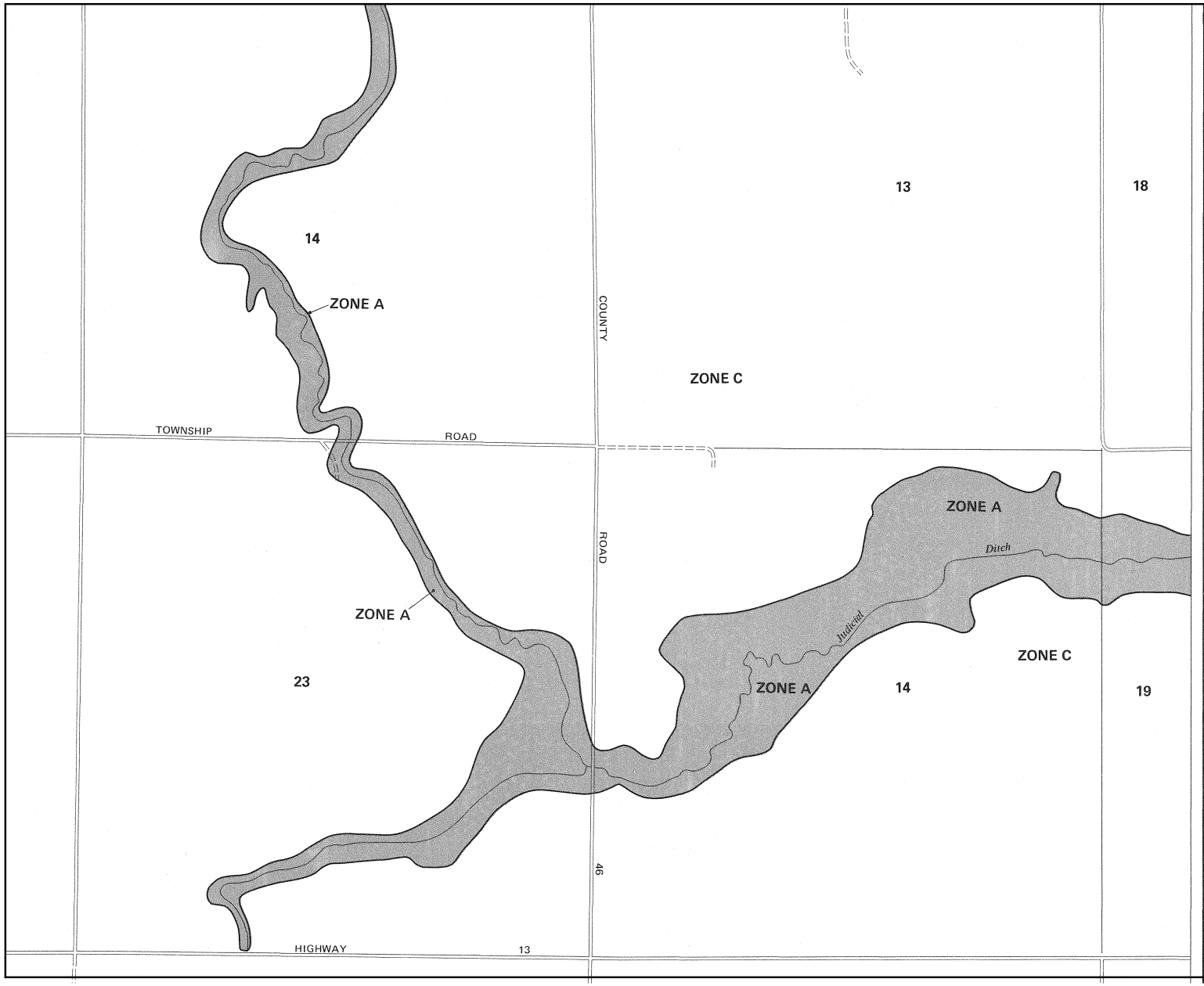
APPENDIX E
FEMA Flood Insurance Maps



APPROXIMATE SCALE
1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

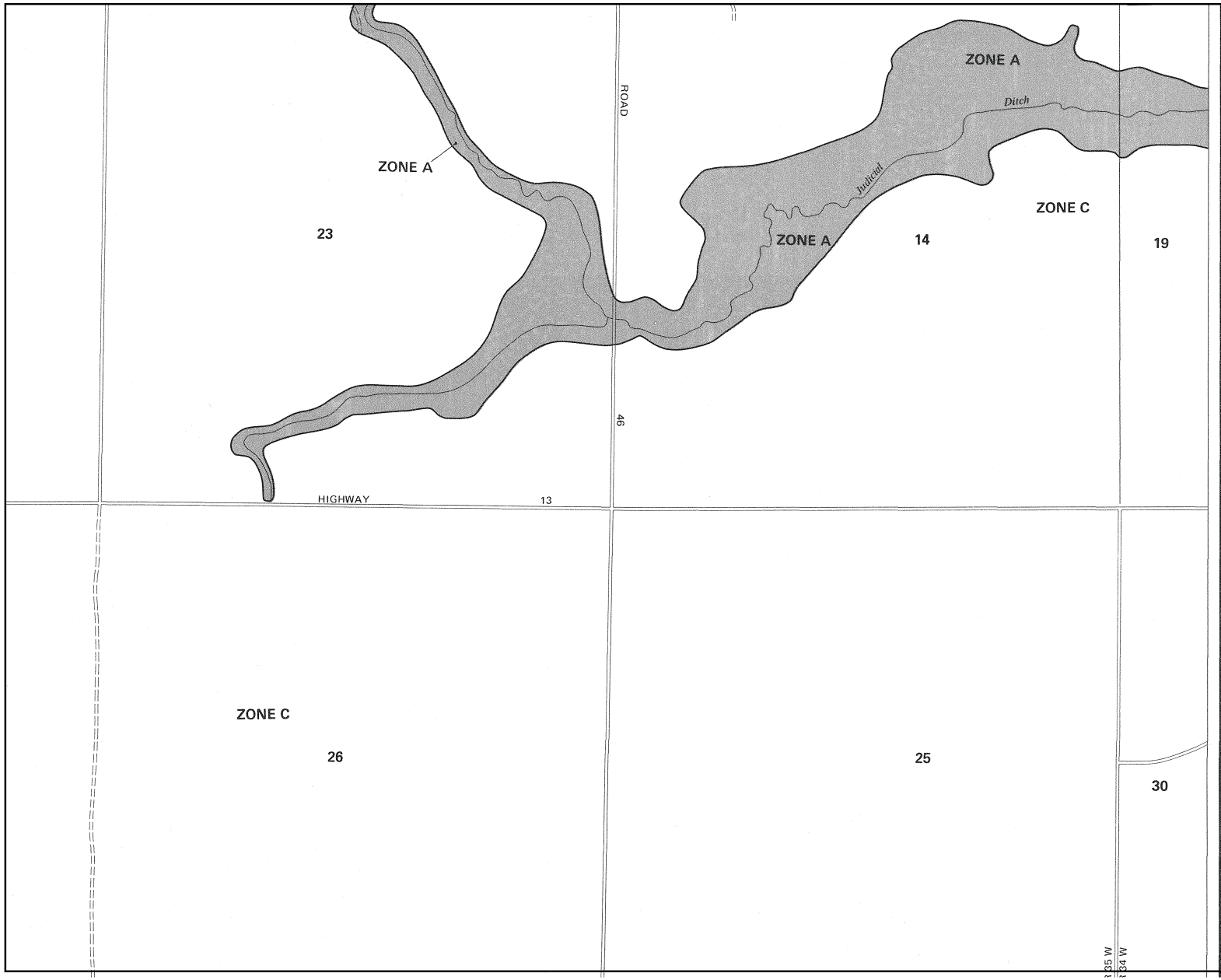
COUNTY OF
COTTONWOOD,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 185 OF 225

COMMUNITY-PANEL NUMBER
270622 0185 B

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

COUNTY OF
COTTONWOOD,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 185 OF 225

COMMUNITY-PANEL NUMBER
270622 0185 B

EFFECTIVE DATE:
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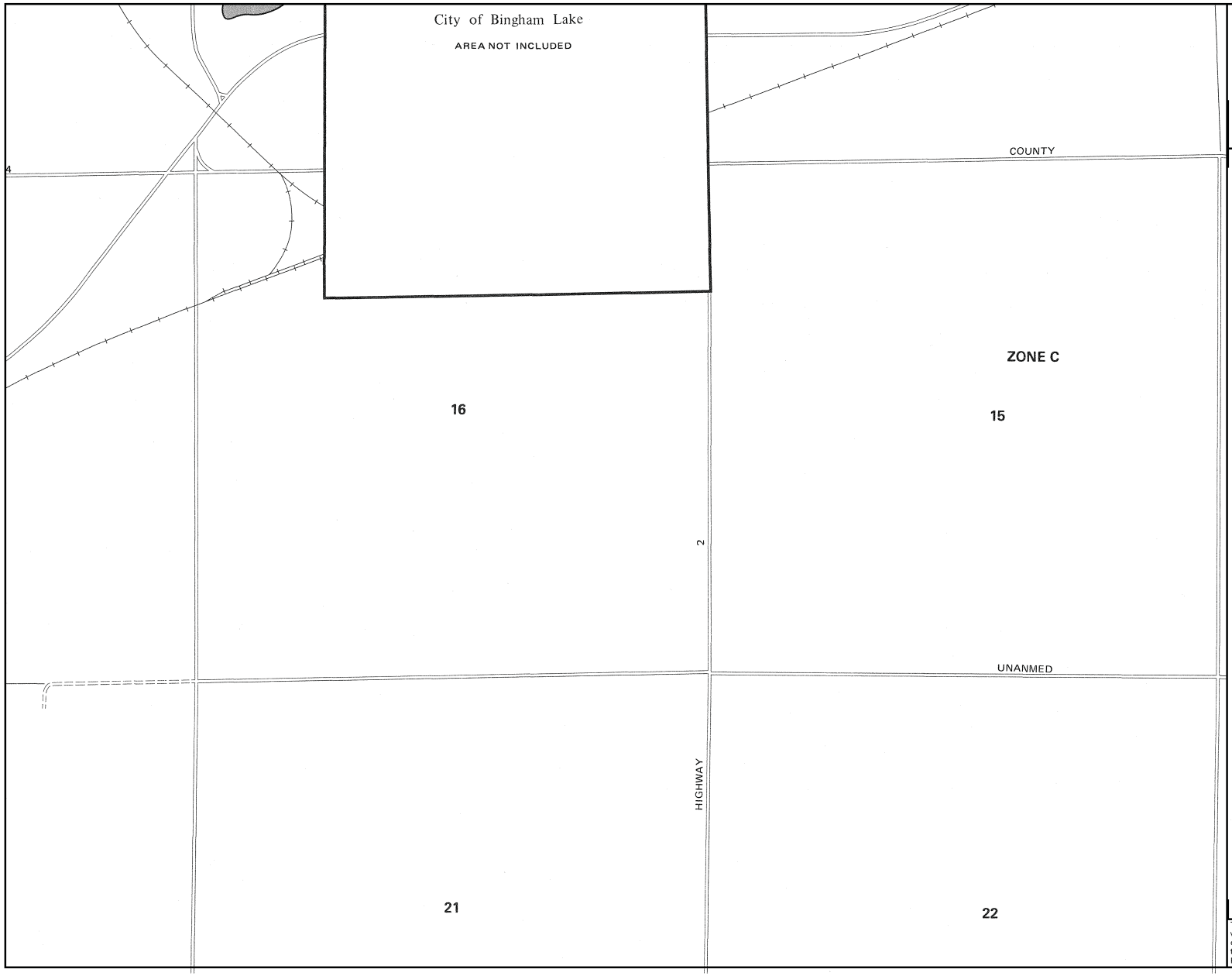
federal emergency management agency
federal insurance administration



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NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

COUNTY OF
COTTONWOOD,
MINNESOTA
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PANEL 185 OF 225

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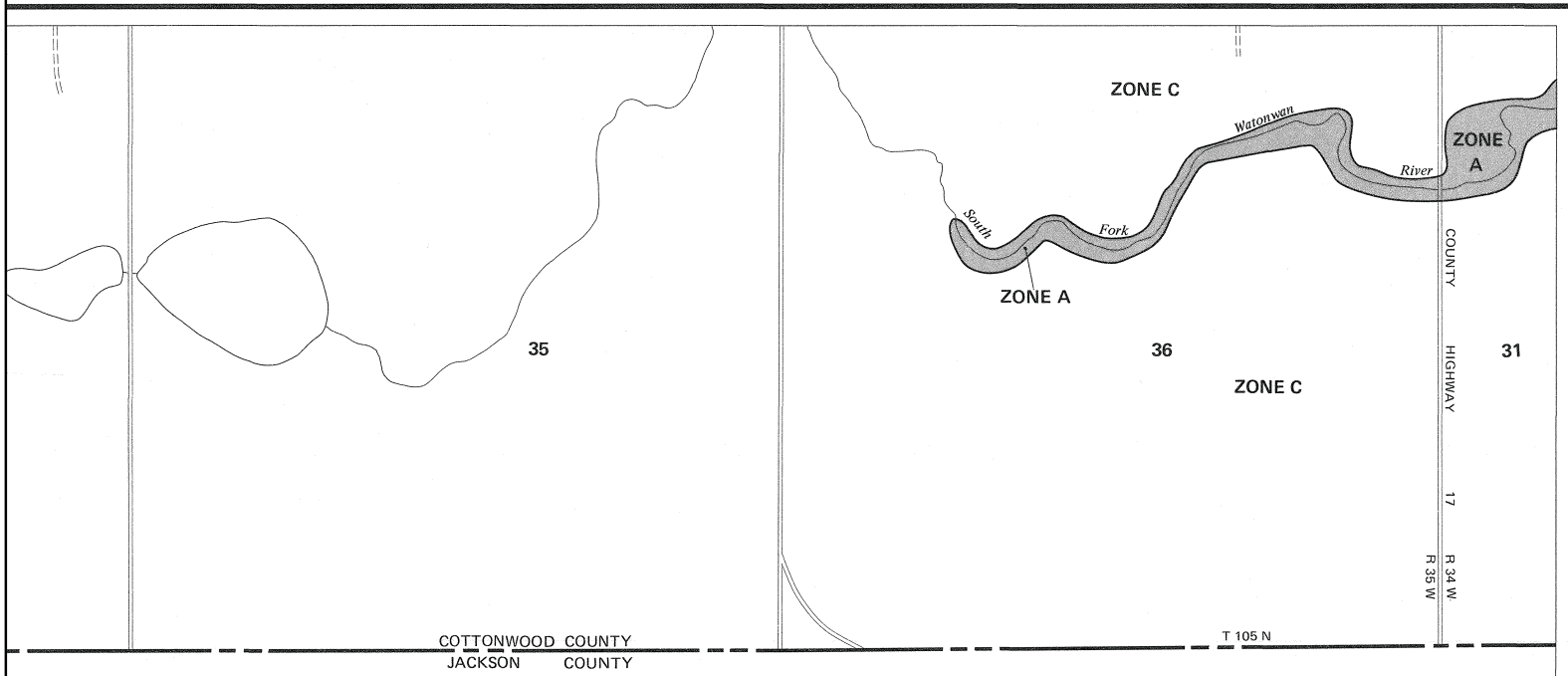


APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

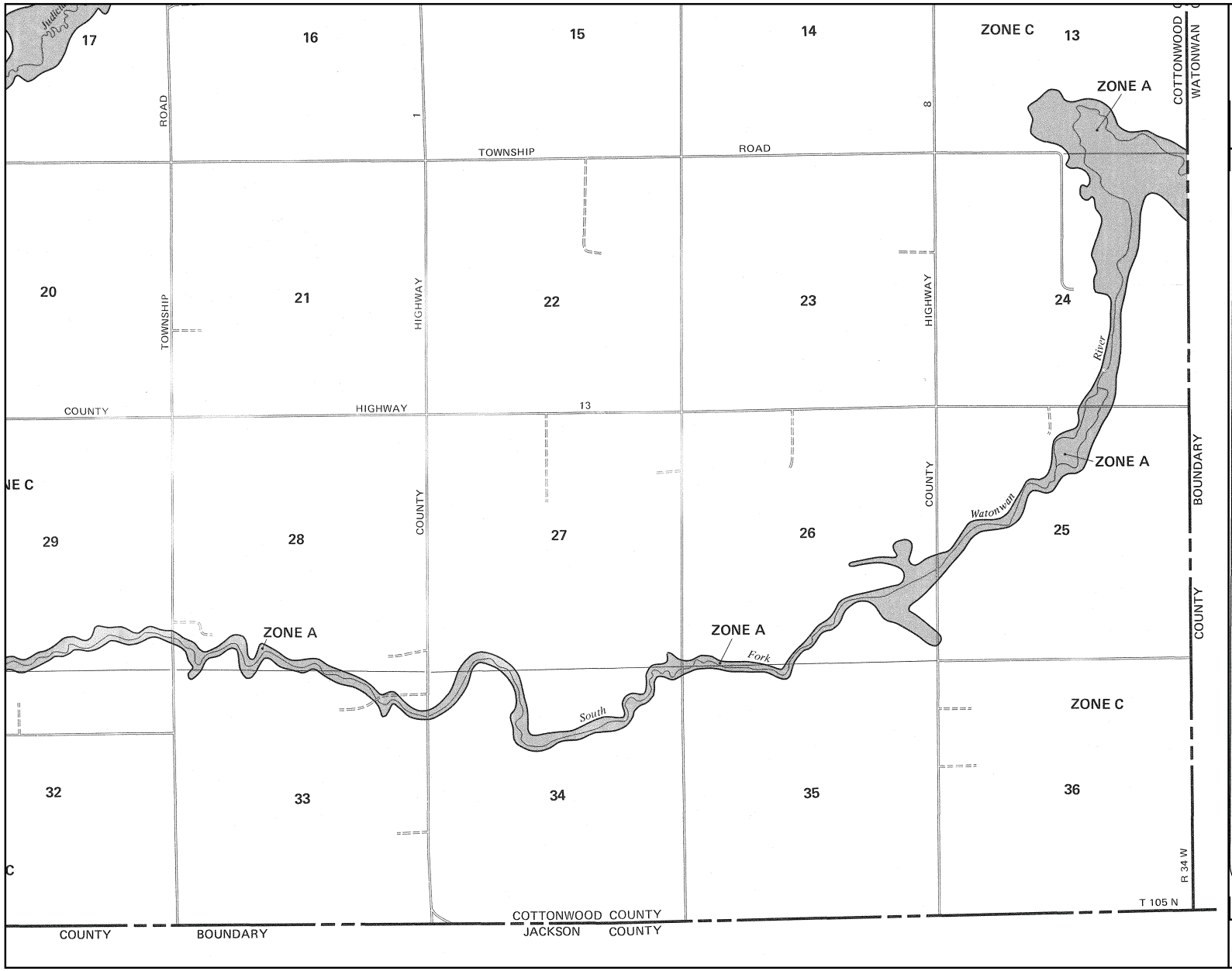
COUNTY OF
COTTONWOOD,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 195 OF 225

COMMUNITY-PANEL NUMBER
270622 0195 B

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



APPROXIMATE SCALE

2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

COUNTY OF
COTTONWOOD,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 225 OF 225

COMMUNITY-PANEL NUMBER
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EFFECTIVE DATE:
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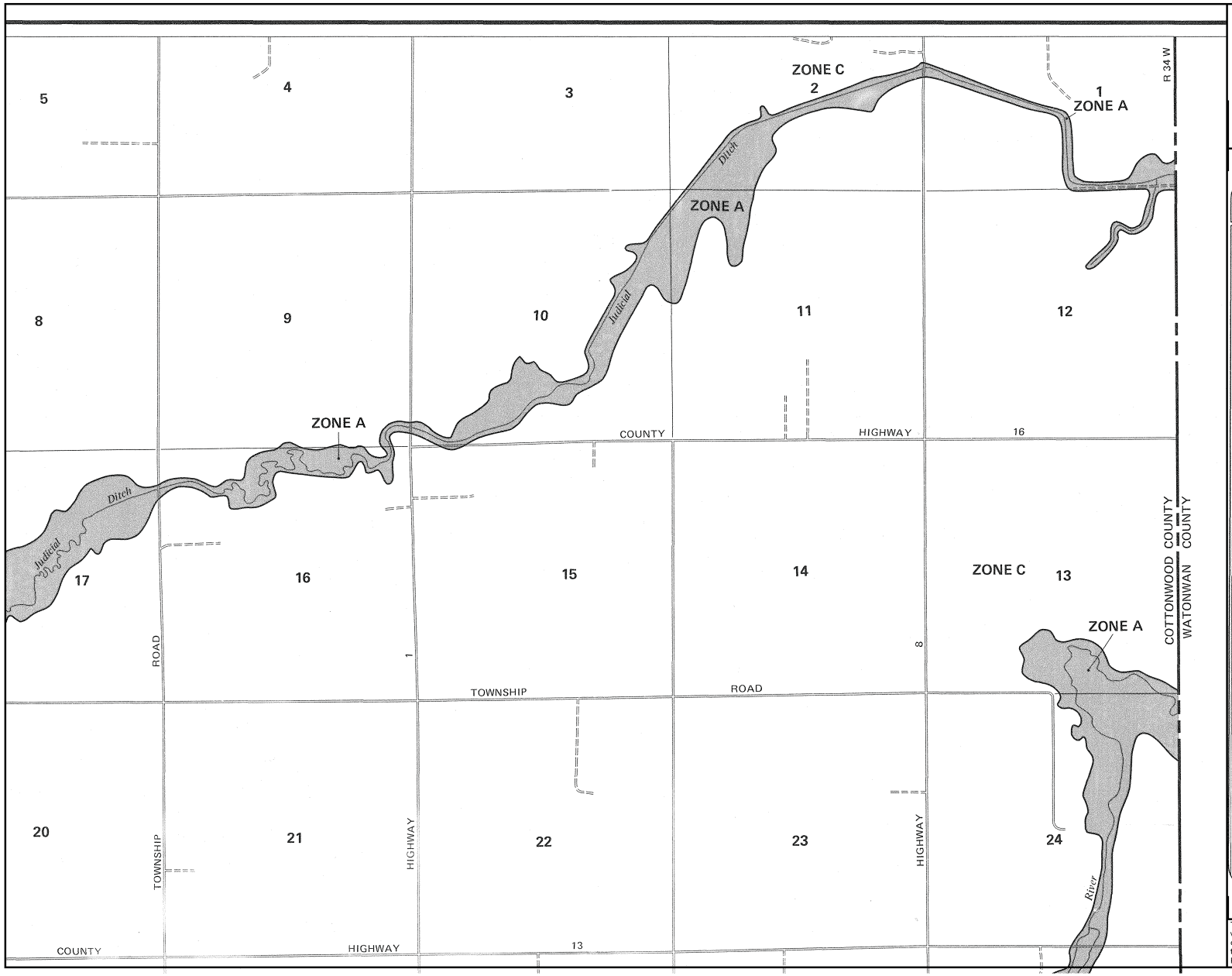

APPROXIMATE SCALE

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NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

COUNTY OF
COTTONWOOD,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 225 OF 225

COMMUNITY-PANEL NUMBER
270622 0225 B

EFFECTIVE DATE:
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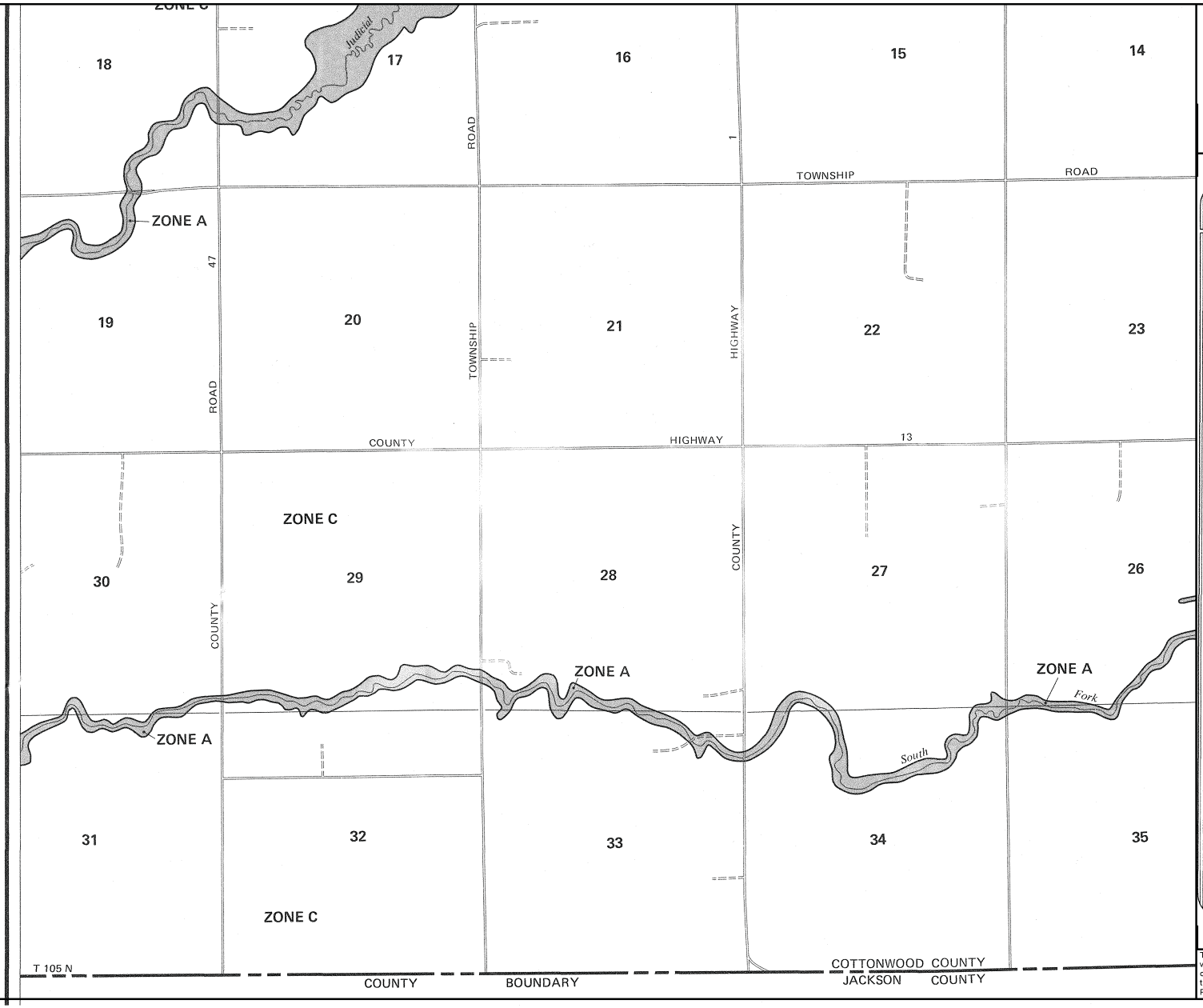
federal insurance administration



N

APPROXIMATE SCALE

2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

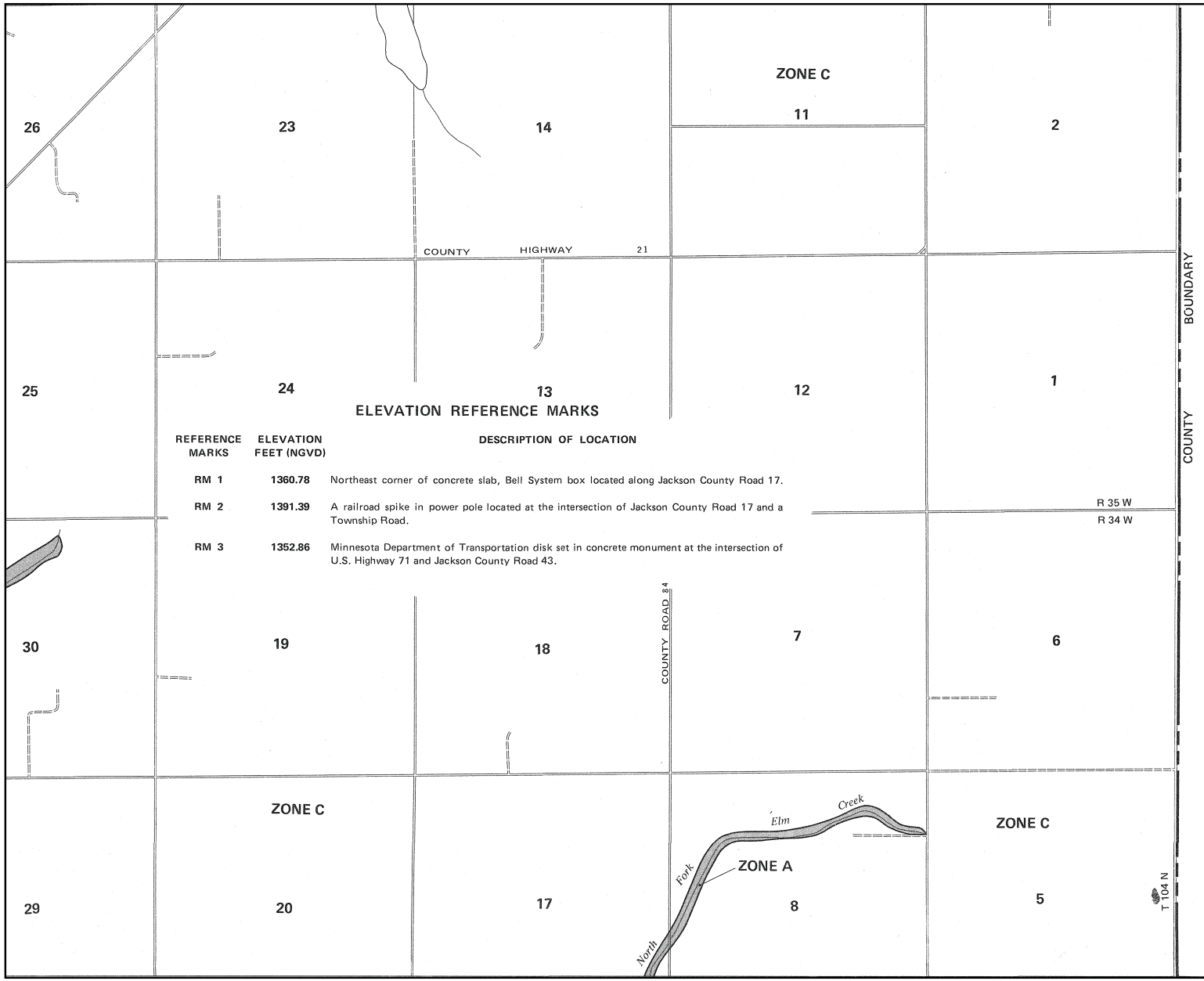
COUNTY OF
COTTONWOOD,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 225 OF 225

COMMUNITY-PANEL NUMBER
270622 0225 B

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



ELEVATION REFERENCE MARKS

REFERENCE MARKS	ELEVATION FEET (NGVD)	DESCRIPTION OF LOCATION
RM 1	1360.78	Northeast corner of concrete slab, Bell System box located along Jackson County Road 17.
RM 2	1391.39	A railroad spike in power pole located at the intersection of Jackson County Road 17 and a Township Road.
RM 3	1352.86	Minnesota Department of Transportation disk set in concrete monument at the intersection of U.S. Highway 71 and Jackson County Road 43.

APPROXIMATE SCALE
2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

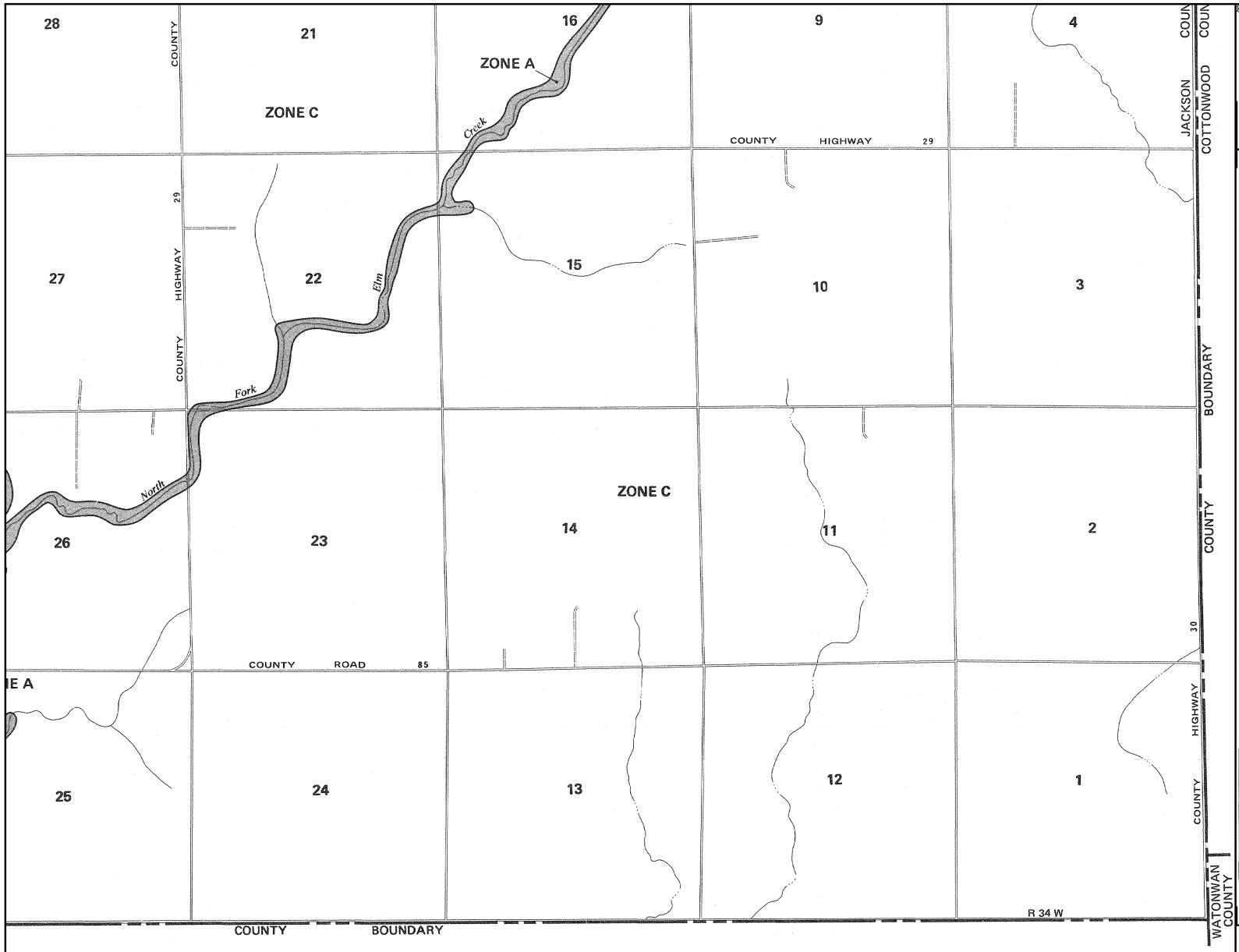
COUNTY OF
JACKSON,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 150 OF 200

COMMUNITY-PANEL NUMBER
270632 0150 B

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



gram, at (800) 638-6620, or (800) 424-8872.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

COUNTY OF
JACKSON,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 200 OF 200

COMMUNITY-PANEL NUMBER
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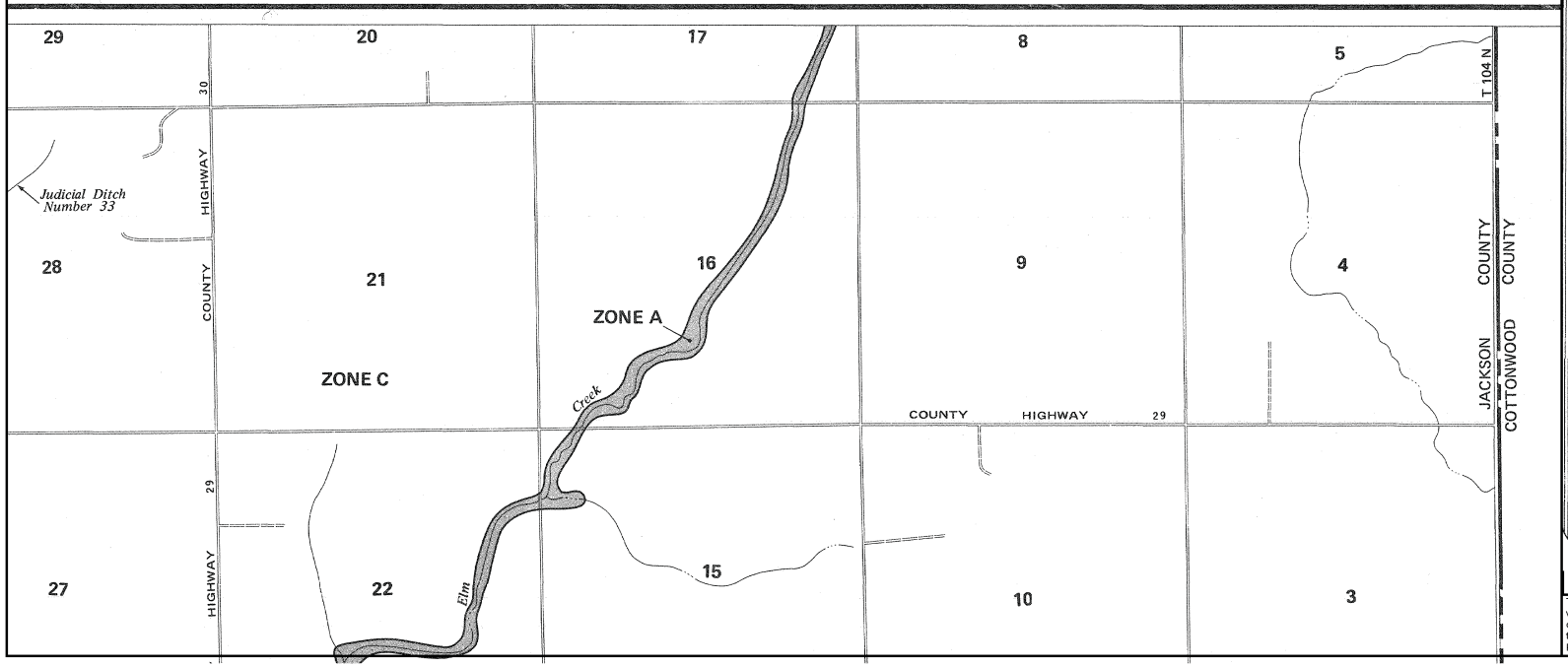
federal insurance administration



APPROXIMATE SCALE

2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

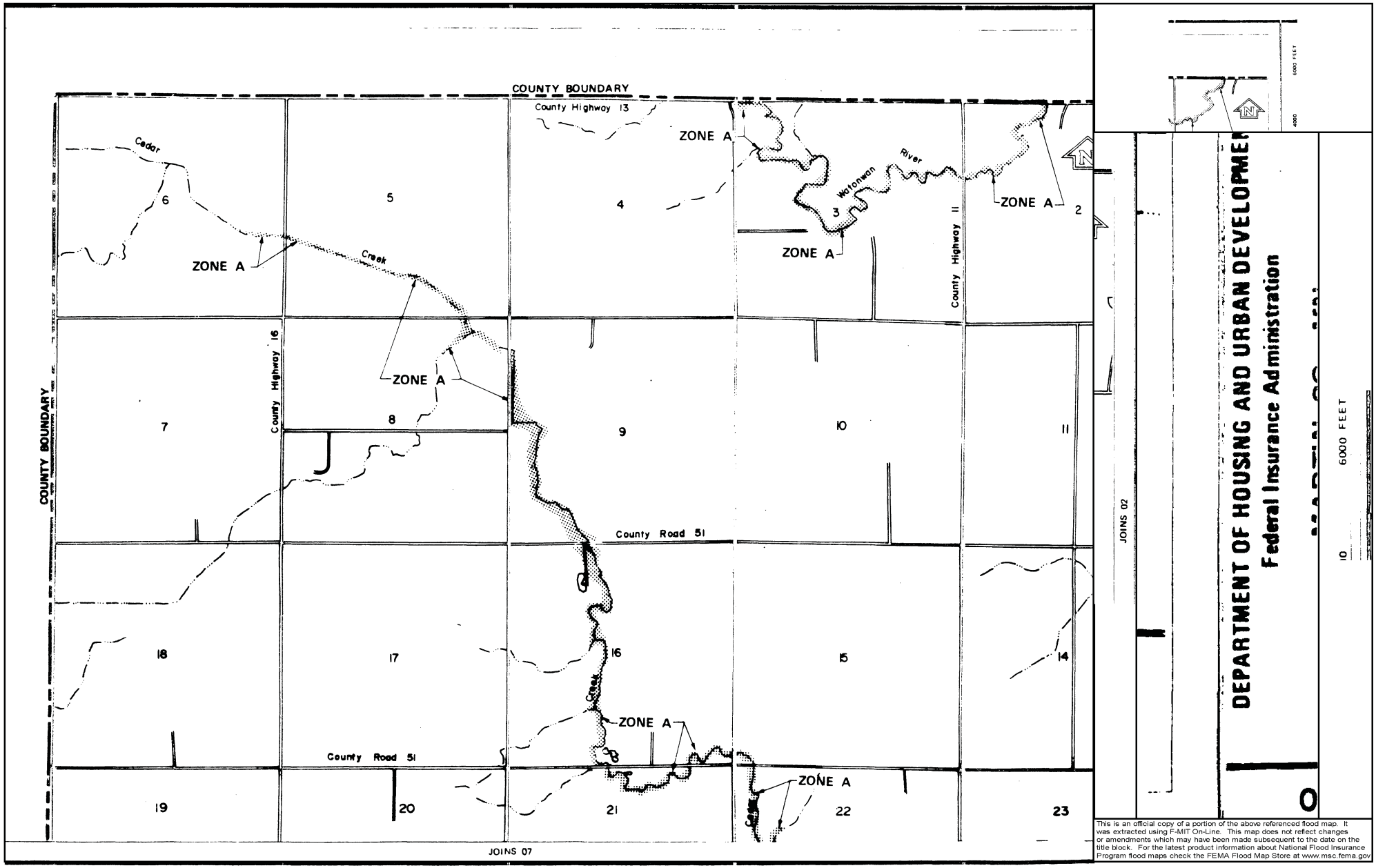
COUNTY OF
JACKSON,
MINNESOTA
(UNINCORPORATED AREAS)

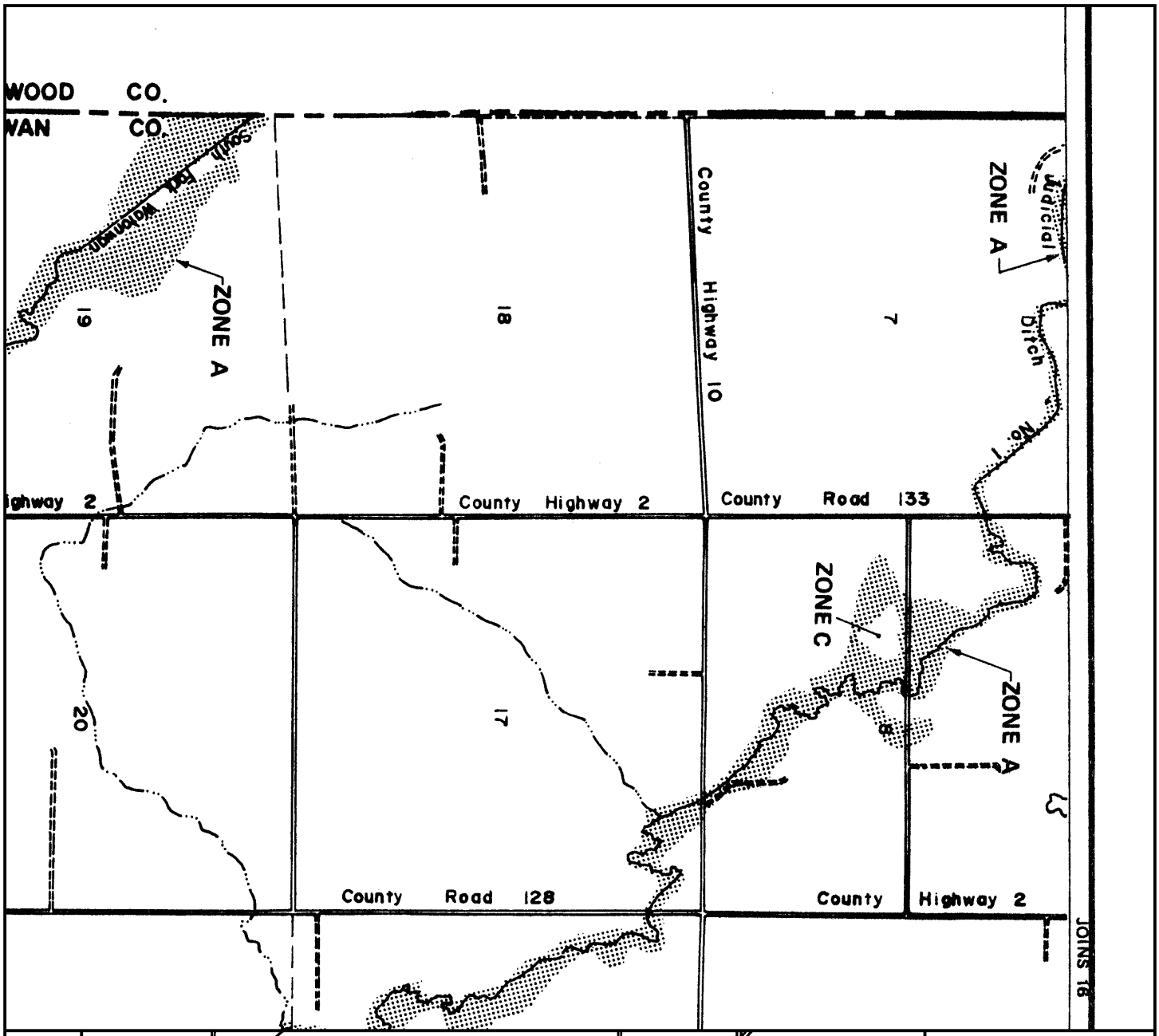
PANEL 200 OF 200

COMMUNITY-PANEL NUMBER
270632 0200 B

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration





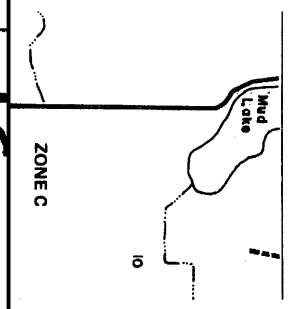
APPROXIMATE SCALE

FEDERAL EMERGENCY MANAGEMENT AGENCY

WATONWAN COUNTY, MN

6000 FEET

EFFECTIVE DATE:



APPENDIX F
Odell Wind Farm: Wildlife Assessment and Field Studies Report

Odell Wind Farm: Wildlife Assessment and Field Studies Interim Report

COTTONWOOD, JACKSON, MARTIN AND WATONWAN COUNTIES, MINNESOTA

Submitted to:
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Odell Wind Farm, LLC
c/o Geronimo Wind Energy, LLC
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Edina, MN, 55435

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September 24, 2013

Applied Ecological Services, Inc.

12-0974

Revision Number	Document Date	Comments	Reviser Initials
1	7/3/2013	Initial draft	HCK, MM, MS, KAC
2	7/9/2013	Revised	HCK, KAC
3	8/16/2013	Revised	PS
4	8/21/2013	Revised	KAC, DMK
5	9/24/2013	Revised	CB, KAC, DMK

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EXECUTIVE SUMMARY

Odell Wind Farm LLC (Odell) retained Applied Ecological Services, Inc. (AES) to assess the potential impacts on wildlife in a 54 square mile evaluation area for a proposed wind energy development project in Cottonwood, Jackson, Watonwan and Martin Counties, southwestern Minnesota. The actual project footprint is smaller than 54 square miles. For convenience, the evaluation area will be called the Odell site in this report.

The site is located in the Prairie Parkland Province and the Minnesota River Prairie subsection. While historically the surrounding landscape was prairie and wet prairie with scattered oak openings, oak barrens and river bottom forest, today 90% of the site is in cropland. Remaining natural habitats are highly fragmented and generally associated with the region's water features. Consequently, wildlife species that required large habitats were replaced by wildlife species adapted to agriculture and development.

This study was designed to comply with federal, state and local requirements and guidance for wind energy development. These include the U.S. and Minnesota Endangered Species Acts, the Bald and Golden Eagle Protection Act (BGEPA), and the Migratory Bird Treaty Act (MBTA). In addition, the 2012 U.S. Fish and Wildlife Service (USFWS) wind turbine guidelines were consulted. Communications with the USFWS and the Minnesota Department of Natural Resources (MNDNR) identified potential species of concern at the project site.

Standard field methods for studying migratory small birds (e.g. passerines), migrating large birds, breeding birds, and migrating bats were used. These methods were acceptable to federal and state agency staff as well as standard in the wind industry. Field surveys began in April 2013 and are expected to continue through November 2013. This report covers Tier 1 and Tier 2 research for the site, as well as Tier 3 surveys conducted during the spring of 2013. Tier 3 surveys will continue through 2013, and report conclusions will be reevaluated at the completion of the survey season.

The topics below are presented from those of greatest to least concern for wind energy development at the Odell site.

Migratory Bats. Bat acoustic monitoring during the spring migratory period identified three species of bats at the site: Big Brown Bat *(Eptesicus fuscus)*, Hoary Bat (*Lasiurus cinereus)*, and Eastern Red Bat (*Lasiurus borealis*). The Hoary Bat and Eastern Red Bed are migratory forest bats which have experienced significant mortality at other wind energy facilities. Overall bat activity was low during this period (1.7 calls per detector-night), although bat activity is typically lower during the spring migratory and breeding periods than during the fall migration. Activity levels during the fall migratory period will be analyzed following additional data collection. No bats in the region are currently protected under the federal Endangered Species Act. Northern Long-eared Bat (*Myotis septentrionalis*), Tri-colored Bat (*Perimyotis subflavus*), Little Brown Bat (*Myotis lucifugus*) (three species that are potentially present at the site) and Big Brown Bat (present at the site) are listed as state special concern species.

Minnesota County Biological Survey Sites of Moderate Significance. There is a prairie wetland complex in the northeastern portion of the site that is identified as having high biological significance. This location has known records for the state special concern Phlox Moth (*Schinia indiana)* and the state threatened Sullivant's Milkweed (*Asclepias sullivantii*). There are four additional sites of moderate significance, and one site considered below statewide significance. Turbines should be sited away from these sites of high or moderate significance to avoid impacts during construction and operations.

Henslow's Sparrow. The state endangered Henslow's Sparrow (*Ammodramus henslowii)* was documented in 2007 at the southern end of the Bennett WMA along the site's northern boundary. Direct impacts to the Henslow sparrow is likely to be low because its flight behavior is likely to not involve flights in the rotar swept area. However, habitat displacement effects on this species due to turbines is not known. This species could be present in the site's larger grasslands. A buffer of large grassland habitat patches would likely reduce the potential for direct and indirect impacts.

Migratory Passerine Birds. The spring and fall migrations are typically the greatest period of avian mortality at wind energy developments, with passerines constituting a large percentage of total mortality, and migratory passerines comprising a large percentage of passerine mortality (NRCNA 2007, Westwood Professional Services 2013). Migratory passerine diversity and abundance at the site during the spring migration was typical of Midwestern agricultural sites, and therefore passerine mortality is expected to be similar to that reported at other Midwestern wind energy developments sited primarily in agricultural lands (i.e., 0.4-11.8 birds per turbine per year; Stantec Consulting Services, Inc. 2012).

Breeding Bird Collision. Habitat cover at the Odell site is 91.4% cropland, 4.7% developed, and 3.0% grassland, with small amounts of barren land, upland forest, emergent wetland and open water. Sensitive bird species, which are experiencing population declines in the region, represent 39% of the bird species at the site. In general, cropland tended to have fewer sensitive and native bird species than grasslands and riparian/grassland areas, although the differences were not significant. The complex vegetation structure of grasslands and riparian areas may contribute to the trend toward higher sensitive and native bird richness and abundance in these grassland and riparian habitats.

Given that bird species composition in cropland at the Odell site is similar to that in other Midwestern wind energy projects, the expected mortality of native and sensitive species is likely to be similar. The most abundant species in cropland were Red-winged Blackbird (*Agelaius phoeniceus*), Common Grackle (*Quiscalus quiscula*), Brown-headed Cowbird (*Molothrus ater*), American Goldfinch (*Carduelis tristis)* and Horned Lark (*Eremophila alpestris*). These species comprised 62% of all individual birds observed in cropland. Of these, Horned Lark is known to be killed at wind energy projects at western and Midwestern sites at a higher rate than other passerine species due to its flight behavior (CEIWEP 2007), although this pattern has not held true for some eastern sites (Stantec Consulting Services, Inc. 2012).

Waterfowl and Waterbird Collision. Southwestern Minnesota is known for high levels of waterfowl activity, particularly during migration. Activity at the site was high, particularly along the site's western and northern boundaries. Large mixed flocks of geese and ducks were observed moving in these areas. Collision risk is low for these species (NRCNA 2007) because observations indicate that waterfowl and waterbirds can see and avoid turbines (Madsen and Boertmann 2008). However, due to the high activity levels in the northwestern corner of the site, care should be used to site turbines away from the highest areas of waterfowl activity.

Trumpeter Swan, Franklin's Gull, American White Pelican. Three birds with state status were observed during the spring surveys. Trumpeter Swan (*Cygnus buccinator*), Franklin's Gull *(Leucophaeus pipixcan*) and American White Pelican (*Pelecanus erythrorhynchos*) are state special concern species. Trumpeter's Swan was observed near a wetland on the site's western boundary. Franklin's Gull was observed in significant numbers throughout the site during the second visit in the spring raptor and large bird survey. Two American White Pelican flocks were observed crossing the site during the spring raptor and large bird surveys. Collision risk for all of these species is relatively low as they are likely to be able to see and avoid turbines, and waterfowl/waterbird mortality has been low for most wind facilities (NRCNA 2007, Westwood Professional Services 2013).

Regionally Sensitive Species (SGCN Bird Species). Seven Minnesota River Prairie Species of Greatest Conservation Need (SGCN) bird species were observed at the site. These are in addition to the three SGCN species with state status described above. SGCN species are considered vulnerable, declining or rare. None of these species was common at the site. Bobolink (*Dolichonyx oryzivorus*) and Northern Harrier (*Circus cyaneus***)** were the most frequently observed species. Northern Harrier typically has low reported mortality at wind facilities likely due to its low-altitude flight behavior (Smallwood et al. 2009). Bobolink was primarily observed in grassland habitat. Of the remaining SGCN species only Upland Sandpiper (*Bartramia longicauda*) was observed in cropland habitat, and mortality for sandpipers from wind energy projects is typically low (NRCNA 2007).

Northern Long-eared Bat. The USFWS Service is studying the status of Northern Long-eared Bat. This species has experienced steep population declines as a result of White-nose Syndrome. A decision of whether

or not the listing of species under the Endangered Species Act is warranted is expected by the end of 2013. Northern long-eared Bat typically breeds in large forest patches. As this habitat is not present in the site, presence during the breeding season is unlikely. The bat could be present at the site during the spring and fall migratory periods. If Northern Long-eared Bat is listed, the implications should be discussed with the USFWS.

Prairie Bush Clover and Poweshiek Skipperling. The federal and state threatened Prairie Bush Clover (*Lespedeza leptostachya*) and the federal candidate/state endangered Poweshiek Skipperling (*Oarisma Poweshiek*) are considered in range in the counties surrounding the site. There are no known records for either species within the site. These species are both dependent upon prairie remnant habitat, and potential impacts can be avoided by siting turbines away from prairie remnants.

Phlox Moth and Sullivant's Milkweed. Phlox Moth is listed as state special concern and Sullivant's Milkweed is state threatened. Records for both of these species are known from a high quality prairie remnant in the northeastern corner of the site. Additional prairie remnants occur in the site and could contain these or other rare prairie features. Impacts to these species are not expected, if impacts to prairie remnants are avoided during construction and operations.

Grassland Bird and Waterfowl Habitat Displacement. Savannah Sparrow (*Passerculus sandwichensis*), Horned Lark , Vesper Sparrow (*Pooecetes gramineus*), Bobolink, Western Meadowlark (*Sturnella neglecta)*, Upland Sandpiper, Northern Harrier and other grassland species constitute a group of birds that has experienced a long term population decline in the eastern United States (Sauer et al. 2008). These species are not protected under state or federal endangered species laws. Grasslands at the site are concentrated along the site's riparian corridors. In addition there are three moderate sized grasslands in the northeastern corner of the site. Habitat displacement—resulting in lower breeding density and fewer individuals near wind turbines—is a concern for grassland birds, and grassland habitat should be considered when siting turbines.

Waterfowl utilize the site for foraging during the spring migration. In some studies waterfowl have been shown to avoid foraging near turbines. However, habituation to the presence of turbines through time is possible, and large acres of agricultural fields for foraging remain outside of the proposed wind facility.

Bald Eagle. The Bald Eagle (*Haliaeetus leucocephalus*) is protected under the BGEPA and MBTA. There is one known nest within ten miles of the site. This nest is located approximately 3.5 miles west of the site along the Des Moines River. This nest was confirmed occupied on April 29, 2013; however since that time no activity has been observed at the nest. No other Bald Eagle nests have been identified within the site or within two miles of the site boundary, and no other known nests are known to the USFWS or MNDNR.

Bald Eagles associated with this nest are likely to forage along the Des Moines River and associated nearby bodies of water.

Nesting and foraging habitat for Bald Eagles at the site is typically poor with few areas with mature trees and open water. While it is possible that Bald Eagles may establish additional nesting territories within ten miles of the site at some point in the future, it is unlikely that Bald Eagle will nest within the site itself due to the poor potential habitat at the site. During the spring surveys three observations of Bald Eagles were made. Nonetheless, collision risk to Bald Eagles at the site is predicted to be low.

Raptor Collision. There are no known raptor migration routes near the site. Raptors were observed in low numbers during the spring migration at rates much lower than at significant migration sites (Ritter et al. 2012). Raptor activity was primarily of three species, Northern Harrier (56%), Red-tailed Hawk (*Buteo jamaicensis*) (16%) and Turkey Vulture (*Cathartes aura*) (15%). Due to the low activity level compared to known raptor migration routes, it is likely that this site is not on a raptor migration route and that raptor mortality rates during migration and in the breeding season will be minimal.

ACKNOWLEDGMENTS

Several individuals warrant our thanks for their contributions to this study. Margaret Rheude (Twin Cities Field Office, USFWS), and Kevin Mixon (MNDNR) reviewed site data, and provided guidance on survey methods. Lisa Joyal provided the review of Natural Heritage Information Systems data. The team also thanks landowners who allowed access to their property for bat acoustic monitoring. Allison Harwood (WSB) and Ry Thompson (AES) assisted with field work.

1. INTRODUCTION

Odell Wind Farm LLC (Odell) retained Applied Ecological Services, Inc. (AES) to assess the potential impacts on wildlife in a 54 square mile evaluation area for a proposed wind energy development project in Cottonwood, Jackson, Watonwan and Martin Counties, southwestern Minnesota (Map Exhibit 1). The actual project footprint is smaller than 54 square miles. For convenience in this report, the evaluation area will be called the Odell site, or site.

The purpose of these surveys is to assess potential biological impacts from the proposed wind facility and to provide data to identify opportunities for wind turbine siting that would reduce potential biological impacts from the proposed Odell project. As part of this process, AES followed U.S. Fish and Wildlife Service (USFWS) land-based wind energy guidelines (USFWS 2012a) and conducted Tier 1 and Tier 2 site characterization studies, which included analyzing available data in the literature and soliciting information from expert sources. Where warranted, AES began conducting USFWS Tier 3 field studies in the spring of 2013 to obtain additional data. Tier 3 field studies will continue through 2013 and a final report will analyze data from all surveys. This report summarizes the results of the Tier 1 and Tier 2 site characterization studies, and the initial Tier 3 surveys conducted during the spring 2013 migration. The Tier 3 surveys conducted include spring raptor and large bird migration, spring passerine migration, and spring migration bat acoustic monitoring. This report summarizes methods and results from the completed biological surveys and discusses the implications of these surveys for the development of the wind energy site.

1.1 Project Description

The site is located in cropland, between several existing wind facilities to the south and east of the site. AES focused its field surveys and data requests on the site and a study area that included a 2-mile buffer of the site.

Design specifications for the wind turbines have not been completed. Turbines may be 1-2 MW, with tower hub heights of approximately 80-112 m and rotors of 35 to 60 m in length. The rotor-swept area (RSA) will likely begin 30-62 m from the ground and extend to a height of 115-172 m above the ground.

1.2 Wildlife and Habitat Near the Odell Site

The Odell site is located in the Prairie Parkland Province in the Minnesota River Prairie subsection (MNDNR 2006). Prior to agricultural clearing, the Odell site and the surrounding landscape were covered in prairie and wet prairie with oak openings and barrens on fire-protected uplands, and river bottom forest along protected waterways (Marschner 1974). The most recent glacial period left the region pocked with small wetlands and kettlehole lakes.

Today approximately 90% of the former natural lands support agriculture. Remaining natural lands are highly fragmented and generally associated with the region's water features. Near the site, these water features include the Des Moines River, 4-5 miles west of the site, the judicial ditch just north of the site and the South Fork of the Watonwan River, which flows through the site. Small remnant prairies occur in the area along railroad right-of-ways and in a few scattered isolated patches. Within the cropland complex small natural patches include grasslands along drainage ditches, fence rows, and woodlots and wind breaks associated with farmsteads.

Many of the larger remaining natural areas are protected through ownership or easement. Protected areas near the site include Kilen Wood's State Park six miles to the southwest along the Des Moines River, Banks Wildlife Management Area (WMA) immediately west of the site, Bennett WMA, Regehr WMA and Sulem Lake WMA located north of the site, Fish Lake & Thompson State Wildlife Refuge and Laurs Lake WMA located west of the site, and Fossum WMA located east of the site. Along many of the riparian corridors land is protected as grassland as part of the Reinvest in Minnesota (RIM) program (Map Exhibit 1).

A small fraction of the area is developed. Windom, located approximately 3 miles west of the site, is the largest nearby community. Mountain Lake and Bingham Lake are located to the north. Bergen is located

near the site's southwest corner. Other development is found at individual farmsteads. Land cover at the site follows these general patterns, and a more detailed discussion of land cover at the site can be found in section 2.2.

In the early 1800s, the county's abundant wildlife included large herds of Bison (*Bison bison*) and American Elk (*Cervus canadensis*). The numerous wetlands provided habitat for large numbers of waterfowl and waterbirds, including Trumpeter Swan (*Cygnus buccinator*), Canada Goose (*Branta canadensis*), Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Canvasback (*Aythya valisineria*), Blue-winged Teal (*Anas discors*), Gadwall (*Anas strepera*), Redhead (*Aythya americana*), Northern Shoveler (*Anas clypeata*), Wilson's Snipe (*Gallinago delicate*), American Bittern (*Botaurus lentiginosus*), Sora (*Porzana carolina*), Virginia Rail (*Rallus limicola*) and Western Grebe (*Aechmophorus occidentalis*). In upland grassland, birds such as Marbled Godwit (*Limosa fedoa*), Upland Sandpiper (*Bartramia longicauda*), Bobolink (*Dolichonyx oryzivorus*), Western Meadowlark (*Sturnella neglecta*), and Greater Prairie Chicken (*Tympanuchus cupido*) thrived (MNDNR 2006).

With the plowing of the prairie and the draining of wetlands the large herds of ungulates have been eliminated, and many of the other formerly conspicuous wildlife is now rare. There are 116 Species in Greatest Conservation Need (SGCN) that are known or predicted to occur in the subsection, which represent 40% of the SGCN species identified for the state (MNDNR 2006). These are species that are rare, declining, or vulnerable or dependent upon habitats that are rare, declining or vulnerable. Habitat loss and degradation is a problem for nearly 90% of SGCN identified for the subsection (MNDNR 2006). In order to persist, these rare species generally require expansive habitat, many large habitat patches near each other, or high quality habitat. While large habitat and high quality habitat is generally lacking from the site, protected areas around the site do provide potential habitat for some of these SGCN species.

In general, however, the wildlife encountered near the Odell site is adapted to agriculture and development. Commonly encountered wildlife species include White-tailed Deer (*Odocoileus virginanus*), Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), Mallard (*Anas platyrhynchos*), Canada Goose (*Branta canadensis*), Red-winged Blackbird (*Agelaius phoeniceus*), Common Grackle (*Quiscalus quisculua*), Common Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*), and the introduced House Sparrow (*Passer domesticus*), House Finch (*Carpodacus mexicanus*), Rock Pigeon (*Columa livia*), Ring-necked Pheasant (*Phasianus colchicus*) and European Starling (*Sturnus vulgaris*). The agricultural landscape and developments of the region have determined the type of wildlife present, supporting chiefly those that can adapt to intensive human land use.

1.3 Agency Consultation

Construction and operation of wind energy facilities will likely cause some impacts to legally protected wildlife, habitat or plants during construction and operation. Therefore, consultation with the USFWS and MNDNR is scheduled early in the development of a wind energy project. State and federal agencies may exercise flexibility with corporations that have demonstrated transparency and good faith efforts to reduce and minimize impacts from wind energy projects. In addition, the agencies may be willing to reconsider their own recommendations if well-documented data are presented to suggest those recommendations should be modified.

NHIS review and records of rare species have been obtained several times during the development of this project. On September 30, 2008 Geronimo Wind Energy requested NHIS review for the North Star Wind Farm. This project encompassed a similar boundary to the Odell Wind Farm. A response was received on November 17, 2008. On June 11, 2009 Geronimo Wind Energy requested NHIS review for the Odell wind project. The boundary has expanded since the date of this request. A response was received on August 26, 2009. Most recently, on April 8, 2013 AES requested a NHIS review for the current site boundary. A response to this request was received on June 24, 2013. Results of these requests are discussed in section 2.3.1 below.

Additional communications with the MNDNR have included a letter dated October 28, 2009 from Kevin Mixon in which the MNDNR provided a preliminary review of the Odell project, and a conference call on April 28, 2013 with Kevin Mixon to review proposed wildlife surveys. A comment letter was received from

Kevin Mixon on June 24, 2013. In this letter Mr. Mixon stated that initial assessment suggests the site is a low risk site, but that wildlife survey data will need to be reviewed prior to assessing the potential for risks at the site.

Existing data on Bald Eagle nest locations was requested from the USFWS on March 28, 2013, and a response was received on May 16, 2013. A teleconference occurred on May 13, 2013 with Margaret Rheude (USFWS) to discuss potential impacts to Bald Eagles at the site and proposed survey methods. Margaret Rheude responded with eagle recommendations via e-mail on May 16, 2013.

Copies of communications can be found in Appendix 1.

2. TIER 2 – SITE CHARACTERIZATION

2.1 Known Species of Concern

The site has the potential to support known species of concern. These species are two plants listed as state-threatened, a bird listed as state-threatened (Table 1), and birds protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

2.1.1 Natural Features Inventory Data

The Minnesota NHIS database request (Table 1, Appendix 1) in 2008 reported records for Sullivant's Milkweed and Prairie Bush Clover near the site. The records for Sullivant's Milkweed and Prairie Bush Clover were associated with railroad prairies approximately 2 miles northwest of the site. In 2009 the NHIS search identified records for Phlox Moth and Sullivant's Milkweed associated with a mesic prairie remnant in the northeastern corner of the site. A 2013 search also identified the Phlox Moth and Sullivant's Milkweed records from the mesic prairie remnant. One new species was identified in 2013, Henslow's Sparrow from a grassland at the south end of the Bennett WMA along the site's northern boundary (Appendix 1).

Impacts to these plant and insect species can be avoided if appropriate setbacks from native plant communities are used. Potential impacts to Henslow's Sparrow are discussed below.

Table 1. Species of concern identified by NHIS data requests

Scientific Name	Common Name	Federal Status[1]	MN State Status[2]	State Rank[6]	Global Rank[3]	Habitat(s)	Likelihood of Presence in the Site[4,5]
Bird							
Ammodramus henslowii	Henslow's Sparrow		SE	S1B	G4	grassland	possible
Invertebrate Animal							
Schinia indiana	Phlox Moth		SPC	S3	G2G4	grassland	Recorded in site
Vascular Plant							
Asclepias sullivantii	Sullivant's Milkweed		ST	S2	G5	grassland	Recorded in site
Lespedeza leptostachya	Prairie Bush Clover	FT	ST	S2	G3	grassland	possible

[1] FE – Federally-Endangered; FT – Federally-Threatened;

[2] SE – State-Endangered; ST– State-Threatened; SPC –State Special Concern, NON– Tracked, but No Legal Status, N/A – Native Plant Communities Have No Legal Status

[3] G1 – Critically Imperiled; G2 – Imperiled; G3 – Rare or Uncommon; G4 – Widespread but with Long-term Concern; G5 – Widespread and Abundant, GNR – Not Ranked

[4] Inferred presences on site based upon habitat and range.

[5] Possible - habitat likely present, in species range for breeding or migration; Low – habitat unlikely, at edge of range; Very Low - habitat absent, or out of range.

[6] S1 =Critically imperiled in Minnesota because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. S2 = Imperiled in Minnesota because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. S3 = Vulnerable in Minnesota either because rare or uncommon, or found in a restricted range, or because of other factors making it vulnerable to extirpation. S4 =Apparently secure in Minnesota, usually widespread. S5 = Demonstrably secure in Minnesota, essentially ineradicable under present conditions. SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, but suspected to be still extant. An element would become SH without the 20-year delay if the only known occurrences in the state were destroyed or if it had been extensively and unsuccessfully looked for. SNR = Rank not yet assessed. B indicates breeding status.

Henslow's Sparrow. There is a 2007 record of a Henslow's Sparrow during the breeding season at the southern edge of the Bennett WMA along the site's northern boundary. Henslow's Sparrow is state endangered. Henslow's Sparrow breeds in grasslands, including fallow fields, pastures, hayfields and meadows with scattered shrubs. It typically requires large grassland habitats of 100 to 250 acres or larger, for nesting (Herkert 1994), and is typically found in damp lowland locations. It has shown a preference for areas with widely scattered shrubs, tall and dense grass cover, and dense standing dead vegetation (Currier 2001). Changes in agricultural land use from hayfields and pasture to specialized crops have been largely responsible for the reduction of available Henslow's Sparrow habitat.

The majority of the site is cropland habitat without significant grasslands. Larger grasslands in and near the site are associated with the Banks and Bennett WMA's along the site's northern border, with two grassland locations in the northeastern portion of the site, and along the South Fork of Watonwan Creek. If the species were present, typical flight heights are well below the RSA, and direct impacts are unlikely. Habitat displacement caused by tall structures, such as wind turbines, is known in grassland bird species, although it has not been documented in Henslow's Sparrow.

No specific Tier 3 studies were considered warranted for these species, although Tier 3 avian surveys are being conducted at the site.

2.1.2 Federally-Listed Species Assumed Present in Cottonwood, Jackson, Watonwan and Martin Counties by USFWS

The USFWS considers the Poweshiek Skipperling (*Oarisma Poweshiek*) and the Prairie Bush Clover (*Lespedeza leptostachya*) to be within possible range at the site. The Poweshiek Skipperling is a federal candidate species and state special concern species that is found in native prairie remnants and the Prairie Bush Clover is a federal and state threatened species typically found in dry prairie sites.

Impacts to these plant and insect species can be avoided if appropriate setbacks from native plant communities are used. No specific Tier 3 surveys were considered warranted for these species.

2.1.3 Bald Eagle

In 2007, the Bald Eagle was delisted from its federally threatened status in the lower 48 states, but it is still federally protected under the Bald and Golden Eagle Protection Act (BGEPA). It was delisted from the Minnesota state list in August 2013.

There is an existing Bald Eagle nest approximately 3.5 miles west of the site along the Des Moines River. The nest was confirmed as occupied on April 29, 2013; however since that date no activity has been observed during repeat visits. Observations of the nest were made on May 13, 14, 15 and June 25 and 26 for a total of 6 hours. No other Bald Eagle nests have been identified within the site or within two miles of the site boundary.

A stick nest survey of this area was conducted from public roads on May 2-3, 2013. During this visit four adult Bald Eagles were observed in the vicinity of Fish Lake approximately one mile west of the site. Records of Bald Eagle nests within 10 miles of the site were requested from the USFWS, and the only known nest

reported within 10 miles of the site is the Des Moines River nest (Appendix 1). No other stick nests were observed during these surveys.

Bald Eagles associate with distinct geographic areas and landscape features, including nest sites, foraging areas, communal roost sites, migration corridors, and migration stopover sites (USFWS 2013). They are typically found in close proximity to water bodies, natural and manmade, due to the presence of fish. They prefer to nest, perch, and roost in old-growth or mature stands of trees, and they usually select a nesting tree that is the tallest among those in its vicinity, to provide visibility. Nesting trees are usually situated near a water body that supports fish, their main preferred prey.

In Minnesota, Bald Eagles typically arrive at their nesting territories between mid-February and mid-March. Nesting pairs are usually faithful to previous nesting sites. Most adult and immature Bald Eagles begin their southward migration by October-November, but many Bald Eagles remain and overwinter in Minnesota.

Existing data suggest that wind energy facilities are not a significant cause of mortality for Bald Eagle. Through 2011, there were five known fatalities of Bald Eagles at wind facilities in North America (Allison 2012). Based on USFWS Region 3 Bald Eagle population numbers and trends, the USFWS has determined that 244 individual Bald Eagles can be taken each year without compromising the long-term sustainability of the population (USFWS 2009b). This is likely a conservative estimate, given that the methodology allows for loss of only half the maximum sustainable yield as calculated by Millsap and Allen (2006). The increase in post-construction monitoring occurring at wind energy facilities across the country will provide important data for better understanding the threat of wind energy facilities to Bald Eagles and will promote improved avoidance, minimization, and mitigation measures.

The Bald Eagle population continues to increase in the lower 48 states, including Minnesota. Some 631 new territories were established in Minnesota between 2001 and 2006 (USFWS 2012c). This species appears to be occupying locations that in the past may have been considered less than optimal. Because the population is expanding, it is possible that in the future Bald Eagle nests may be located within ten miles of the site. However, it is unlikely due to the lack of open water and mature tree stands that they would nest in the site.

During all Tier 3 bird surveys and at incidental times between surveys, observers search for and note all occurrences of Bald Eagles at the site (see sections 3.1.3 and 3.3.2 for survey results).

2.2 Protected and Sensitive Lands

The Odell site does not contain protected or sensitive lands, but such lands are present within a mile of the boundary of the site (Map Exhibit 1 & 2, Appendix 1). Banks and Bennett WMAs are at the northwest corner the site. In the northeast corner of the site is Sulem Lake WMA. These WMAs contain native plant communities, including open water and wetlands, which are used by waterfowl and waterbirds. Fish Lake and Thompson State Wildlife Refuges are at the site's western edge. Regehr WMA is also at the site's northeast corner. An approximately 80-acre county parcel occurs within the site's northeast corner. Nearby a RIM (Reinvest in Minnesota) easement is within one mile of the site's boundary, but not within the site. These constitute the protected lands in and near the Odell site.

The Minnesota County Biological Survey has completed a survey of this area for native plant communities. One dry hill prairie of moderate biodiversity significance was identified in the center of the site along the South Fork of Watonwan Creek. Several significant areas are located outside but near the Odell site. A mesic prairie at the northeast corner of the Odell site was mapped as a site of high biodiversity significance. It contains several rare native plant communities, including mesic prairie, wet prairie, prairie mixed cattail marsh, seepage meadow/carr and southern basin wet meadow/carr. Native plant communities of moderate biodiversity significance were also identified at Banks and Bennett WMA's near the northeast corner of the site. Communities here include dry hill prairie, prairie wetland complex, mesic prairie and prairie mixed cattail marsh. A dry hill prairie of moderate biodiversity significance also occurs on the site's northern border. Finally, an area just below the threshold for statewide significance occurs near the northeast corner of the site;

it is along the judicial ditch just south of Sulem Lake WMA. The locations of these native plant communities were confirmed during a site visit on April 2 and 3, 2013.

2.3 Plant Communities of Concern

The Minnesota NHIS database request (Appendix 1) in 2008 reported records of five native plant community locations (Map Exhibit 1 & 2, Table 2). Three of the four known prairie locations (a dry hill prairie and a mesic prairie) were railroad prairies in this general vicinity. The fourth known prairie location is a mesic prairie located in the northeastern portion of the site. The final identified native plant community is a Basswood-Bur Oak (Green Ash) forest located a half mile outside the site's northern boundary. In 2013, the NHIS search identified records for the above mentioned mesic prairie located in the northeastern portion of the site and the Basswood-Bur Oak forest located a half mile outside the site's northern boundary.

Impacts to these native plant communities can be avoided if appropriate setbacks from native plant communities are used.

Table 2. Plant communities of concern identified by NHIS data requests

Scientific Name	Qualifier	State Rank[6]	Global Rank[3]	Likelihood of Presence in the Evaluation Area[4,5]
Dry Hill Prairie (2 occurrences)	Southern	S2	GNR	present
Mesic Prairie (2 occurences)	Southern	S2	GNR	present
Native Plant Community (Basswood-Bur Oak Forest)	Undetermined Class	SNR	GNR	low

[3] G1 – Critically Imperiled; G2 – Imperiled; G3 – Rare or Uncommon; G4 – Widespread but with Long-term Concern; G5 – Widespread and Abundant, GNR – Not Ranked

[4] Inferred presences on site based upon habitat and range.

[5] Possible - habitat likely present, in species range for breeding or migration; Low – habitat unlikely, at edge of range; Very Low - habitat absent, or out of range.

[6] S1 =Critically imperiled in Minnesota because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. S2 = Imperiled in Minnesota because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. S3 = Vulnerable in Minnesota either because rare or uncommon, or found in a restricted range, or because of other factors making it vulnerable to extirpation. S4 =Apparently secure in Minnesota, usually widespread. S5 = Demonstrably secure in Minnesota, essentially ineradicable under present conditions. SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, but suspected to be still extant. An element would become SH without the 20-year delay if the only known occurrences in the state were destroyed or if it had been extensively and unsuccessfully looked for. SNR = Rank not yet assessed. B indicates breeding status.

2.4 Congregation Areas

No congregation areas for birds or bats have been identified inside the site. Waterfowl and waterbird congregation areas exist in protected areas outside the site. Those protected areas are described in Section 2.3 Protected and Sensitive Lands.

2.5 Species of Habitat Fragmentation Concern

No species of habitat fragmentation concern have been identified as potentially present within the site.

2.6 Bird and Bat Site Use and Mortality Risk

Bird and bat use of the site and associated mortality risk were evaluated by mapping land cover to identify habitats used by birds and bats, and conducting a literature review of potential impacts to birds and bats due to wind energy projects.

2.6.1 Habitat Cover Mapping Methods

Habitat cover mapping is used for a habitat-by-habitat assessment of landscape impacts and risk associated with the installation of the proposed project. The distribution and abundance of bird and bat species are correlated during the breeding and winter season, and to some extent during the spring and fall migration period, with the spatial distribution and amount of habitat. Land cover is used to represent habitat.

A land cover map was created to define and visualize the locations where different bird and bat habitats were present. Base data were from the National Land Cover Database (NLCD) raster dataset developed in 2001 by the US Geological Survey, based on LANDSAT images from March 1997-Sept 2001. This coverage was developed for the U.S. Department of Agriculture at a cell size of 30 x 30m. The raster NLCD coverage was clipped to the site. Each NLCD land cover type was assigned to an AES habitat cover type for use in avian field surveys (Table 3, Map Exhibit 2).

The NLCD mapping of permanent grassland that could serve as long-standing wildlife habitat was inaccurate as determined by AES field checks. Consequently, in 2013, Odell re-mapped permanent grasslands in the Project Area. Odell mapped grassland polygons based on remote analysis of 2010 National Ag Imagery Program aerial photographs, and field verified grasslands is April 2013. Permanent grasslands included CRP lands, RIM lands, hay meadows and pastures. Small linear areas of grassland in stream corridors, ditches and rights-of-way were not mapped. Therefore, the refined land cover mapping combined NLCD land cover data with Odell's field-verified grasslands. Areas identified in the NLCD land cover data and aerial photographs as grassland and pasture were field-verified and mapped by Odell. Other than grasslands, Odell's 2013 field observations confirmed that the NLCD land cover had not changed significantly from 2001 when the NLCD data were developed.

Table 3. AES habitat cover type descriptions

AES Habitat Cover Type	Description
Developed	Residential, commercial, industrial, and other developed land, including developed green space (e.g., golf course, city park).
Cropland	Regularly cultivated land. Pasture, hay meadow, and fallow field are grasslands.
Barren Land	Land with sparse to no vegetation (e.g., mines, landfills, construction sites, sparsely vegetated shores).
Grassland	Grass and herbaceous plants cover ≥90% of the ground in uplands; includes pasture, hay meadow and fallow field.
Upland Shrub-Scrub	Shrubs and scrubby or mature trees cover 10-50% of the ground. Includes brushland and savanna with trees and shrubs.
Upland Forest	Trees cover ≥50% of the ground.
Forested Wetland	A wetland or lowland flooded area with 50-100% tree cover.
Shrub-Scrub Wetland	A wetland with 10-50% cover by shrubs, scrubby and mature trees. Includes savanna with trees and shrubs.
Emergent Wetland	A wetland with ≥90% cover of herbaceous plants.
Open Water	Water and sparse to no vegetation cover; rivers, streams, lakes, ponds.

2.6.2 Habitat Cover Mapping Results and Discussion

The proposed Odell site lies in rural southwest, Minnesota, and like most of this agricultural region habitat at the site is 91% cropland (Table 4, Map Exhibit 2). Historically the site was covered in prairie and wet prairie

(Marschner 1974). Almost all of these prairie communities have been replaced through agricultural conversion, and only scattered prairie remnants remain in the region.

The Minnesota County Biological Survey identified two native prairies within the site. In the northeastern corner of the site there is a 70-acre mesic/wet prairie complex. Along the South Fork of the Watonwan River there is a 120-acre dry hill prairie. When these prairie patches are combined with other non-native grasslands, grassland habitat comprises 3% of the site. The larger non-native grasslands at the site are protected with RIM easements.

Natural habitats at the site are concentrated along the riparian corridors of the South Fork of the Watonwan River in the center of the site, the North Fork of Elm Creek in the south of the site, and the Cedar Run in the southeastern corner of the site. These habitats consist primarily of grassland (3.0%) and emergent wetland (0.5%) with scattered shrub-scrub and small patches of forested habitat (0.2%). Natural habitats are also concentrated along the northern boundary of the site in the Bennett and Banks Wildlife Management Areas (WMA's). The National Wetland Inventory shows additional wetlands not identified by the NLCD data. Most of these are small scattered wetlands located in cropland habitat.

Only 4.7% of the site is developed, consisting primarily of roads, farmsteads and home sites, with concentrations in Windom (four miles west) and Mountain Lake (two miles north). Most of the farmsteads have windbreaks and woodlots with mature trees.

Table 4. Habitat cover types at the Odell site

Land Classification (combined NLCD data)	Area (acres)	Percent of Total
Developed	1,634.4	4.7
Cropland	31,626.9	91.4
Barren Land	12.0	0.03
Grassland	1,028.2	3.0
Upland Forest	60.3	0.2
Emergent Wetland	177.4	0.5
Open Water	52.8	0.2
Total	**34,591.9**	**100.0**

In general the habitat cover at the site was similar to that found at the Lakefield wind project located approximately 10 miles southwest of the site. The Lakefield project, built in 2011, has a land cover comprised of 88.8% cropland, 6.6% developed and 4.6% natural habitats (grassland, wetland, woodland/shrub-scrub) (Westwood Professional Services 2013). The Lakefield project is similarly surrounded by protected grassland, wetland and open water habitats including the WMAs of Toe, Bootleg, Summers, Husen and Dead Horse (Westwood Professional Services 2013).

2.6.3 Species Protected by the Migratory Bird Treaty Act

As explained in Section 1.3, the Migratory Bird Treaty Act of 1918 (MBTA, 16 USC §§703-712) assigns legal authority to the USFWS to prevent the taking[1] of migratory birds. These include over 800 species of raptors, diurnal migrants, and passerine migratory birds.

[1] Taking is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities." Take does not include habitat destruction or alteration, as long as there is not a direct taking of birds, nests, eggs, or parts thereof.

The mean mortality rate at several wind energy facilities in the Upper Midwest is 2-2.5 birds of all species per turbine (NWCC 2004; CEIWEP 2007). Research indicates that factors that increase the risk of birds colliding with wind turbines are complex, and mortality cannot reliably be predicted from local bird abundance and flight height measurements. Several unpublished and published studies in Europe and the United States have suggested that bird behavior in the vicinity of turbines is a stronger predictor of collision risk than bird abundance (e.g., Barrios and Rodriguez 2004; de Lucas et al. 2008; Smallwood et al. 2009). These studies also note that environmental factors play a role (e.g., foraging habitat, migratory routes and uplift areas for raptors). Depending on the type of environmental factor (e.g., uplift areas), collision risk and tower height may be correlated (Barrios and Rodriguez 2004). Bird behavior that increases collision risk may include territorial chases, mating displays, soaring in thermals, and stooping after prey. These "risky" behaviors in the vicinity of wind turbines may be reflected in actual mortality rates as measured at existing wind projects. In the Upper Midwest the species that appear to be most at risk from collisions with turbines are those that regularly fly in the RSA, such as Horned Lark and European Starling.

Habitat is also likely to be an important predictor of collision risk. Bird abundance is correlated with habitat type. Habitats containing more individuals of high risk species, due to their behavior, are predicted to have higher impacts from turbines located in or near them. A commonly used measure of risk, flight height, has been shown to be generally uncorrelated with risk (Johnson et al. 2000a). The flight heights of individual species, however, can help explain the specific behavior and timing of the behavior that puts a species at risk.

There is also a strong seasonality to avian mortality. The majority of avian collisions take place during the spring and fall migratory periods. In general, breeding birds experience few collisions with wind turbines. For instance, at Buffalo Ridge, Minnesota, Osborn et al. (1998) found that 70-75% of breeding birds flew below 21m elevation (below the turbine blade height).

A proactive approach to minimizing impacts to birds protected under the MBTA is strongly encouraged through the U.S. Fish & Wildlife Service (USFWS) voluntary Land-based Wind Energy Guidance (LBWEGS). With this understanding, we provide an overview of all bird guilds potentially present at or near the project location whose potential impact could result in legal action through the MBTA if enforced. Within these guilds we highlight species which are ranked as Species of Greatest Conservation Need (SGCN) in the Minnesota River Prairie subsection (MNDNR 2006) since these species are currently considered vulnerable, declining or rare. SGCN includes all species with Federal and/or State protection status.

Passerine (Songbirds). Minnesota recognizes 30 passerine species as Species of Greatest Conservation Need (SGCN) in the Minnesota River Prairie subsection. Many of these species are grassland nesting birds (e.g. Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Dickcissel, Field Sparrow, Eastern Meadowlark) or associated with the regions open wetlands (e.g. Marsh Wren, Sedge Wren, Swamp Sparrow). Habitat for these species is present at the site in the larger grasslands, and the grassland and wetland habitats associated with the site's riparian corridors. The site also has shrub-scrub and woodland habitat along these corridors that could provide breeding habitat for additional SGCN species, (e.g., Whip-poor-will, Black-billed Cuckoo, Least Flycatcher, Willow Flycatcher, Acadian Flycatcher, Red-headed Woodpecker, Rose-breasted Grosbeak, Brown Thrasher, Blue-winged Warbler). The site is lacking habitat for SGCN forest birds (e.g. Veery, Eastern Wood-pewee, Wood Thrush, Ovenbird), but some of these species might utilize the natural habitats associated with the site's riparian corridors as stopover habitat during migration.

On average, in the U.S., 74% of all bird mortalities at wind energy facilities are passerines (NRCNA 2007). Erickson et al. (2001) estimated that half of passerine bird mortality consists of long-distance migrants, including warblers. These numbers may be an underestimate due to the difficulty of locating small birds in post-construction mortality studies (CEIWEP 2007).

Long-distance migrants typically fly at night at several thousand foot elevations, well above the RSA (Kerlinger 1995). Erickson et al. (2001) provisionally estimated that 34-60% of passerine mortality to be night migrants. They appear most vulnerable during inclement weather when visibility is reduced and birds are forced to fly at lower elevations. During inclement weather the number of birds killed is unlikely to be high in any single event because long-distance migrants typically move in broad fronts across the landscape

(Kingsley and Whittam 2003; NRCNA 2007), and large, dense flocks are unlikely to fly through wind energy facilities (NWCC 2004).

To some extent, birds in migration are selective about which habitats they use. Long-distance migrants tend to utilize forest and brushy habitat during stopovers rather than open agricultural land (Kerlinger 1995). Migrants have also been observed focusing their feeding in structurally complex habitats, such as forests with a shrubby understory or brushy areas (Kerlinger 1995). The majority of the site is in cropland with scattered grasslands and associated shrub-scrub habitats along riparian corridors. Wooded habitat occurs in small patches along these riparian corridors, and in windbreaks associated with farmsteads. Natural habitats at the site are concentrated along the South Fork of the Watonwan River in the center of the site and the Cedar Run in the southeastern corner of the site. There is also a corridor of natural habitats associated with a series of wetlands along the site's northern border. The agricultural land in the proposed site is less likely to attract migrating passerines, especially long-distance migrants.

Raptors. Most raptors are protected by the federal MBTA, and several are State Listed species in Minnesota (e.g. Burrowing Owl (State Endangered), Peregrine Falcon (State Special Concern), Short-eared Owl (Special Concern), and Red-shouldered Hawk (Special Concern)). A total of five raptors are on the SGCN list for Minnesota River Prairie subsection (Short-eared Owl, Swainson's Hawk, Northern Harrier, Bald Eagle and Burrowing Owl).

There are no known concentrated raptor migration routes near the site, although there is likely to be a broad front migration through the region (USFWS 2006a and 2006b). There are no topographic features at or near the site that would concentrate raptor activity. There are known raptor migration routes along the western edge of Minnesota (approximately 70 miles west of the site) and along the Minnesota and Mississippi Rivers (approximately 45 miles northeast of the site). The nearest hawk watch sites along these raptor migration routes are near Council Bluffs, Iowa, on the Missouri River (10 years data) and Mankato, Minnesota, on the Minnesota River (3 years data). Compared to other sites, these sites have lower passage rates of 25.0 and 41.7 raptors per hour respectively (Orsag et al. 2012; Heins 2012). By contrast, migration areas such as the Duluth Hawk Watch near Lake Superior may see several thousand birds per day, with an average passage rate of 135 birds/hour during the fall migration in 20 years of data collection (Ritter et al. 2012).

At the Minnesota River hawk watch site, there were 14 species: Broad-winged Hawk (62% of observations), Turkey Vulture (12%), Red-tailed Hawk (9%), Bald Eagle (5%), Sharp-shinned Hawk (5%), with Osprey, Northern Harrier, Cooper's Hawk, Red-shouldered Hawk, Rough-legged Hawk, American Kestrel, Merlin, Peregrine Falcon, and Swainson's Hawk in lesser numbers.

In general, hawks and owls appear to have moderate to low collision risk from wind turbines depending on location (Johnson et al. 2000a; de Lucas et al. 2004). Previous studies have documented species-specific behavioral responses to wind turbines by raptors (Garvin et al. 2011, Martinez-Abrain et al. 2012). De Lucas et al. (2004) found raptors appear to avoid wind turbines and increase their soaring height on approach. However, the large number of Golden Eagles killed at the Altamont Pass facility in California (Smallwood and Thelander 2008), and the relatively low reproductive rate of most raptor species have raised concerns about the potential for impacts and concern persists in the general public.

Buteos, eagles, and vultures use updrafts and thermals to soar during migration and reach high altitudes before gliding over water (Kerlinger 1995). By contrast, accipiters, falcons, harriers and similar birds can use updrafts, but often use powered flight at treetop or ground-level, allowing them greater maneuverability in flight. Consequently, the greatest risk to raptors may occur with those that soar. Moreover, because they avoid a water crossing until they reach a considerable altitude, soaring raptors concentrate along shorelines where they use off-shore breezes (from water to land) to increase their altitude (Kerlinger 1995).

Updraft areas occur throughout the site over agricultural land and other land covers that warm early in the day. There is a strong tendency for raptors to move with favorable winds, especially soaring raptors (Kerlinger 1995). Southerly winds are most favorable in spring, and conversely northerly winds are favorable in fall. However, raptor mortality is most likely to occur where migrating raptors become concentrated—

along shorelines, ridgelines and mountain chains—or where food is plentiful and soaring is facilitated by local wind patterns, such as at Altamont Pass, California. There are no topographical features that would concentrate raptors at the Odell site.

Although raptors that soar in migration may generally be at greater risk than powered-flight raptors when they are flying within 200m of the ground, powered-flight raptors may experience high mortality at other times of the year, such as the breeding season. For example, Smallwood et al. (2009) found high mortality rates for American Kestrel at Altamont Wind Energy Facility in California.

Waterfowl and Waterbirds (Gulls, Shorebirds and Wading Birds). Southwestern Minnesota has a significant dabbling duck (e.g. Northern Shoveler, Mallard) migration (Lincoln et al. 1998), and diving ducks (e.g. Scaup and Bufflehead) also migrate through the region. Although the site itself has few areas of open water, the site is surrounded by wetlands and open water habitats. Many of these are protected as WMA's by the MNDNR or the USFWS (Map Exhibit 1). Wetlands are particularly concentrated on the northern border of the site, along the Des Moines River west of the site, and along a drainage corridor east of the site (Map Exhibit 2). Migrating waterfowl and waterbirds are likely to stop at small and seasonal ponds inside the site, and in agricultural fields to feed, particularly if they are temporarily flooded. They are also likely to fly across the site as they move between the surrounding wetlands.

Eight waterfowl species (Western Grebe, Northern Pintail, Trumpeter Swan, Common Moorhen, Common Loon, American White Pelican, Red-necked Grebe, and Eared Grebe) are listed as SGCN in the Minnesota River Prairie subsection. Of these, all have the potential to fly though the site, stopover in migration or feed in flooded crop fields. Possible breeding habitat is limited to two small open water wetlands, one on the western site boundary and one near the southern site boundary. Waterfowl species observed on or near the site during the May 2-3 site visit included: Canada Goose, Mallard, Northern Shoveler, Gadwall, Blue-winged Teal, Wood Duck, American Widgeon, Lesser Scaup, Greater White-fronted Goose, Redhead, Ring-necked Duck, Coot, Hooded Merganser, Common Merganser and Canvasback.

One gull (Franklin's Gull), also a species of Special Concern in Minnesota, is uncommonly observed in southwest Minnesota. See discussion of this species in section 3.3.2 below. There are two Minnesota River Prairie subsection SGCN tern species, Forster's and Black. These occur sparsely in the southwest portion of the state, but typically remain close to large waterbodies, and are unlikely to utilize the cropland habitat at the site.

Fifteen shorebird species are SGCN in the Minnesota River Prairie subsection. Most of these species are migrants in the area. A few (e.g. Upland Sandpiper, Marbled Godwit, Hudsonian Godwit, Whimbrel) require large grassland habitats for breeding. Of these only Upland Sandpiper has the potential to breed on or near the site due to the quality and the size of the grassland habitat present. Other species may be present during migration. Other SGCN waterbirds for the Minnesota River Prairie subsection include American Bittern, Least Bittern, Black-crowned Night-heron and Virginia Rail. These species could be present in wetland habitats in or near the site.

Few waterfowl and waterbirds have been killed at wind energy facilities (NRCNA 2007). This may be due to avoidance behavior or effective siting of wind energy facilities in order to avoid waterfowl and waterbird concentration areas. Typical migratory flight of waterfowl is much higher than the RSA of wind turbines (Kerlinger 1995), and many waterbirds appear to be exceptionally adept at avoiding wind turbines. This behavioral pattern has been documented by researchers in the field (e.g., Madsen and Boertmann 2008), and AES staff. Migrating waterfowl and waterbirds may be vulnerable when a) ascending or descending from water bodies, b) feeding in and near wind energy facilities, c) flying in inclement weather, d) flying in early morning and late evening if visibility is poor, and e) turbines are near or between roosting and feeding sites.

In summary it is predicted that avian mortality at the Odell site will be similar to that found at other wind facilities in Midwestern cropland. Mortality is likely to consist primarily of passerine species, with limited risk to raptors, waterfowl and waterbirds. Mortality is likely to be greatest during the spring and fall migratory periods, particularly on nights with low visibility or weather conditions that cause birds to fly at lower

elevations. Mortality is likely to be greatest for species flying at night, or species with flight behaviors that put them at risk of collision. Tier 3 Avian surveys were recommended to assess these general conclusions, and to provide site specific data regarding avian migration and breeding activity at the site (see section 3 below).

2.6.4 Non-Listed Bat Species

Impacts to bat species are of continued concern to biologists and wildlife agencies (Arnett et al. 2008; Rydell et al. 2010) due to sustained mortality of bats from white nose syndrome (WNS) and few select wind farms where significant numbers of bat fatalities have been recorded. However, current modifications to siting procedures (Santos et al. 2013) and operational procedures (Arnett et al. 2011) have documented reductions in bat mortalities at wind farms in recent years. Improvements to statistical modeling and mortality estimates further advance the validity of studies at wind farms (Peron et al. 2013).

Most wind energy projects have not documented large bat kills, but a few sites have had significant mortality that has raised overall concern. For example, in West Virginia an estimated 1,364-1,980 bats were killed in a six-week period in 2004 (Kerns and Kerlinger 2004). Jain and colleagues (2011) estimated mortality rates of 3.64 – 9.17 bats per turbine per year (BTY) at a wind farm in cropland in north-central Iowa. A recent wind energy project in Jackson County, Minnesota (in ~90% cropland) used statistical estimation methods described by Strickland et al. 2011 to estimate mortality at 29.80 BTY (Westwood Professional Services 2013). These results are significantly higher than previous Midwestern cropland wind farm project bat fatality estimates which are 0.01 – 10.2 BTY (Arnett et al. 2008, Gruver 2008a). Specifically, three Minnesota wind farms, Buffalo Wind I, II, & III, were determined to have corrected BTY are 0.07, 2.01, and 2.06, respectively (Barclay, Baerwald, & Gruder 2007). Variation in mortality rates at sites in similar habitat types can be a function of many different variables, including turbine siting, bat migration corridor routes, wind/weather patterns, and other known and unknown factors.

Since bats in the temperate zone give birth to one or two young each year; the biological and cumulative significance of the reported mortality for species with low birth rates is unclear (O'Shea and Bogan 2003), but presumed significant in concert with White Nose Syndrome (WNS) fatalities (WNS is not currently documented in Minnesota). Of 45 bat species in the continental U.S., six already are federally endangered and 20 at risk. All cave-hibernating bats in the Eastern U.S. are declining due to WNS, a fungal disease that has eliminated 95% of populations where it occurs in the Northeast and Midwest (Bat Conservation International 2009). As of mid-May 2013, WNS is documented in 22 US states and 5 Canadian Provinces (Bat Conservation International 2013). WNS was most recently (Winter 2012/2013) discovered in hibernacula primarily south and west of Appalachian sites (but also few additional sites in Canada and New England), impacting bat populations at hibernation areas in Kentucky, Tennessee, Missouri, and Illinois along northwesterly transmission pathways. The nearest confirmed case of WNS to the project location is in bat hibernation areas of north-central Illinois where it is killing Little Brown Bat and Northern Long-eared Bat (Illinois Department of Natural Resources 2013).

As a result of WNS, the USFWS was petitioned to protect the Northern Long-eared Bat, Eastern Small-footed Bat (not in range at the site) and Little Brown Bat by emergency listing under the Endangered Species Act (Bat Conservation International 2011). The USFWS had published a 90-day finding for Northern Long-eared Bat indicating that there is substantial scientific evidence for listing, and the USFWS is currently conducting status reviews for these species. Results of this status review are expected by the end of 2013. Additionally the state of Minnesota is considering listing Big Brown Bat and Little Brown Bat as state special concern with the next revision of the species list. The low reproductive rate, potential for high mortality, and large proportion of at-risk species has elevated concern for bats among biologists and regulatory agency staff.

Three tree-roosting bat species, Hoary (*Lasiurus cinereus*), Eastern Red (*Lasiurus borealis*) and Silver-haired (*Lasionycteris noctivagans*), comprise the majority of all wind farm-related bat mortalities in North America (Cryan 2011). Johnson (2005) identified eleven species experiencing mortality at wind energy projects and calculated that over 80% were of Hoary Bat, Eastern Red Bat, and Silver-haired Bat. All three species are known to occur in Minnesota near the site. These migratory tree bat species travel up to 1,200 miles in spring and fall and spend summers in the northern U.S. and Canada (Kurta 1995; Cryan 2003).

Four other bat species also known to occur in Minnesota, (i.e, Big Brown Bat (*Eptesicus fuscus*), Little Brown Bat, Tri-colored Bat and Northern Long-eared Bat), have low reported impacts at wind energy projects. These and other species not found in Minnesota represent approximately 20% of all reported mortality (Arnett et al. 2008), although mortality rates have been higher at a few facilities (Gruver et al. 2009). Because these species are widely distributed in Minnesota, all of these species are expected to occur near the site.

Half of all reported bat collisions occurred from August 16 to 31 and one-fourth from September 1 to 15, presumably corresponding with the peak of fall bat migration (Johnson 2005; Arnett et al. 2008, Westwood Professional Services 2013). Most of the other collisions were July 16-August 16 and September 16-October 15. There is little mortality during the April-May spring bat migration for unknown reasons (Zinn and Baker 1979; Cryan 2003; Cryan 2008). Rydell and colleagues (2011) found similar guilds and seasons for impacts at European wind farms.

Mortality is often associated with passing weather fronts and nights with low wind speed when bats appear to migrate (Arnett et al. 2008). Mortality is also associated with a bat's preferred altitude. For example, the Hoary Bat is found most often above 30m (Arnett et al. 2007, AES observations), within the RSA, rather than at lower elevations, and Hoary Bat accounts for 50% of known bat mortality in North America (Cryan 2011).

Cryan and Barclay (2009) hypothesize that particular mating behaviors (aerial copulation, resource defense polygyny, and lekking) may contribute to bat fatalities at wind farms since they are correlated with attraction to the tallest trees in a given area, but no formal experiments have been completed to prove this theory. Furthermore, these behaviors are prevalent in the tree bat species which are most impacted by turbines. Other theories correlate bat mortality at wind farms to migrating insects (Rydell et al. 2010). Despite these hypotheses, a consistent pattern between bat habitat and mortality has not been established (Arnett et al. 2008; Santos 2013). Models have been developed to attempt to correlate ecological conditions of the surrounding landscape for estimating mortality rates per species (for select species) at proposed turbine locations based upon distance to certain landscape features (Santos et al. 2013). Certain combinations of particular distances to forest, slopes, and open water tend to yield consistently high mortality rates for one or more bat species. These "mortality niches" have allowed for enhanced prediction of potential collision risk areas and, thereby, aid in both environmental assessments and turbine siting exercises (Santos et al. 2013). While this approach is helpful for some species-specific assessments, a paucity of critical behavioral and spatial use information needed to apply these models exists for many species and geographic regions. Results of previous studies suggest that turbines placed in cropland are likely to pose less risk to bats compared to forests, rivers, lakeshores and ridgelines (Johnson 2005; Arnett 2005). Because bats appear to follow edges and linear features, including forest edges and treelines (Hall 1962; Furlonger et al. 1987; Verboom and Huitema 1997; Murray and Kurta 2004; Arnett 2005; Larkin 2006; Cryan and Veilleux 2007; Kurta et al. 2007).

Infrared imagery shows that bats often investigate wind turbine towers, pass them multiple times, and land on stationary blades (Horn et al. 2008, Cryan and Barclay 2009). Physical avoidance responses to spinning blades by bats in close proximity to turbines are limited. Grodsky (2011) explains, "The maximum range at which bats can echolocate is 20 m (Neuweiler 2000); given a turbine blade rotation speed of 75 m/s, bats have approximately 0.25 s to react to spinning turbine blades before being struck…Thus, it is unlikely that bats can adjust their flight direction before entering airspace occupied by spinning turbine blades." This suggests that the turbine siting process is critical for minimizing bat mortalities, since avoidance measures afforded by some bat species are less available.

Due to the likely passage of migratory tree bat species at the site, a Tier 3 acoustic monitoring study was recommended as a result of the Tier 2 review (see section 4 below).

2.7 Potential for Significant Adverse Impacts

The review of existing information indicates that wind energy development at the Odell site is unlikely to create significant adverse impacts. Significant impacts include those of large intensity, large geographic scope,

and long duration. The risk of significant impacts could be further diminished by reducing the footprint of the Odell wind energy facility. The site does not contain, but is near protected and sensitive areas, including areas of statewide biodiversity significance and waterfowl and waterbird concentration areas during migration. Considering buffers for these protected and sensitive areas will reduce the impact of the Odell project on the most important locations for birds in the vicinity.

The similarity and proximity of the Odell investigation area to the Lakefield project, where bat mortality appears to be slightly above average for agricultural lands in the Midwest, suggests that bat mortality at the Odell site may also be average to slightly above average. Although presently none of the potentially affected species are protected by federal or state law, the Odell project should explore ways to reduce the potential mortality of bats.

3. TIER 3 – AVIAN FIELD STUDIES

3.1 Field Methods

AES designed the Tier 3 surveys to describe the distribution and abundance of species in and near the proposed Odell site in order to understand the relative risk of collision and habitat displacement among habitat types and to enable decisions to use or avoid different areas in the site. Since wind turbines will most likely be sited in cropland, the analysis focused on cropland habitats relative to other habitats in or near the site. Surveys completed to date are listed in Table 5, and surveys expected to be completed in 2013 are listed in Table 6. To date, approximately 85 hours of surveys have been conducted. Overall, nearly 145 hours of surveys will be conducted at the site in 2013.

Table 5. Completed point count survey effort at the Odell site

Survey Type/Season	Survey Dates	# of Points	# of Counts per Point	Minutes per Count	Total Survey Hours	Survey Hours
Raptor and Large Bird/Early Spring Migration	April 3-6, 2013	30	1	60	30.0	7:00am to 7:30pm
Raptor and Large Bird/Early Spring Migration	April 23-26, 2013	30	1	60	30.0	7:00am to 7:30pm
Passerine/Spring Migration	May 14 – 16, 2013	25	2	10	8.33	6:30am to 11:00am; 5:00pm to 8:45pm
Passerine/Breeding	June 2013	25	2	10	8.3	5:00am to 10:00am
Passerine/Fall Migration	Late August to mid-September, 2013	25	2	10	8.3	7:00am to 8:00pm
Total	-		-	-	**84.93**	-

Table 6. Proposed point count survey effort at the Odell site

Survey Type/Season	Survey Dates	# of Points	# of Counts per Point	Minutes per Count	Total Survey Hours	Survey Hours
Raptor and Large Bird/Fall Migration	Proposed October 2013	30	1	60	30.0	7:15am to 7:00pm
Raptor and Large Bird/Late Fall Migration	Proposed November 2013	30	1	60	30.0	6:30am to 5:30pm
Total	-		-	-	**60.00**	-

3.1.1 Passerine Surveys

Point count surveys were designed to assess passerine species abundance and richness at the site during the spring and fall migrations as well as during the breeding season (Tables 5 & 6). The passerine migration periods are designed to coincide with the beginning of the passage of long-distance migrants through the region, but short-distance migrants are also represented. The breeding survey was timed to occur at the peak nesting time for long-distance migrants, with short-distance migrants and resident birds present but at later stages of nesting.

Twenty-five points were located in cropland, grassland and riparian/grassland habitats, and each was sampled twice each season (Table 7, Map Exhibits 1 & 2). There are two main riparian systems associated with the site. A judicial ditch runs along the site's northern border that has a series of grassland, shrub-scrub and open water habitats. A series of WMA's and grasslands with RIM easements are associated with these natural habitats (Map Exhibit 1). The second riparian corridor is associated with the South Fork of the Watonwan River in the center of the site. The County Biological Survey has identified a prairie remnant along portions of the river. Some of the grasslands in this stretch were active pasture. A third minor riparian corridor associated with the North Fork of Elm Creek begins in the southern portion of the site. Points were located along these corridors. Grassland comprised a minimum of 30% of the habitat at all except one point. This point (212) was primarily cropland; however due to its location along the South Fork of the Watonwan River activity at this point was similar to that of the other riparian/grassland points.

In the northeastern portion of the site there are three moderate sized grasslands (90-140 acres). One of these grasslands (at point 207) is a mesic prairie. The other two grasslands are planted with native warm season grasses. Points were located along the public right-of-way near these grasslands. Cropland habitat dominated 40-60% of the habitat at these points. The remaining points were associated with cropland habitat. This habitat included grassed ditches, smaller grassed waterways, farmsteads and associated woodlots and shelterbelts. Point 221 in the southwest portion of the site had a larger percentage of grassland than other cropland points and is associated with the headwaters of the Cedar Run River; however it is classified with the cropland points due to the preponderance of cropland habitat in the area and surveyed richness and abundance that were similar to the other cropland points.

Table 7. Number of passerine survey points by habitat and season (2013)

Habitat	Spring Migration (N)	Breeding* (N)	Fall Migration* (N)	Total (N)
Cropland	11	11	11	**33**
Grassland	3	3	3	**9**
Riparian/Grassland	11	11	11	**33**
Total	**25**	**25**	**25**	**75**

*Surveys recently completed or expected to be completed later in 2013. Results for these surveys will be presented in a final report upon the completion of 2013 surveys.
N=number of survey points; number of 10-minute surveys was twice the number of points each season or 150 point counts overall.

Point counts lasted for ten minutes. Data recorded included: all birds seen and heard in an unlimited radius of the survey point, numbers of individuals, behavior, distance and direction from the observer, and weather conditions. The flight origin direction and flight direction from the survey point, and the flight height were recorded. Estimates of flight heights were based on comparison with known heights of existing objects (e.g., silos, power poles, towers, trees, buildings). Survey data were entered into an Access database for storage and analysis.

Survey times vary with season. In the spring, passerine migration surveys begin near dawn and last until noon or until a noticeable drop in bird activity. In the breeding season, surveys are conducted from near dawn to approximately 10 a.m. During the fall migration surveys are conducted between dawn and dusk. Start locations are rotated and survey routes are varied to control for time-of-day bias. Point counts are not performed in steady rain, fog, or steady winds over 25mph.

3.1.2 Raptor and Large Bird Surveys

Raptor and large bird migration point count surveys were conducted twice at thirty locations in spring 2013 (Table 5). Two additional surveys of these same 30 points are proposed for fall 2013 (Table 6). These surveys are designed to assess species richness and abundance during the period when raptors and other large birds are migrating in significant numbers. Two 60-minute surveys were conducted at each point during the spring migration, for a total of two hours at each point. Two additional 60-minute surveys are proposed for fall 2013. Sixty survey hours will be conducted each season, and 120 survey hours overall. The thirty survey points have distant, unobstructed views that allow visual observations at 2-3 miles distance (Map Exhibits 1 & 2). Point locations are distributed throughout the site.

The surveys are timed to coincide with the spring and fall migration of raptors and waterfowl. Surveys are conducted between dawn and dusk. Survey times are varied between surveys. Data collection follows the passerine survey methods above, except that surveys were conducted for 60 minutes at each point and only raptor, waterfowl, waterbirds and other large birds are recorded during these surveys.

3.1.3 Bald Eagle Field Methods

Observations for eagles are made during and between all avian surveys, including passerine and raptor/large bird surveys (Table 5 & 6). Early spring and late fall migration surveys last 60 minutes each, while spring and fall migration and breeding surveys last 10 minutes each. To date 60 hours of 60-minute and 8.33 hours of 10-minute eagle observations have been conducted during surveys. Proposed surveys will include a total of 120 hours of 60-minute and 24.99 hours of 10-minute eagle observation periods for a total of 144.99 hours. Any incidental observations made between surveys will be recorded. Observations of eagles are the same as for other species, except the eagle flight path is also recorded.

3.2 Data Analysis

Data analysis is focused on differentiating among habitat types in terms of the richness and abundance of all native bird species and sensitive bird species. Understanding the relative contribution to risk of the wind energy project in different habitats facilitates the micrositing of turbines.

3.2.1 Identification of Sensitive Bird Species

Among the bird species observed at the Odell site, some have no legal protection under the MBTA (e.g., European Starling, House Sparrow), some are protected but in no danger of becoming rare (e.g., American Robin, Common Crow), while some are both protected and have a high risk of becoming limited in distribution or abundance due to existing environmental factors (e.g., endangered or special concern species, or declining species).

Some factors that place a species at risk include a limited distribution or small population size, habitat loss and fragmentation in the species' main range, and historical or ongoing habitat degradation. AES terms these high-risk birds as "sensitive species." Sensitive species are most likely to experience impacts from wind

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

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

Bird species at the Odell site were identified as sensitive if they met one of the following conditions:

- Endangered, threatened, candidate or special concern on federal and state lists;
- Birds of Conservation Concern for Region 11, Prairie Potholes (USFWS 2008b);
- Minnesota SGCN species for the Coteau Moraines and Minnesota River Prairie subsections;
- Critically endangered, endangered, vulnerable and near threatened in IUCN Red Book;
- Significantly declining in United States Geological Survey (USGS) Breeding Bird Survey (BBS) data in region 40 Black Prairie and USFWS region 3 (Sauer et al. 2008); or
- Known from scientific literature to require large habitat blocks (i.e., area-sensitive species).

BBS declining birds were derived from 1980-2007 bird trend data by ecoregion. The Odell site is located in the Black Prairie (BBS Region 40). All native birds in this region that were significantly declining and had a relative abundance of <5 birds per route were considered sensitive. A species seen <5 times on a 25-mile BBS route is an uncommon species; those with >5 per BBS route were common (e.g., Red-winged Blackbird, Cedar Waxwing, American Robin, Barn Swallow). The significance of a decline depended on the quality of the data and involved the number of routes on which a bird was sighted, number of times it was sighted and number of years it was sighted. BBS presents trend significance with a 3-tiered Regional Credibility Measure. For the BBS declining bird analysis, a trend was considered significant if the variance in the decline due to sampling error was less than the decline measured in the field. The least credible trends required a decline of >5% annually to be significant; the moderately credible trends required a decline >3% to be considered significant; and the most credible trends were considered significant regardless of the level of decline. Additionally, we included native birds that were significantly declining in USFWS Region 3 but not significantly increasing in the Black Prairie and that had a relative abundance <5 birds per route in the Black Prairie.

3.2.2 Statistical Analysis

Data were analyzed to answer pertinent questions about wind turbine siting. Did the number of species (richness) or of individual birds (abundance) vary from habitat to habitat; specifically, did cropland (where turbines will be located) have fewer birds and species than grassland or riparian habitats? Did sensitive bird species differ from the rest of the native bird species in their distribution and abundance, and what do the differences indicate about risk associated with the different habitats and settings?

Habitats were compared on the basis of mean number of species (richness) and mean number of individual birds (abundance). These were calculated separately for native and sensitive bird species. Upon completion of fall surveys, calculations will be completed for each survey season, and for all seasons combined. Combining all seasons in a single analysis will simplify the comparison of habitats, even if seasons affect richness and abundance in some habitats.

Avian field data often are non-normal in distribution and require non-parametric statistical tests. For this reason, a Shapiro-Wilk normality test was performed on all data sets. Native species richness was normally

distributed. Other data sets were not normally distributed. Therefore for the richness data an analysis of variance test (ANOVA) was performed on all datasets. Habitats were compared pairwise to each other using the Bonferroni method. A Kruskal-Wallis ranked ANOVA was employed to detect differences in habitats for all measures that were non-normally distributed. Habitats were compared pairwise to each other using the Kolmogorov-Smirnov method.

Data collected during the spring and fall migration period for raptors, waterfowl and waterbirds will be analyzed by calculating the mean number of birds per hour.

3.3 Native and Sensitive Bird Species Results and Discussion

During the spring 2013 surveys, AES observed 66 different species of birds in or near the Odell site (Appendix 2). The results presented in this interim report are exclusively from spring 2013 surveys. The results of breeding season and fall 2013 surveys will be analyzed when all 2013 surveys are complete. Four of the observed species, European Starling, House Sparrow, Ring-necked Pheasant and Rock Pigeon, were introduced from Europe and Asia. House Finch was introduced from the western United States. (See Appendix 2 for scientific names for bird species mentioned in this section). These first four introduced species are not protected by federal or state law. While the House Finch is protected by the MBTA, it and the other introduced species are not of conservation concern and will not be discussed further. Of the 61 native bird species seen in the survey, 24 species (39%) were classified as sensitive by criteria described above (Appendix 2). These species have the greatest need for conservation action given their population status and trends and their habitat requirements. Sensitive species and the group of all native species are treated separately in the analysis below.

3.3.1 Passerine Native Bird Species Collision Risk

The key question related to collision risk at the Odell site is whether the richness and abundance of native bird species varies between habitats, particularly how the natural habitats associated with the site's riparian corridors influence richness and abundance in comparison to cropland. Grassland habitats not closely associated with the riparian habitats were also surveyed.

The most common birds (>1/point count) in the Odell site are those that are common in agricultural regions: Red-winged Blackbird, Common Grackle, Brown-headed Cowbird, Canada Goose, American Robin, Killdeer and American Goldfinch. Cliff Swallow was also common at the site, as it was found in large numbers at many of the site's stream crossings. These species comprised 64% of all individuals observed. Appendix 2 provides detailed data on individual bird species relative abundance by habitat.

Native species richness data were normally distributed. Consequently, the ANOVA statistical test was used. Other data were not normally distributed across habitats. For these data statistical tests were used that handled non-normal data distributions, as described in the methods section (3.2.2 above).

Seasonal and Habitat Differences. A comparison of seasonal variation of bird activity at the site will be made upon completion of the fall passerine migration surveys.

Riparian/grassland habitat had significantly greater species richness than either cropland or grassland habitats. Grassland trended towards slightly greater species richness than cropland, but this result was not significant ($p=.1$) (Table 8, "Richness"). Abundance also varied significantly with habitat. Again riparian/grassland points had significantly greater abundance when compared to cropland and grassland points. Although grassland tended toward greater abundance than cropland, this result was not significant ($p=.15$). (Table 9, "Abundance").

Table 8. Mean richness of native bird species per point by habitat and season

Survey Season	Cropland (11 pts)	Grassland (3 pts)	Riparian/Grassland (11 pts)	All Habitats (25 pts)
Spring Passerine	7.14	8.83	11.00	9.04
All Survey Seasons	**7.14[a]**	**8.83[a]**	**11.00[b]**	**9.04**

*Data expected to be collected in 2013
For the "All Habitat" column, there is no statistical difference between seasons if the numbers have the same letter.
For the "All Survey Seasons" row, there is no statistical difference between habitats if the numbers have the same letter.

Table 9. Mean abundance of native birds per point by habitat and season

Survey Season	Cropland (11 pts)	Grassland (3 pts)	Riparian/Grassland (11 pts)	All Habitats (25 pts)
Spring Passerine	15.95	27.17	35.86	26.06
All Survey Seasons	**15.95[a]**	**27.17[ab]**	**35.86[b]**	**26.06**

*Data expected to be collected in 2013
For the "All Habitat" column, there is no statistical difference between seasons if the numbers have the same letter.
For the "All Survey Seasons" row, there is no statistical difference between habitats if the numbers have the same letter.

Cropland Versus Other Habitats. The lower species richness and abundance in cropland was probably due to the simpler vegetation structure compared to riparian/grassland habitat. Cropland vegetation consists of one species of crop plant growing at a uniform density and height. Other habitats in cropland are poor quality—grass ditches, scattered tree lines, small woodlots associated with farmsteads or patches of shrubland, etc. The riparian/grassland points had more structurally complex habitats, with multiple layers of vegetation and patches of different vegetation heights and plant stem diameters and densities. These habitats included nearby flowing water or open water wetlands, grasslands, small patches of shrub-scrub or young trees and occasional mature trees—which together provide habitat for a wider variety of species.

The most common native bird species (mean >1 individual/point count) observed in Odell's croplands were: Red-winged Blackbird, Common Grackle, Brown-headed Cowbird, American Goldfinch and Horned Lark. These species comprised 62% of all individuals observed in the site's cropland. None of these species is classified as sensitive by AES. Most of these species form large flocks or have high nesting densities, resulting in large numbers of birds in cropland in the spring migration. Uncommon birds in cropland (0.1-0.99 birds/point count) were: Killdeer, American Robin, Savannah Sparrow, Tree Swallow, Vesper Sparrow, Canada Goose, Barn Swallow, Ring-necked Pheasant, Mourning Dove, and American Crow. Of these less common cropland birds, only Vesper Sparrow is classified as sensitive by AES criteria (see section 3.3.2 below).

Mortality Risk. Collision risk may largely be due to a combination of bird species' behavior and abundance in a specific habitat. The behavior of some birds which exposes them to greater risk of collision can be inferred from their higher mortality rates at wind energy facilities. In particular, birds that have flight behaviors that place them in the RSA while foraging, defending territory or performing courtship displays are particularly at risk (Smallwood et al. 2009). Among the common and uncommon native bird species occurring in cropland, Horned Lark is reported to have higher mortality rates than expected at some wind energy facilities (e.g., Johnson et al. 2000a, Johnson et al. 2000b, CEIWEP 2007, Stantec Consulting Group 2011). This species engages in aerial displays that may bring them into the RSA.

It is predicted that passerine birds will comprise the majority of avian mortality at the Odell site (CEIWEP 2007) as was observed at the nearby Lakefield Wind Project (Westwood Professional Services 2013). The overall mortality rate is predicted to be similar to mortality rates at other wind turbines in Midwest cropland. Species likely to be killed in cropland are common, flock-forming species. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

3.3.2 Sensitive Bird Species Collision Risk

Sensitive bird species are used to indicate habitats that warrant special attention when siting wind turbines. Of the 61 native bird species seen in AES surveys, 24 species (39%) were classified by AES as sensitive species. These species already experience problems unrelated to wind energy development, which raises concern for their conservation.

Cropland Versus Other Habitats. There were no significant differences in richness or abundance of sensitive species between habitats (Tables 10 & 11). Cropland had slightly fewer sensitive species and slightly fewer individuals of sensitive species in comparison to other habitats, while riparian/grassland habitat had slightly more.

Just over three-quarters of all cropland points contained one of the six sensitive species observed at cropland points. Five of these species were rare in cropland (<0.1 birds/point count): Blue Jay, American Kestrel, Great Blue Heron, Hairy Woodpecker and Upland Sandpiper. One species, Vesper Sparrow, was uncommon (0.1-0.99 birds/point count). This species is discussed below.

Table 10. Mean richness of sensitive bird species per point by habitat and season

Survey Season	Cropland (11 pts)	Grassland (3 pts)	Riparian/Grassland (11 pts)	All Habitats (25 pts)
Spring Passerine	0.77	0.83	1.14	0.94
All Survey Seasons	**0.77[a]**	**0.83[a]**	**1.14[a]**	**0.94**

*Data expected to be collected in 2013
For the "All Habitat" column, there is no statistical difference between seasons if the numbers have the same letter.
For the "All Survey Seasons" row, there is no statistical difference between habitats if the numbers have the same letter.

Table 11. Mean abundance of sensitive birds per point by habitat and season

Survey Season	Cropland (11 pts)	Grassland (3 pts)	Riparian/Grassland (11 pts)	All Habitats (25 pts)
Spring Passerine	0.91	1.17	2.23	1.52
All Survey Seasons	**0.91[a]**	**1.17[a]**	**2.23[a]**	**1.52**

*Data expected to be collected in 2013
For the "All Habitat" column, there is no statistical difference between seasons if the numbers have the same letter.
For the "All Survey Seasons" row, there is no statistical difference between habitats if the numbers have the same letter.

Vesper Sparrow. Vesper Sparrow was observed at six of the eleven cropland points and at one riparian/grassland point resulting in observations of 0.30 birds/point count overall. Vesper Sparrow is not protected by federal or state endangered and threatened species law, but is considered an AES sensitive species because of its tendency to require large blocks of grassland and cropland habitat. The bird was present both along grassed field edges and divides and foraging in the crop fields.

Vesper Sparrow appears to have a higher than expected mortality rate at some wind farms, perhaps due to display behavior during the breeding season (Erickson et al. 2001). However, no mortality of this species was observed at the Lakefield Wind Project (Westwood Professional Services 2013), despite pre-construction presence of the species there (Westwood Professional Services 2010). It is to be expected, therefore, that low risk of collision to this species occurs at the Odell site. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

State Endangered, Threatened and Special Concern Species. There were three state special concern species (Franklin's Gull, American White Pelican and Trumpeter Swan) observed at the site during the spring surveys. None of these species are protected by the federal ESA.

Trumpeter Swan. The Trumpeter Swan is currently listed as a Special Concern species by the MNDNR. The Trumpeter Swan downgraded from a Threatened status in August 2013 due to the success of restoration efforts exceeding population goals. Trumpeter Swans were observed during the spring raptor and large bird

surveys and the spring passerine migration survey. During the raptor and large bird surveys a pair was observed flying at 5m in elevation north of point 113 along the site's western boundary. During the spring passerine survey a pair was observed on the open water wetland at point 216, which is just south of the previous observation. These points are located near the Fish Lake and Thompson State Wildlife Refuge.

During the breeding season, Trumpeter Swans typically select small ponds, lakes, or bays within larger lakes with extensive beds of cattails, bulrush, sedges, and/or horsetail. Coffin and Pfanmuller (1988) state that "Muskrat houses and beaver lodges are frequently used for nesting platforms." They are known to protect large territories during the nesting period and are intolerant of crowding by other species. They have been known to kill perceived competitors such as pelicans while protecting breeding territories. Trumpeter Swan nesting territories range from 6 to 150 acres in size. They utilize large, shallow wetlands 1-3 feet deep with a diverse mix of emergent vegetation and open water. Such locations support a rich variety of submergent (underwater) plants used for food, such as sago pondweed and water milfoil.

While Trumpeter Swan may be present in the open water wetlands surrounding the site, they are unlikely to be present in the site's cropland. Open water wetlands within the site are found at two locations, near point 216 and 113 on the site's western boundary and near point 225 on the site's southern boundary. Trumpeter Swan may cross the site between wetlands, but waterfowl are generally capable of seeing and avoiding turbines (Madsen and Boertmann 2008 and AES staff observations). No Trumpeter Swans or other waterfowl mortality was found at the nearby Lakefield Wind Project in 2012 mortality surveys (Westwood Professional Services 2013). Due to these factors, risk of mortality to Trumpeter Swan at the site is likely to be low. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

Franklin's Gull. The Franklin's Gull is also listed as a Special Concern Species by the State of Minnesota. It was observed in large numbers during the second site visit of the spring raptor and large bird survey. During this visit 2,833 individual Franklin's Gulls were observed at 12 different points (47.2 gulls/hour obs.). Additionally 1,271 unidentified gulls were observed that were likely Franklin's Gull or Ring-billed Gull. These gulls were observed in cropland habitats flying at heights from 5 to 60m in elevation. Of all individuals observed the mean flight height was 20m and 81% were flying below the RSA.

This species is known to nest within large wetland complexes or lakes within the Prairie Parkland Province. The Franklin's Gull is a colonial nesting species that utilizes extensive prairie marshes for breeding, where it nests over water on floating vegetation or muskrat houses. Franklin's Gull colonies are known to switch locations between years in response to changing water levels, and water level disturbances are one of the largest threats to this species. It is this sensitivity to water level changes and colony nesting behavior that resulted in the identification of this species as special concern. A large colony of Franklin's Gulls occurs at Heron Lake in Jackson County, approximately 12 miles west of the site, just 4 miles northwest of the Lakefield Wind Project. Colony locations for this species are generally known, and there are no other known locations near the site (MNDNR 2013).

The individuals observed at the site were engaged in migration and did not appear during the surveys to exhibit a tendency to nest in the WMA's around the site. There is a risk of mortality to this species during the spring migration, but no Franklin's Gull mortality was observed at the Lakefield Wind Project in 2012 (Westwood Professional Services 2013), and mortality rates for waterfowl and waterbirds are typically low (NRCNA 2007, Jain 2005). For these reasons the risk of collision by Franklin's Gulls at the site is considered low. These preliminary conclusions will be reevaluated after the collection of fall migration data.

American White Pelican. American White Pelicans were observed on two occasions during the second raptor and large bird spring survey. Two flocks were observed, one with 16 individuals and one with 40 individuals. Overall 0.93 individuals per hour were observed during the spring raptor migration. None were observed during the spring passerine migration surveys. The two flocks observed were flying above the RSA at 200 and 300m.

The MNDNR currently lists this species as Special Concern and several studies have shown this species abundance is increasing across its range over the past 20-25 years (Wires et al. 2001; Evans and Knopf 1993). This species is a colonial nesting species that selects large, shallow bodies of water that are rich in fish which it preys upon. Usually the nesting site is a flat bare island that is isolated from human disturbance (Coffin and Pfannmueller, 1988). There is a small recently established nesting colony at Big Twin Lake in Martin County (Wires et al. 2005) approximately 3 miles southeast of the site.

Mortality risk for this species is predicted to be low. No mortality of this species has been observed at the nearby Lakefield Wind Project (Westwood Professional Services 2013), and waterfowl and waterbirds are generally able to see and avoid turbines (Madsen and Boertmann 2008 and AES staff observations). These preliminary conclusions will be reevaluated after the fall migration data.

Bald Eagle. Two Bald Eagles and one possible Bald Eagle were observed during the 68 hours of spring raptor and large bird surveys (Table 12). One of these observations was outside the site, and one was over 800m from a survey point. These two observations would not be used in collision risk modeling as defined by the USFWS (USFWS 2013). The possible eagle observation would qualify as an eagle minute in the USFWS risk model. No Bald Eagles were observed during the spring passerine survey. No Bald Eagles were observed on site during the April site visit; however, at that time, four Bald Eagles were observed in the vicinity of Fish Lake just west of the site.

Table 12. Bald Eagle observations

Eagle Obs.	Date/ Time	Point Num.	Location Description	Flight Behavior	Flight Ht. (m)	Eagle Min.	Eagle Min. below 200m elevation and within 800m of point
1	4/3/2013; 7:15am	114	West of point 1,200m; outside site boundary	Flew to perch in tree from the north, departure flight not observed	15	1	0
2	4/3/2013; 1:05pm	122	North of point 2,500m; inside site boundary	Soaring, circled upwards until out of site	150	2	0
3	4/4/2013; 8:54am	102	Southwest of point 700m; inside site boundary	Possible eagle flew low to the ground and out of sight. Ducks and geese spooked near where the bird was flying. Possible eagle couldn't be located in the circling ducks and geese.	3	1	1

Bald Eagles may occasionally fly over the site, but Bald Eagle activity at the site is likely to be generally low, as concluded from 68 hours of surveys during spring migration and the breeding season. Habitat at the site is generally of poor quality for nesting and foraging due to the lack of mature trees and open water. Eagles associated with the Des Moines River nest are likely to forage along the Des Moines River and neighboring bodies of water, and are less likely to forage at the site. It is possible that Bald Eagle activity at the site will increase as the regional Bald Eagle population increases; however it is unlikely that Bald Eagles would ever nest in the site itself due to lack of appropriate nest sites. It is possible that an eagle passing through the area may forage along the site's riparian corridors or on a road-killed carcass, but the site is not within the typical home range distance (Buehler 2000) of high quality Bald Eagle habitat, where most foraging is likely to occur. As discussed above, the nearest Bald Eagle nest is 3.5 miles from the site.

SGCN Species. Seven SGCN bird species without state status were observed on the site during the spring surveys. While these species are not protected under federal or state endangered species law, these are species that are considered vulnerable, declining or rare, and potential impacts to these species should be considered.

Of the SGCN species without state status none were common at the site. Bobolink was uncommon (0.22 individual per point count), and Northern Harrier was also uncommon (0.63 raptors/hour). These uncommon species are discussed in more detail below. The remaining species were rare at the site with 1-2 individuals observed, and included Brown Thrasher, Least Flycatcher, Northern Pintail, Red-headed Woodpecker and Upland Sandpiper. Of these rarer species only Upland Sandpiper was observed at a cropland point. The remaining species were observed at grassland or grassland/riparian points. Impacts to Upland Sandpiper are expected to be low, and sandpipers have had low overall mortality (CEIWEP 2007, Erickson et al. 2005, Westwood Professional Services 2013).

Bobolink. During the spring passerine migration, eleven Bobolink individuals were observed at seven grassland or riparian grassland points (0.22 birds per point count overall). No Bobolink were observed in cropland. Bobolink nesting density is greatest where it can hide its nest in dense, low vegetation, such as alfalfa, fallow field, and hay meadow (Brewer et al. 1991). The species is sensitive to habitat fragmentation (Johnson and Igl 2001) and has been declining in the eastern U.S. for decades (Sauer et al. 2008). Mortality to this species has occurred at some wind farms, including Buffalo Ridge in southwestern Minnesota, where turbines were placed in grassland habitat (Johnson et al. 2000b). No Bobolink mortality was observed at the Lakefield Wind Project where turbines were typically placed in cropland habitat (Westwood Professional Services 2013). It is expected that mortality and habitat displacement risks for this species will be low if turbines are placed in cropland away from permanent grassland habitat. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

Northern Harrier. Northern Harrier was observed at a rate of 0.63 birds per hour during the spring raptor and large bird surveys, and was not observed during the spring passerine migration survey. It was the most commonly observed raptor at the site, comprising 56% of raptor observations during the spring migration. It was observed in cropland and grassland habitats. A total of thirty-eight sightings were made at twenty different points. These raptors hunt small mammals (e.g., meadow voles, white-footed mice) in open landscapes and are often found in fallow fields, meadows, inland and coastal marshes, cultivated and uncultivated fields, sedge meadows and prairies. Northern Harrier prefers to nest in wet meadows, but will utilize grasslands and uncultivated agricultural fields. Observed foraging flight heights of Northern Harriers at the Odell site were at or below 20m for 95% of observed flights. Two observed flights were at 40m. Additionally, they appear to actively avoid turbines (Smallwood et al. 2009). Raptors have exhibited low mortality rates at recently constructed facilities (CEIWEP 2007, Erickson et al. 2005). Mortality risk to this species from direct collision is low. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

In summary, sensitive bird species were uncommon overall at the Odell site and least common in cropland habitat, although this trend was not significant. Of the sensitive species identified at the site, only Vesper Sparrow was commonly found in cropland. State special concern species included Trumpeter Swan, Franklin's Gull, and American White Pelican, which are from groups that have generally had low mortality at wind facilities, and are predicted to have a low risk of mortality at the site. Bald Eagle is likely to have a low risk of mortality at the site due to its minimal presence. The natural habitats concentrated in the site's riparian corridors tended to be the most important locations for sensitive bird species. Placing turbines in cropland at a distance from riparian corridors would present the lowest risk to sensitive bird species. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

3.3.3 Raptor Collision Risk

There are no known raptor migration routes near the site or topographic features likely to concentrate raptor migration. Compared to other known raptor migration sites, observed raptor passage rates were very low during the spring migration (Table 13). Fall migration passage rates will be investigated during raptor and large bird surveys in October and November, 2013. On average 1.1 raptors/hour passed surveyors during the AES raptor and large bird surveys in April, and 0.5 raptors/hour were observed during the May passerine surveys. The average among all surveys was 1.0 raptors/hour.

Northern Harrier comprised 56% of observations, Red-tailed Hawk 16%, and Turkey Vulture another 15%. Other species and groups, constituting 13% of observations, were American Kestrel, Bald Eagle, and unidentified hawks and raptors. Bald Eagle is protected under the BGEPA. See discussion below. Northern Harrier is a SGCN species in the Minnesota River Prairie region (MNDNR 2006). Potential impacts to this species are discussed in 3.3.2 above.

Table 13. Raptor observations by survey season

	Spring Raptor & Large Bird	Spring Passerine	All Surveys
Number of Species Observed	4	3	5
Individual Raptors	64	4	68
Hours of Observation	60	8.3	68.3
Raptors/ Hour	1.1	0.5	1.0

By contrast, major migration areas such as the Duluth Hawk Watch near Lake Superior may see several thousand birds per day, with an average passage rate of 135 birds/hour during the fall migration in 20 years of data collection (Ritter et al. 2012). Hawk migration through southwestern Minnesota is generally in a broad front due to the lack of geographic constraints to migration. There are a few migration routes along river corridors, but the nearest hawk watch sites only collect fall data because the spring migration is not concentrated enough to warrant data collection. The closest hawk watch sites are at Council Bluffs, Iowa, on the Missouri River (10 years of data, 190 miles southwest of the site), and Mankato, Minnesota, on the Minnesota River (3 years of data, 45 miles northeast of the site). These sites have generally low passage rates of 25.0 and 41.7 raptors per hour respectively (Orsag et al. 2012; Heins 2012). Those passage rates are 25-40 times greater than that observed at the Odell site during the spring.

Besides their local abundance, the flight behavior of raptors is helpful in discussing collision risk. Raptors that often use powered flight in migration—American Kestrel, Cooper's Hawk, Northern Harrier, Sharp-shinned Hawk—may differ in level of risk than consistently soaring raptors—buteos, eagles, vultures. Powered-flight raptors may be more maneuverable when not soaring, whereas soaring raptors that usually depend on updrafts of warmed air ("thermals") and on offshore winds may be less able to avoid turbines. In the spring raptor migration study, powered-flight raptors comprised 62% of observations and soaring raptors 38%; nearly all these soaring raptors were Turkey Vultures or Red-tailed Hawks. Outside the peak migration period, however, some powered-flight raptors do experience high mortality (e.g., Smallwood et al. 2009).

In summary, there are no known raptor migration routes near the site, and no topographic features that would concentrate raptor migratory activity. Data discussed above indicate that the raptors observed at the site during the spring migration occurred at much lower numbers than those observed at major migration sites. Soaring raptors which might have a greater collision risk during migration than powered-flight raptors were primarily of two common species, Turkey Vulture and Red-tailed Hawk. Due to the generally low raptor use of the site, it is unlikely that the Odell site is part of a spring raptor migration route. The overall risk to raptors at the Odell site is expected to be low. These preliminary conclusions will be reevaluated after the analysis of breeding and fall migration data.

3.3.4 Waterfowl and Waterbird Collision Risk

Southwestern Minnesota has a significant dabbling duck (e.g. Northern Shoveler, Mallard) migration (Lincoln et al. 1998). Diving ducks (e.g. Scaup and Bufflehead) also migrate through the region. Although the site itself has few areas of open water, the site is surrounded by wetlands and open water habitats. Many of these are protected as Wildlife Management or Waterfowl Production Areas by the MNDNR and the USFWS respectively (Map Exhibit 1). Wetlands are particularly concentrated on the northern border of the site, along the Des Moines River west of the site, and along a drainage corridor east of the site (Map Exhibit 2).

Waterfowl and waterbird activity was high during the April raptor and large bird surveys (Table 14). On average 307.4 waterfowl and waterbirds were observed per hour. During the May passerine migration survey waterfowl activity was moderate with 21.4 waterfowl and water birds observed per hour. Waterfowl activity was concentrated in the northeastern portion of the site where large flocks of geese and ducks flew between wetlands and foraged in agricultural fields (Map Exhibit 3).

Table 14. Waterfowl and waterbird observations by survey season

	Spring Raptor & Large Bird	Spring Passerine	All Surveys
Number of Species Observed	13	10	17
Individual Waterfowl and Waterbirds	18,442	178	18,620
Hours of Observation	60	8.3	68.3
Waterfowl and Waterbirds/ Hour	307.4	21.4	272.6

During the April raptor and large bird surveys large numbers of ducks and geese were observed flying together, often at significant distances from the survey point. It was not possible to identify and count individual species in these flocks, however most of the birds were probably Canada Geese, Mallards and Northern Shovelers, based on observations at the site and on incidental observations at wetlands around the site. These birds were recorded as unidentified waterfowl or unidentified ducks. Overall, unidentified waterfowl comprised 36% of observations and unidentified ducks 13% of observations. Large flocks of mixed gulls, likely Ring-billed Gull and Franklin's Gull, were also observed and comprised 7% of observations.

Of the identified waterfowl and waterbirds, Canada Goose was the most common species, accounting for 56% of all observations. During the second raptor and large bird survey (April 23 – 26), Franklin's Gulls were migrating through the site in large numbers, and accounted for 34% of all identified waterfowl and waterbirds (see discussion above). The remaining 10% of observations consisted of the following species (in order of decreasing abundance): Mallard, Double-crested Cormorant, Ring-billed Gull, American White Pelican, Snow Goose, Greater White-fronted Goose, Northern Shoveler, Blue-winged Teal, American Coot, Trumpeter Swan, Wood Duck, Northern Pintail, Great Blue Heron, Green Heron and Pied-billed Grebe. Observations away from the wetlands documented primarily Canada Goose, Franklin's Gull and Ring-billed Gull.

Few waterfowl and waterbirds have been killed at wind energy facilities (NRCNA 2007). For example, at the Top of Iowa site large numbers of Canada Geese were present, but no Canada Goose mortality was observed (Jain 2005). Likewise no waterfowl or waterbird mortality was observed at the nearby Lakefield Wind Project (Westwood Professional Services 2013). This may be due to waterfowl avoidance behavior or to effective siting of turbines in order to avoid waterfowl and waterbird concentration areas. Typical migratory flights of waterfowl are much higher than the RSA of wind turbines (Kerlinger 1995), and many waterbirds appear exceptionally adept at avoiding wind turbines. This avoidance behavior in flight has been observed at wind energy projects by some researchers (e.g., Madsen and Boertmann 2008) and by AES staff. Migrating waterfowl and waterbirds may be vulnerable when: a) ascending or descending from water bodies, b) feeding in and near wind energy projects, c) flying in inclement weather, d) flying in early morning and late evening if visibility is poor, and e) turbines are near or between roosting and feeding sites.

In summary, high numbers of waterfowl and waterbirds were observed on the site during the spring migration. Canada Goose was the most common species, followed by Franklin's Gull. Mallard, Double-crested Cormorant and Ring-billed Gull were also common. Waterfowl activity was concentrated in and near protected wetlands in the northwestern portion of the site. Because data and field observation suggest that waterfowl and waterbirds are able to see and avoid turbines, the risk to these species is expected to be low in

the majority of the site. The greatest risks will occur in the northwestern portion of the site near protected wetlands and during inclement weather when visibility is poor. These preliminary conclusions will be reevaluated after the analysis of breeding and fall migration data.

3.3.5 Habitat Displacement Risk

Grassland Birds. Habitat displacement—i.e., breeding at a reduced density due to environmental factors—has been documented in birds (Mabey and Paul 2007; Committee on Environmental Impacts of Wind-Energy Projects (CEIWEP) 2007). Bird species most at risk of habitat displacement are sensitive to the size of habitat patches or to intrusions into their habitat by human activities and infrastructure. These are generally called area-sensitive species (Ribic et al. 2009).

Area-sensitivity is a complicated phenomenon. Not just the size of grassland patches, but the landscape pattern of habitats around grassland patches, including the presence of trees and tall objects, is involved (Ribic et al. 2009). Species that are area sensitive are thought to also be sensitive to the proximity of non-grassland habitat, such as forests, although this sensitivity varies geographically (Ribic et al. 2009).

Species known to be sensitive to both habitat displacement and area effects are included in the AES sensitive species list. Prior studies to detect habitat effects caused by wind turbines have focused on grassland, steppe and shrubland birds since these have been shown in other studies to be more sensitive to habitat displacement than forest or wetland birds, and appear to be experiencing greater declines as a group in North America than forest birds (Leddy et al. 1999; Herkert et al. 2003; CEIWEP 2007; Mabey and Paul 2007). Possible mechanisms for avoidance behavior include: a) the perception by grassland birds that turbines are vertical structures, like trees, and are to be avoided, and b) the visual disturbance of moving blades. Others have documented displacement of grassland birds due to traffic noise (e.g., Forman et al. 2002), but it is not known if a noise level from a wind turbine is perceived by birds to be similar to noise levels from traffic.

Birds present at the site and typically considered area-sensitive grassland species were Savannah Sparrow, Horned Lark, Vesper Sparrow, Bobolink, Western Meadowlark, Upland Sandpiper and Northern Harrier. Bobolink and Savannah Sparrow have been shown to experience displacement in grassland and similar habitat when turbines are in the habitat or nearby. One study in Minnesota found that the nesting density of these two species, together with Red-winged Blackbird and Sedge Wren, were four times lower within 80m of wind turbines than when 180m from turbines (Leddy et al. 1999). In this study in extensive grasslands, Bobolink, Savannah Sparrow and Western Meadowlark were among the most common species. Johnson et al. (2000a) also documented reduced grassland bird densities within 100m of turbines at the same southwest Minnesota wind energy facility (Buffalo Ridge) as did Leddy et al. (1999). It has been pointed out that habitat displacement studies are few and sometimes report contradictory or inconclusive results (Mabey and Paul 2007; CEIWEP 2007).

Habituation is the tendency of individuals to increase their use of areas where a human intrusion into the habitat had previously reduced their density. The Buffalo Ridge study (Johnson et al. 2000a), where habitat displacement was demonstrated for some species, did not directly assess habituation, and habituation may have complicated the results. It used a BACI experimental design (Before/After Control/Impact). However, time since construction may have influenced densities of the grassland bird species that exhibited habitat displacement. The Buffalo Ridge study took place over 4 years (1996-1999). Sample points were randomized throughout the Buffalo Ridge wind development area. During the study some points fell within the 73-turbine Phase 1 at 2-6 years after construction, some points in the 73-turbine Phase 2 at 1-2 years after construction, and some in the 138-turbine Phase 3 at 1 year after construction. The sample points span a range of time since construction, from 1 year to 6 years, and full habituation to the turbines may not have occurred, if it does occur in these species. If habituation to wind turbines occurs in these species, then sample points placed in locations where turbines were recently erected at Buffalo Ridge may have had a lower density in the study than locations where turbines were built several years before sampling occurred.

Grassland habitat in and near the Odell site is concentrated along the site's riparian corridors, the judicial ditch north of the site, South Fork Watonwan River in the center of the site, North Fork Elm Creek in the

south of the site and Cedar Run in the southeastern corner of the site. There are also three moderate sized grasslands (90-140acres) located in or near the northeastern portion of the site.

As described above, area-sensitive grassland birds tend not to use small habitat patches (Ribic et al. 2009). Of the seven area-sensitive grassland birds at the site, Horned Lark, Vesper Sparrow, Upland Sandpiper and Northern Harrier were consistently found to be area sensitive, while Bobolink, Western Meadowlark and Savannah Sparrow were area sensitive in some studies and not others (Warner 1994; Herkert 1995; Johnson and Igl 2001; Ribic et al. 2009). Several studies have demonstrated that forest edges and even solitary trees can affect the density of grassland birds (e.g., Renfrew and Ribic 2008). In the first of these studies, Johnson and Temple (1990) documented that several species of grassland birds had lower nesting density and higher rates of predation near forests. Thus, the grassland birds at the Odell site that may exhibit displacement behavior in the presence of wind turbines may be absent from the smaller grasslands with greater tree encroachment. These species are more likely to be present in the larger grasslands at the site.

In summary, the more or less permanent grasslands and pastures in the Odell site are possibly important to already at-risk grassland bird species. Wind development may reduce breeding densities of these species through habitat displacement. Large and clustered grassland habitats should be avoided when siting turbines. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

Waterfowl and Waterbirds in Agricultural Foraging Habitat. Waterfowl (primarily Canada Goose) use agricultural fields during migration to put on the weight necessary to complete their journey (Petrie and Wilcox 2003). Because most waterfowl avoid tree lines, trees and other tall objects, wind turbines potentially may cause swans, waterfowl, and waterbirds to not use some areas where they have foraged in the past. Displacement from foraging habitat was observed in Pink-footed Geese at a wind farm development (Larsen and Madsen 2000). In subsequent years, the geese began using portions of the wind energy project, reducing the original displacement distance by 50-60% (Madsen and Boertmann 2008). This suggests that habituation to turbines is possible in waterfowl.

Most waterfowl foraging is expected to occur near the protected open water wetlands along the site's northern and western boundaries where the greatest waterfowl activity was observed during the spring migration. However, habituation to turbines is likely to occur, reducing the impact of wind development over time. In addition, thousands of acres of cropland remain outside the site. These preliminary conclusions will be reevaluated after the analysis of breeding and fall migration data.

4. TIER 3 – BAT FIELD STUDIES

4.1 Acoustic Monitoring Methods

Bat activity data were collected using full spectrum acoustic monitoring and data logging platforms (Song Meter SM2Bat+, Wildlife Acoustics, Inc., Concord, MA, USA). The Song Meter SM2Bat+ records full spectrum bat echolocation calls over time to compact flash cards (CF cards). One detector with two microphones was deployed on each of three met towers for the 2013 season. One SMX-US microphone was mounted at 3m and a second microphone was mounted at 55m above ground level (see Appendix 3 for photos). This report provides data collected from the spring migration data collection at one of these towers (Table 15). Due to logistical constraints, detectors were not deployed on the remaining two towers until June. Data from the full 2013 survey season at all detectors will be compiled in a final report at the end of the survey season.

Three met towers were located in or near the proposed site in the agricultural landscape (Map Exhibit 1 & 2). Met Tower 1 (Tower 1) is located on the northwest corner of 400th Street and 550th Avenue in an extensive cornfield. Met Tower 2 (Tower 2) is located on the southwest corner of 420th Street and 590th Avenue, in a small CRP grassland surrounded by crop fields. Met Tower 3 (Tower 3) is located in the northwest corner of 430th Street and 550th Avenue, just south of Tower 1 in a cornfield.

Each microphone was positioned at a slight downward angle to reduce condensation and/or water damage to the microphone. All microphones were positioned opposite the prevailing wind direction, and connected with an extension cable to the platform/recording system, which was housed at ground level in a weatherproof box. The detectors were powered by a 12V battery, recharged daily by a 10W solar panel attached to the tower at ground level. The detectors were programmed to record calls from sunset to sunrise each day.

Table 15. Bat acoustic monitoring set-up and dates

Tower	Sensor Elevation	Deployment Date	Expected Removal Date
Tower 1	3 meters	April 29, 2013	November 1, 2013
Tower 1	55 meters	April 29, 2013	November 1, 2013
Tower 2	3 meters	June 5, 2013	November 1, 2013
Tower 2	55 meters	June 5, 2013	November 1, 2013
Tower 3	3 meters	June 5, 2013	November 1, 2013
Tower 3	55 meters	June 5, 2013	November 1, 2013

Bat acoustic monitoring data were downloaded as necessary to ensure no loss of data. Each data file was downloaded and processed using a computer application program, *Kaleidoscope*. Once the data were downloaded, they were transferred for later analysis to a folder with the site name, tower number, monitoring height, and date of download. Each data card was given a specific number which correlated to the monitoring location.

Data from detectors was downloaded and processed throughout the sampling period. Prior to summary and analysis, all irrelevant noise was eliminated from the data. The clean bat calls were placed in previously labeled bat call files with monitoring location, monitoring height, and date of download. AES defined a bat call as a series of ≥2 echolocation calls with duration of ≥10 ms (Hayes 1997; Thomas 1988; Weller 2007). Each call file was visually inspected to determine whether it was a bat pass. Bat passes were then identified to species if possible, comparing minimum frequency and call shape to a library of vocal signatures (O'Farrell et al. 1999). *Myotis* were identified to genus level due to the inherent difficulty in distinguishing *Myotis* species. Unidentifiable calls were labeled as being produced by high (≥35 kHz) or low (<35 kHz) frequency echolocating bats, based on their minimum frequency (See Appendix 4 for Voucher calls).

4.2 Acoustic Monitoring Results and Discussion

4.2.1 Bat Species Detected

Acoustic monitoring detected three species of bats (Big Brown, Hoary, and Eastern Red) and two unidentified groups of bats (high and low echolocation frequencies) (Table 16).

Unidentified low-frequency bats may have included the Hoary, Big Brown and Silver-haired Bats. The unidentified high-frequency bats likely included Eastern Red Bat and possibly Tri-colored Bat or *Myotis* species. If *Myotis* species were present in the unidentified high-frequency group they would most likely be Little Brown Bat, but could possibly be Northern Long-eared Bat. Both are present in the region, but the most common *Myotis* species in cropland settings is thought to be Little Brown Bat. It is more general in its habitat preferences than other *Myotis* species and tends to forage along water, in cropland and over woodlots, rather than in the interior of woodlots. Northern Long-eared Bat typically forages in or above forests, and could occur at the site in migration. Forested breeding habitat for this species is absent from the site.

Table 16. Bat species detected at the Odell Wind site

Subfamily	Scientific Name	Common Name	Feeding Habitat	Roosting Habitat	Detection Period
Vespertilioninae	*Eptesicus fuscus*	Big Brown Bat	Meadows, over water, trees, backyards	Buildings or trees	4/29/13-5/31/13
Vespertilioninae	*Lasiurus cinereus*	Hoary Bat	Clearings, fields, over streams	Trees	4/29/13-6/3/13
Vespertilioninae	*Lasiurus borealis*	Eastern Red Bat	Trees, clearings, over water	Trees	5/18/13-5/30/13

4.2.2 Bat Activity Level Indicated by Calls

From April 29, 2013 to June 6, 2013 the two microphones at the met tower 1 recorded a total of 134 bat calls in 39 nights of recording. The mean number of calls per detector-night for the high and low microphones combined was 1.7 (134 bat calls/78 detector-nights) (Table 17).

Table 17. Bat activity & species composition at Odell Met Tower 1 (55m & 3m combined)

Species	Total Calls	Calls Per Detector-Night	% All Calls
Low Frequency Call Group			
Hoary Bat*	57	0.7	42.5
Unknown <35 kHz	33	0.4	24.6
Big Brown Bat	23	0.3	17.2
High Frequency Call Group			
Eastern Red Bat*	13	0.2	9.7
Unknown >35 kHz	8	0.1	6.0
Total Calls	**134**	**1.7**	**100.0**

*Migratory tree bat species

Met Towers 2 and 3 were installed on June 5, 2013, and did not record any calls in the one-day sampling period when data were collected; hence they are not reported here. The complete season of data will be analyzed and reported following the end of the survey season. Bat activity of 1.7 calls per detector-night for the spring monitoring period at met tower 1 was in the low range of reported activity for other wind energy projects (Table 18), although bat activity is typically at its lowest during the spring migration and breeding periods, and many surveys do not report data from the spring migratory period. Activity levels will be fully assessed after collection of a full season's data.

Data from Mountaineer and Buffalo Mountain in the eastern United States and from Foote Creek Rim and Buffalo Ridge in the eastern Rockies and Great Plains, suggest a relationship between accurately assessed bat activity and actual post-construction mortality rates. In these projects the mortality rates are of the same order of magnitude as the bat activity detected by acoustic monitoring. Of course this pattern does not hold for all wind energy projects. The relationship of bat activity at the Odell site to other sites will be assessed after additional data collection.

Table 18. Comparison of Odell bat activity to other wind energy projects

Project Name, Location	Survey Dates	Bat Activity (Calls per Detector-Night)	Mortality (Bats per Turbine per Year)	Reference
Mountaineer WV	Aug 1-Sep 14, 2004	38.3	38.0	Gruver 2008a
Top of Iowa IA	Sep 4-Oct 9, 2003 May 26-Sep 24, 2004	34.9	10.2	Gruver 2008a
Buffalo Mountain TN	Apr 1-Sep 30, 2001-2002	23.7	20.8	Gruver 2008a
Butler Ridge Wind Farm WI	Jul 19-Sep 30, 2005	23.0	Unknown	Redell et al. 2006
Lakefield Wind Project MN (north recorders)	Apr 1-Oct 31, 2011	8.4 (45m) 13.1 (5m)	Unknown	Rodriguez 2011
Lakefield Wind Project MN (south recorders)	Apr 1-Oct 31, 2011	6.6 (45m) 10.4 (5m)	Unknown	Rodriguez 2011
Fowler Ridge Wind Farm, IN	Apr 13 – May 15, 2010; Aug 1 – Oct 15, 2010	1.34 (Spring) 8.12 (Fall)	0.43-1.25 (Spring) 15.73-24.17 (Fall)	Good et al. 2011
Blue Sky Green Field WI	Jul 24-Oct 29, 2007	7.7*	40.5	Gruver 2008b, Gruver et al. 2009
Glacier Hills WI	Aug 16-Oct 29, 2007	5.7	Unknown	Gruver 2008a
South Central PA	Aug 1-Nov 1, 2005	4.9	Unknown	Arnett et al. 2006
Lincoln WI	Jul 1999 – Jul 2001	Unknown	4.3	Howe et al. 2002
Foote Creek Rim WY	Jun 15-Sep 1, 2000-2001	2.2	1.3	Gruver 2008a
Buffalo Ridge MN	Jun 15-Sep 1, 2000-2001	2.1	2.2	Gruver 2008a
Odell MN	April 29 – Jun 6, 2013	1.7	Unknown	This study

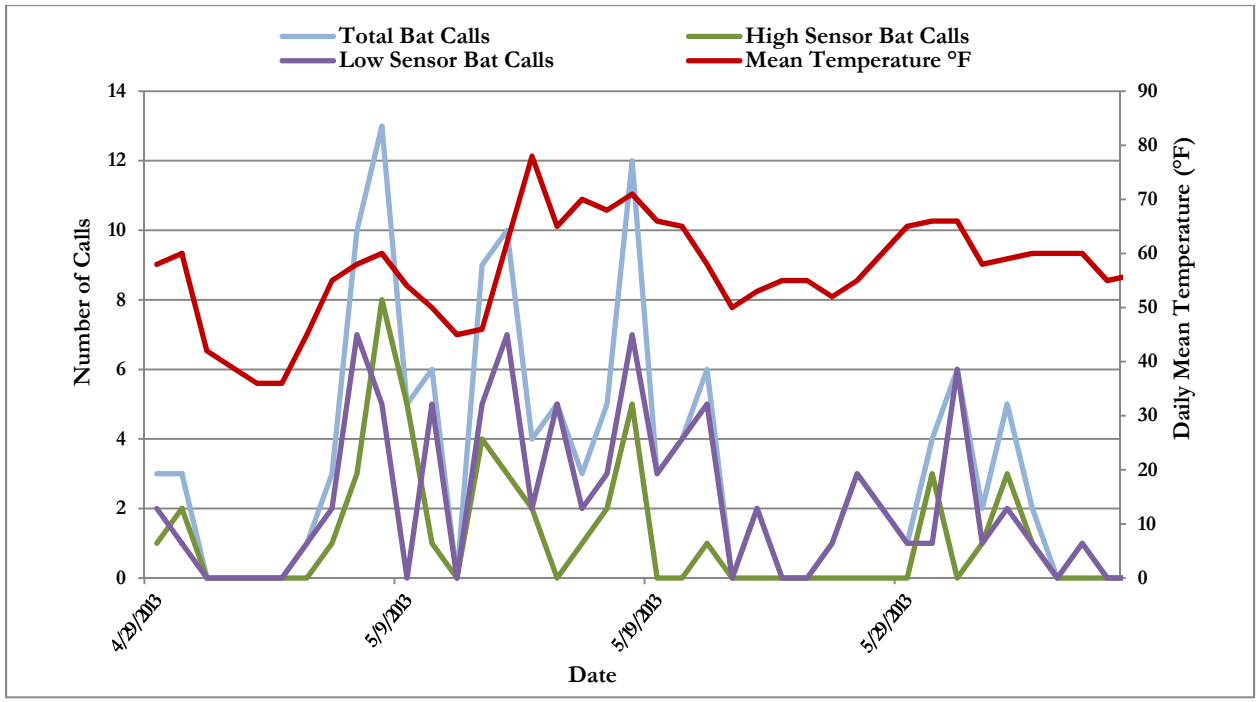
* Although an average of 7.7 calls per night were recorded at ground level across all met tower locations, the reference location at the edge of a woodlot near a trail and stream recorded 97% of all calls in the study.

4.2.3 Seasonal Pattern of Bat Activity

Bat activity was variable over the spring study period, with distinct peaks on particular days (Figure 1). The highest peaks in bat activity corresponded with higher temperatures, although passage of weather fronts complicated this simple pattern. Acoustic monitoring studies at other wind facilities reported similar variation in bat activity with temperature (e.g., Fielder 2004; Redell et al. 2006; Reynolds 2006). Erickson and West (2002) reported that both regional patterns of climatic conditions as well as local weather conditions could be used to predict bat activity. Bats are known to be less active in periods of rain, low temperatures and strong winds (Eckert 1982; Erickson and West 2002). Many of these relationships may be related to variation in insect activity with weather patterns. For example, strong winds can influence insect abundance and activity,

which in turn can influence bat activity. The timing of high bat activity with bat mortality levels also has been previously reported (e.g., Fiedler 2004; Johnson et al. 2004; Jain 2005) and suggests that temporal patterns of activity may prove useful for predicting the timing of mortality events (Redell et al. 2006).

Figure 1. Nightly bat activity at the Odell Met Tower 1 site



4.2.4 Differences in Activity Among Bat Species and Locations

Hoary Bat was the most frequently recorded bat (42.5% of calls) (Table 18). Big Brown Bat (17.2% of calls) and Eastern Red Bat (9.7% of calls) were also common at the site. The remaining calls were unidentifiable: 6.0% were in the high frequency call group (Eastern Red Bat, Tri-colored Bat and/or *Myotis* species) and 24.6% were in the low frequency call group (Hoary Bat, Big Brown Bat and/or Silver-haired Bat).

Bat activity typically is greater at low elevations (<5m) than at the high elevation of the RSA (e.g. Redell et al. 2006, Arnett et al. 2006). This pattern of activity was observed at Odell with 64.9% of calls at 3m and 35.1% of calls at 55m (Table 19). This pattern may be caused by greater insect abundance at lower elevations, more advantageous feeding conditions for bats at lower elevations, or a combination of these and other factors such as surrounding topography, vegetation and water features and the resultant local wind patterns.

At the high elevation Hoary Bat was the most common species (70.2% of calls at 55m) (Table 19). More Hoary Bat calls were recorded at the high elevation than at the low elevation (57.9% versus 42.1% respectively), as is frequently reported for this species (e.g. Baerwald and Barclay 2009). Eastern Red Bat was also present at the high elevation (6.4% of calls at 55m), but was present in greater numbers at the low elevation (76.9% versus 23.1% respectively). Big Brown Bats were recorded at the high elevation in low numbers, but were much more common at the 3m elevation. No *Myotis,* Silver-haired, or Tri-colored Bats were recorded at either elevation in the spring migratory data.

At the low elevation Hoary Bat was the most common species (27.6% of calls at 3m) (Table 19). Big Brown and Eastern Red Bats were also common (24.1% and 11.5% of calls at 3m, respectively).

High-frequency bats (e.g. *Myotis,* Eastern Red Bat) are thought to be more active at low elevations than high elevations (Arnett et al. 2007). This is presumably due to a smaller body size and higher energy requirements of the high frequency bats compared to the larger, lower frequency bats. In order to conserve energy, high

frequency bats are theorized to forage closer to ground level where insects are more plentiful and wind speed is lower. Activity at the low elevation represented 72.9% of high frequency calls (Table 20).

Table 19. Bat activity species composition at Odell Met Tower 1 by elevation

Species	Elevation	Total	Calls Per Detector-Night	% All Calls at Elevation
Low Frequency Call Group				
Big Brown Bat	55m	2	0.1	4.3
Big Brown Bat	3m	21	0.5	24.1
Hoary Bat*	55m	33	0.8	70.2
Hoary Bat*	3m	24	0.6	27.6
Silver-haired*	55m	0	0.0	0.0
Silver-haired*	3m	0	0.0	0.0
Unknown <35 kHz	55m	7	0.2	14.9
Unknown <35 kHz	3m	26	0.7	29.9
High Frequency Call Group				
Eastern Red Bat*	55m	3	0.1	6.4
Eastern Red Bat*	3m	10	0.3	11.5
Myotis	55m	0	0.0	0.0
Myotis	3m	0	0.0	0.0
Unknown >35 kHz	55m	2	0.1	4.3
Unknown >35 kHz	3m	6	0.2	6.9
All Call Groups, All Calls				
Total Calls		134	1.7	100.0
Total Calls at 55m	55m	47	1.2	35.1
Total Calls at 3m	3m	87	2.2	64.9

*Migratory tree bat species

Table 20. Summary of bat activity at Odell Met Tower 1 by elevation

Group	Elevation	Total	Calls Per Detector-Night	% of All Calls at Each Elevation	% of Each Group's Calls at Each Elevation
Low Frequency Calls	55m	42	0.5	89.4	37.2
Low Frequency Calls	3m	71	0.9	81.6	62.8
High Frequency Calls	55m	5	0.06	10.6	23.8
High Frequency Calls	3m	16	0.2	18.4	76.2
Low & High Frequency Calls	55m	47	0.6	100.0	35.1
Low & High Frequency Calls	3m	87	1.1	100.0	64.9
Total Calls - Both Elevations		**134**	**1.7**	**100.0**	**100.0**

Overall, species composition indicated by call activity at the proposed Odell site included 52% migratory tree bats (Hoary and Eastern Red Bats). However, the percent of migratory tree bats varied by elevation. At the 55m elevation, migratory tree bats comprised over three-fourths of all calls (76.6%). At the 3m elevation,

migratory tree bats made up less than half of all calls (39.1%). The high percentage of migratory tree bat calls at the 55m elevation is due to the presence of the migratory forest-dwelling Hoary Bat.

4.3 Bat Collision Risk

In summary, bats known to be susceptible to wind energy project mortality occur at the site during the spring migration, and are likely to be present at the site through the end of seasonal bat activity. The level of activity at the Odell site cannot be directly compared to other sites that report data, as these studies frequently do not cover the spring migratory period, and the peak fall bat migration period has not yet been studied at the Odell site. Bat activity level at the site will be assessed when data collection is complete.

Impacts are likely to be greatest during the peak migration (July 15-September 15), at low wind speeds, and associated with the passage of weather fronts. Due to the proximity to and habitat similarities with the Lakefield Wind site, it is possible that bat mortality at the Odell site could be similar to that found at the Lakefield site, which has bat activity that is in the mid-range of values reported at Midwestern wind energy development sites (Table 18). However, until the bat study is completed at Odell and mortality data are collected, the level of bat mortality at the Odell site cannot be predicted with confidence.

5. SUMMARY OF RESULTS OF TIER 1, 2 & 3 ANALYSIS

5.1 Summary of Issues of Concern

Issues discussed in this report are listed below from greatest to least concern, with the assumption of ***no*** avoidance, minimization or mitigation (Table 21). The level of concern would decrease if avoidance, minimization and mitigation were employed. Best management practices are recommended by the USFWS (2012a) (Appendix 5). In addition to these recommendations, site-specific recommendations derived from literature and the 2013 surveys are provided below. These conclusions and recommendations will be reevaluated upon completion of Tier 3 assessments at the Odell site.

Table 21. Issues of Concern

Topic	Regulatory Framework
Migratory Bats	None for species detected
Minnesota County Biological Survey Sites of Moderate Significance	None
Henslow's Sparrow	State Endangered Species Act, MBTA
Migratory Passerine Birds	MBTA
Breeding Bird Collision	MBTA
Waterfowl and Waterbird Collision	MBTA
Trumpeter Swan (state threatened), Franklin's Gull (state special concern), American White Pelican (state special concern)	State Endangered Species Act, MBTA
Regionally Sensitive Species (SGCN Bird Species)	MBTA
Prairie Bush Clover (federal and state threatened) and Poweshiek Skipperling (federal candidate, state special concern)	Federal and State Endangered Species Acts
Northern Long-eared Bat	Federal and State Endangered Species Acts
Phlox Moth, Sullivant's Milkweed	State Endangered Species Act
Grassland Bird and Waterfowl Habitat Displacement	None
Bald Eagle	BGEPA, MBTA, State Endangered Species Act
Raptor Collision	MBTA

5.1.1 Migratory Bats. Migratory tree bats that have experienced mortality at other wind sites are present at the site in low numbers during the spring migration. There are no bat species currently protected under the federal ESA. There are three species possibly present at the site, Tri-colored Bat, Northern Long-eared Bat and Little Brown Bat and one species present at this site, Big Brown Bat, listed as state special concern.

Bat activity at the Odell site was at the low end of that reported from other wind energy projects, although bat activity is typically at its lowest during the spring migration and breeding period. Three species of bats (Big Brown, Eastern Red, and Hoary) have been documented to date during acoustic monitoring. Two of these are migratory tree bats (Hoary and Eastern Red Bat). Mortality for these species is sometimes in proportion to the pre-construction abundance indicated by bat call activity. It is likely that mortality will occur at the Odell site, and that mortality will be similar to other wind energy projects in agricultural regions of the Midwest with low-to-moderate bat activity. Hoary and Eastern Red Bats may experience the greatest mortality.

Risk of mortality at the Odell site is likely to be greatest on nights in the July 15-September 15 period which correspond to the passage of the largest numbers of migratory tree bats and an increase in the abundance of Big Brown Bats. Due to changing weather conditions, each night carries a different level of risk. During the periods of peak passage, weather conditions that are most conducive to high mortality rates occur with warm temperatures (>50F) and low wind speeds (<6.5m/s) (Baerwald et al. 2009, Arnett et al. 2010, Good et al. 2011, Cryan and Brown 2007). In addition, risk is higher on the first night following the passage of a low pressure system when the prevailing wind shifts from a southerly to a northerly direction (Cryan and Brown 2007, Good et al. 2011).

5.1.2 Minnesota County Biological Survey Sites of Moderate Significance. The Minnesota County Biological Survey has identified six significant sites within the project. One is a prairie wetland complex in the northeastern portion of the site that is considered of high significance. Four are considered of moderate significance, and one is considered below the standard of statewide significance. Impacts to the high and moderate quality natural areas should be avoided during construction and operations.

5.1.3 Henslow's Sparrow. A record exists for Henslow's Sparrow on the southern edge of the Bennett WMA. This species could also be present in the larger grasslands at the site. Based on flight behavior direct collision mortality for this species is likely to be low. Habitat displacement effects for this species are unknown. A buffer of large grassland habitat patches would reduce potential for direct and indirect impacts to this species.

5.1.4 Migratory Passerine Birds. Passerine bird mortality during spring and fall migration is typically the greatest source of bird mortality at wind energy developments. Migratory passerine use of the site was typical of Midwestern agricultural habitats, and mortality for these species is predicted to be similar to that at other Midwestern wind energy developments.

5.1.5 Breeding Bird Collision. Breeding bird collision is an issue of low concern due to the small numbers of at-risk species likely in cropland where turbines will be placed. Analysis of point count data from the breeding season will be used to reevaluate this conclusion. Sensitive bird species were uncommon at the site, particularly in cropland. In cropland, where most wind turbines will be placed, post-construction mortality is expected to be similar to mortality at other Midwestern wind energy projects.

5.1.6 Waterfowl and Waterbird Collision. Southwestern Minnesota is known for significant activity during the waterfowl migration, and activity at the site was high during the April migratory period. Activity was particularly high along the site's western and eastern boundaries where open water wetlands are concentrated. Canada Goose, Franklin's Gull, Mallard, Double-crested Cormorant and Ring-billed Gull were commonly observed species. Collision risk is low for waterfowl and waterbird species because studies and observations indicate that waterfowl and waterbirds can see and avoid turbines during flight. However, due to the high activity level, turbine placement should avoid areas of high waterfowl activity.

5.1.7 Trumpeter Swan (state special concern), Franklin's Gull (state special concern), American White Pelican (state special concern). Three birds protected under the state endangered species act were observed at the site during the spring migratory period. Trumpeter's Swan was observed near a wetland on the site's western boundary. Franklin's Gull was observed in significant numbers throughout the site during one week of the spring migration. American White Pelican flocks were occasionally observed crossing the site during the spring migration. Collision risk for all of these species is relatively low as they are likely able to see and avoid turbines, and waterfowl/waterbird mortality has been low at most wind facilities.

5.1.8 Regionally Sensitive Species (SGCN Bird Species). Seven Minnesota River Prairie ecoregional SGCN species were observed during the spring migratory period. These are in addition to the three species having state status discussed above. These species are considered vulnerable, declining or rare. None of them was common at the site. Bobolink and Northern Harrier were the most frequently observed species. Northern Harrier typically has had low mortality at wind facilities likely due to its flight behavior, which is usually observed to be below 20m. Bobolink was observed in grassland habitat at the site. By siting turbines in cropland habitat away from large grassland patches, impacts to this species can be reduced. Of the remaining SGCN species only Upland Sandpiper was observed in cropland habitat, and mortality for sandpipers is typically low.

5.1.9 Northern Long-eared Bat. Northern Long-eared Bat has been proposed for listing under the ESA. This species is experiencing steep population declines due to White Nose Syndrome. A decision on whether listing the Northern Long-eared Bat is warranted is expected late in 2013. This species is known to occur throughout Minnesota, although it prefers forested habitat. Due to lack of significant forest habitat it is unlikely to breed at the site, although it could be present during migration. If Northern Long-eared Bat is listed, the listing could be effective by late 2014 and require coordination with the USFWS. Coordination would establish potential impacts of the project and identify appropriate actions to address impacts.

5.1.10 Prairie Bush Clover (federal and state threatened) and Poweshiek Skipperling (federal candidate, state endangered). Prairie Bush Clover and Poweshiek Skipperling are possibly present in some of the project's counties. These species are both found in remnant prairie habitat. If the project avoids prairie remnants, impacts to these species are not likely.

5.1.11 Phlox Moth and Sullivant's Milkweed. Records of the state special concern Phlox Moth and state threatened Sullivant's Milkweed occur at a prairie in the northeastern portion of the site. Additional prairie remnants occur in the site and could contain these or other rare prairie features. Impacts to these species are not expected, if impacts to prairie remnants are avoided during construction and operations.

5.1.12 Grassland Bird and Waterfowl Habitat Displacement. Some grassland bird species (e.g., Bobolink, Savannah Sparrow) appear to avoid wind turbines, reducing their nesting density within 200m of turbines and potentially affecting local populations (Johnson et al. 2000a). Forman et al. (2002) detected a reduction in grassland breeding bird density at up to 400m due to highway noise; whether noise from wind turbines has a similar effect is not known. Grassland habitat in and near the Odell site is concentrated along the site's riparian corridors, the judicial ditch north of the site, South Fork Watonwan River in the center of the site, North Fork Elm Creek in the south of the site, and Cedar Run in the southeastern corner of the site. There are also three moderate-sized grasslands (90-140 acres) located in or near the northeastern portion of the site. These locations have a greater potential to provide habitat for grassland birds than small grasslands. While habitat displacement during the breeding season is a possibility, suitable grassland is limited at this site, making this an issue of low concern.

Waterfowl use agricultural fields in and near the site during migration. Waterfowl have been observed to avoid foraging near wind turbines, although habituation to the presence of wind turbines has been observed. Due to the likelihood of habituation, and the availability of agricultural land for foraging outside of the wind facility this is considered an issue of low concern.

5.1.13 Bald Eagle. There is a low level of concern for potential Bald Eagle mortality at the site. The Bald Eagle is protected under the BGEPA. There is one known nest within 10 miles of the site along the Des Moines River. This nest was active during the first portion of the breeding season in 2013, but abandoned during the second portion of the breeding season. No other nests were identified in a stick nest survey of the site and a 2-mile buffer area around the site.

Bald Eagles were observed at nearby Fish Lake during the site visit in April. There were three observations of Bald Eagles during the raptor and large bird survey. One observation was outside the site boundary, another observation was over 800m from the observation point. These observations would not be typically used in calculating risk per the USFWS risk model. One Bald Eagle was observed within 800m of a point in the site, and under 200m. This Bald Eagle observation would typically be used in the USFWS risk model (USFWS 2013).

The site, with its limited forest and lack of open water habitat, does not contain high quality Bald Eagle nesting or foraging habitat. The Bald Eagle population is expanding, and it is possible that Bald Eagles may establish additional nesting territories within 10 miles of the site at some point in the future; however, it is unlikely that Bald Eagle will nest within the site itself.

A guidance document for eagles for wind energy development was completed by the USFWS (2013). The guidance recommends a sequence of investigative steps, leading to a conservation plan that includes mitigation, should impacts to eagles warrant mitigation. The steps include calculation of eagle nest density within 10 miles of the project boundary, documentation of eagle use of the area, creation of an impact model, and calculation of mitigation needs. A continuous but fully mitigated level of taking (programmatic take) can be permitted under the Bald and Golden Eagle Protection Act.

5.1.14 Raptor Collision. There are no known raptor migration routes near the site. Raptors were observed in much lower numbers than those at major migration sites. Due to the low raptor use of the site and typical raptor mortality rates, it is unlikely that significant numbers of raptors would be killed at the Odell site.

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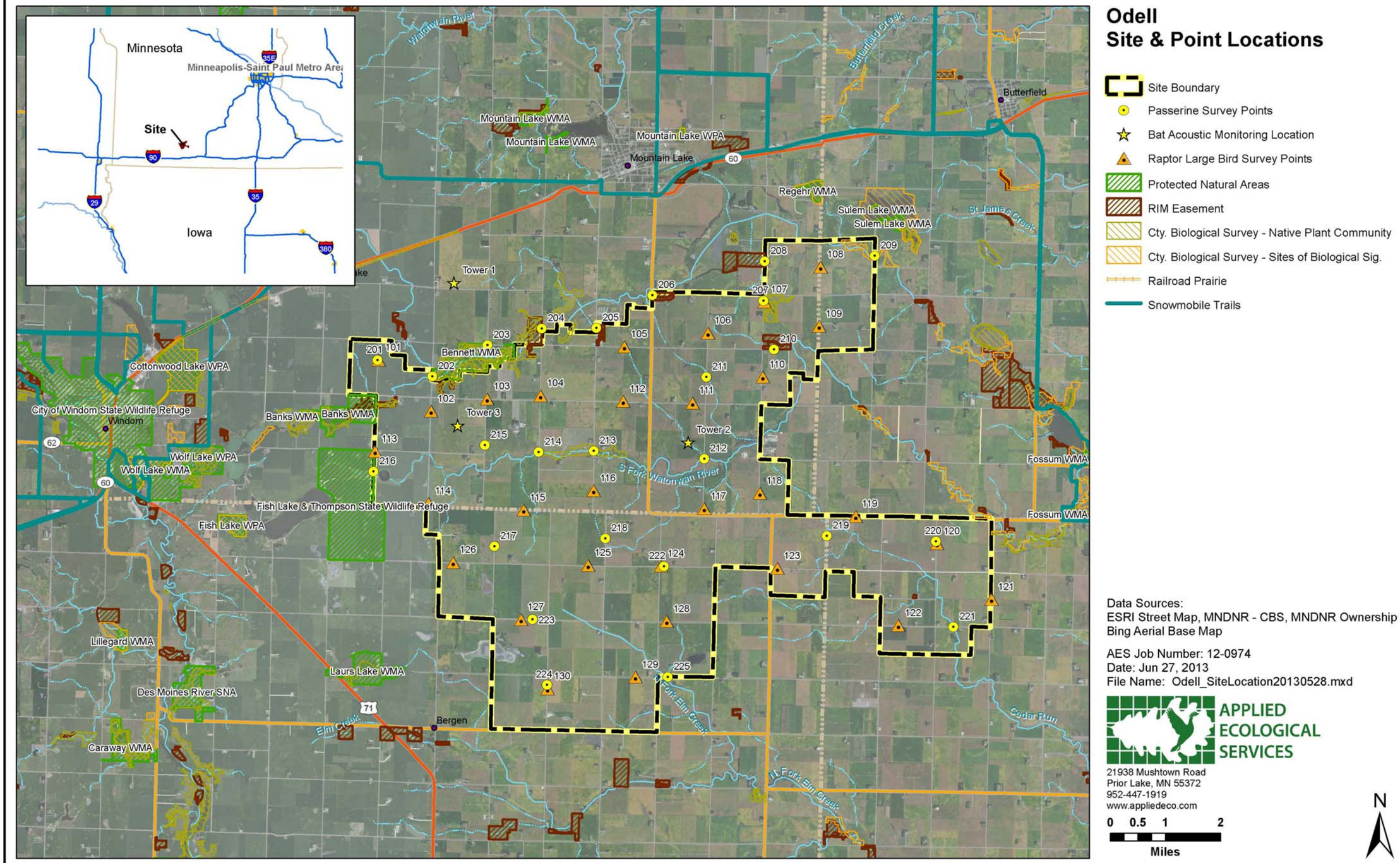
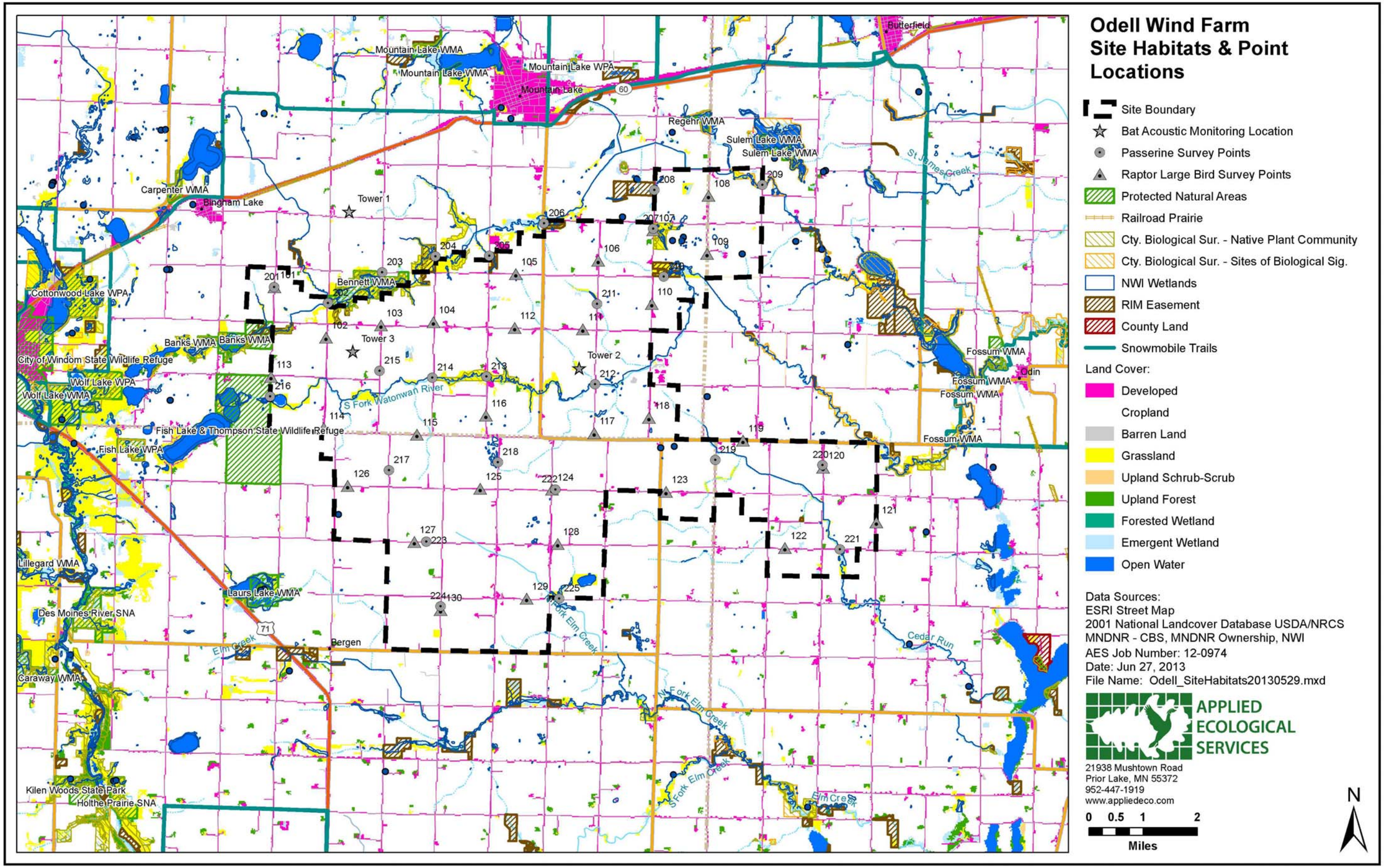
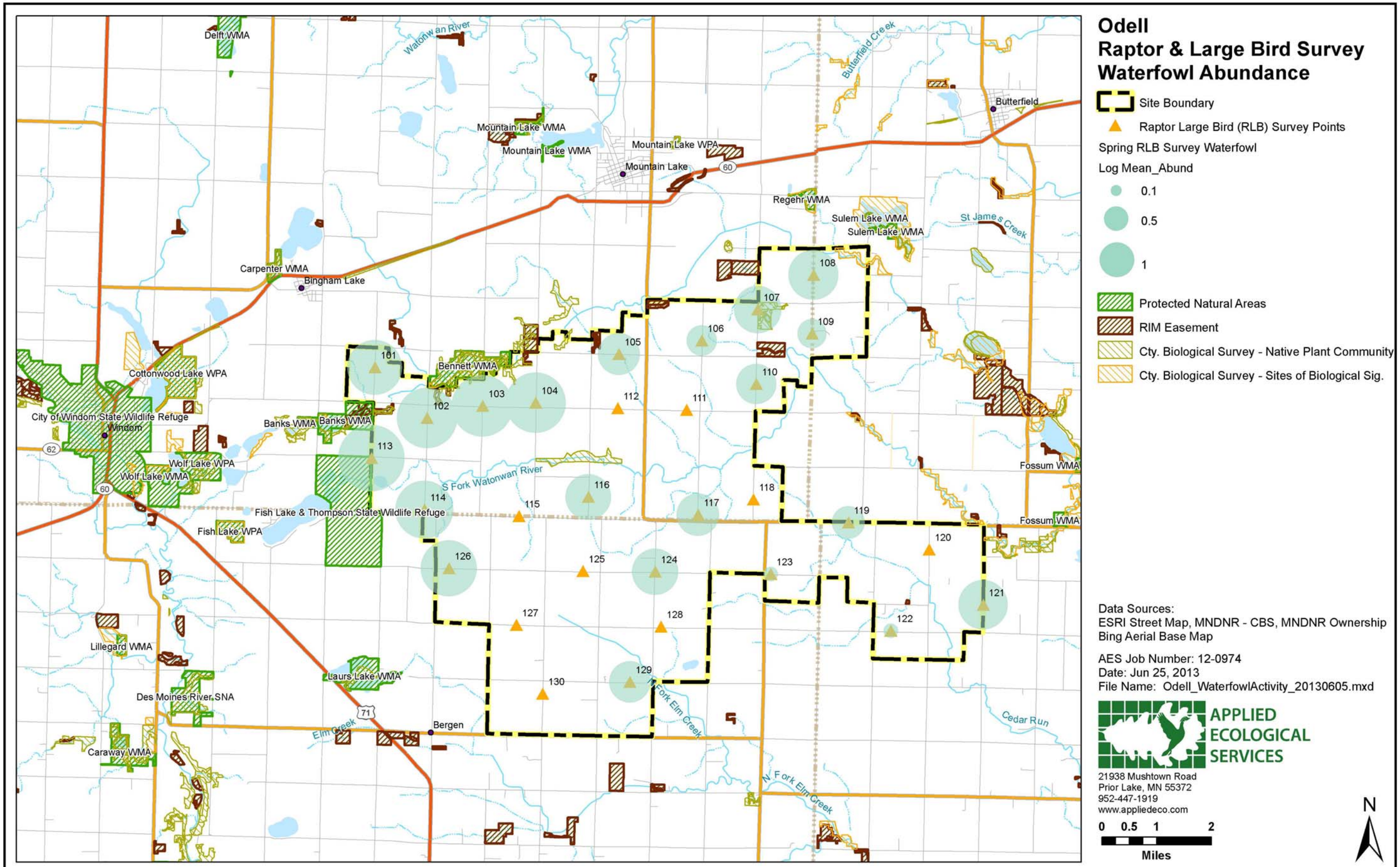
Map Exhibit 1. Site Location & Survey Point Locations



Map Exhibit 2. Site Habitats & Survey Point Locations



Map Exhibit 3. Waterfowl Activity



Appendix 1. Correspondence with USFWS and MNDNR

[Agency correspondence related to this Interim Wildlife Report has been extracted from this Appendix 1 because it is duplicative of the correspondence included in Appendix D of the Site Permit Application.]

Appendix 2. Bird Species Observed at the Odell Site with Relative Number of Individuals by Habitat

[SGCN]= Minnesota River Prairie SGCN Species; ST = State threatened; [SPC]=State special concern; *=Introduced species; Sensitive species are in **bold**;

		Passerine Surveys Relative Abundance (Individual birds per 10-minute point count)				Raptor and Large Bird Surveys (Individual Birds per Hour Obs.)
Common Name	**Scientific Name**	**Cropland (22 surveys)**	**Grassland (6 surveys)**	**Riparian/Grassland (22 surveys)**	**All Habitats (50 surveys)**	**Cropland (60 Hours)**
Red-winged Blackbird	*Agelaius phoeniceus*	3.32	13.00	10.73	7.74	
Common Grackle	*Quiscalus quiscula*	2.41	1.00	1.59	1.88	
Brown-headed Cowbird	*Molothrus ater*	1.86	1.67	1.91	1.86	
Cliff Swallow	*Petrochelidon pyrrhonota*	0.00	0.00	3.23	1.42	
Canada Goose	*Branta canadensis*	0.36	2.00	1.77	1.18	70.85
American Robin	*Turdus migratorius*	0.91	1.83	1.18	1.14	
Killdeer	*Charadrius vociferus*	0.95	1.00	1.27	1.10	0.37
American Goldfinch	*Carduelis tristis*	1.27	1.50	0.68	1.04	
Unidentified Duck	*Anatinae (gen, sp)*	0.14	0.50	2.00	1.00	38.37
Harris's Sparrow	*Zonotrichia querula*	0.00	0.00	2.23	0.98	
Mallard	*Anas platyrhynchos*	0.09	0.17	1.45	0.70	6.90
Savannah Sparrow	*Passerculus sandwichensis*	0.73	0.17	0.82	0.70	
Horned Lark	*Eremophila alpestris*	1.18	0.17	0.18	0.62	
Tree Swallow	*Tachycineta bicolor*	0.68	0.00	0.55	0.54	
Unidentified Passerine		0.14	0.67	0.82	0.50	
Ring-necked Pheasant*	*Phasianus colchicus*	0.23	0.83	0.64	0.48	0.05
Mourning Dove	*Zenaida macroura*	0.23	0.33	0.55	0.38	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	0.00	0.17	0.68	0.32	
Vesper Sparrow	***Pooecetes gramineus***	**0.64**	**0.00**	**0.05**	**0.30**	
American Coot	***Fulica americana***	**0.00**	**0.00**	**0.64**	**0.28**	**0.10**
Bobolink[SGCN]	***Dolichonyx oryzivorus***	**0.00**	**0.83**	**0.27**	**0.22**	
Song Sparrow	*Melospiza melodia*	0.00	0.00	0.50	0.22	
Barn Swallow	*Hirundo rustica*	0.27	0.17	0.14	0.20	
European Starling*	*Sturnus vulgaris*	0.09	0.83	0.14	0.20	
Northern Shoveler	***Anas clypeata***	**0.00**	**0.17**	**0.41**	**0.20**	**0.42**
Unidentified Sparrow	*Emberizidae (gen, sp)*	0.18	0.00	0.18	0.16	

		Passerine Surveys Relative Abundance (Individual birds per 10-minute point count)				Raptor and Large Bird Surveys (Individual Birds per Hour Obs.)
Common Name	**Scientific Name**	**Cropland (22 surveys)**	**Grassland (6 surveys)**	**Riparian/Grassland (22 surveys)**	**All Habitats (50 surveys)**	**Cropland (60 Hours)**
American Crow	*Corvus brachyrhynchos*	0.23	0.00	0.09	0.14	
Blue Jay	***Cyanocitta cristata***	**0.09**	**0.00**	**0.18**	**0.12**	
House Sparrow*	*Passer domesticus*	0.00	0.17	0.23	0.12	
Rock Pigeon*	*Columba livia*	0.00	0.00	0.18	0.08	
Unidentified Shorebird		0.00	0.00	0.18	0.08	
Unidentified Swallow	*Hirundidae (gen, sp)*	0.00	0.00	0.18	0.08	
Western Meadowlark	*Sturnella neglecta*	0.00	0.33	0.09	0.08	
Baltimore Oriole	***Icterus galbula***	**0.00**	**0.00**	**0.14**	**0.06**	
Wood Duck	*Aix sponsa*	0.00	0.50	0.00	0.06	
Blue-winged Teal	***Anas discors***	**0.00**	**0.00**	**0.09**	**0.04**	**0.37**
Brown Thrasher[SGCN]	***Toxostoma rufum***	**0.00**	**0.00**	**0.09**	**0.04**	
Chipping Sparrow	*Spizella passerina*	0.00	0.17	0.05	0.04	
Common Yellowthroat	*Geothlypis trichas*	0.00	0.33	0.00	0.04	
Eastern Kingbird	*Tyrannus tyrannus*	0.00	0.00	0.09	0.04	
Lesser Yellowlegs	*Tringa flavipes*	0.09	0.00	0.00	0.04	0.02
Northern Flicker	***Colaptes auratus***	**0.00**	**0.00**	**0.09**	**0.04**	
Red-tailed Hawk	*Buteo jamaicensis*	0.00	0.17	0.05	0.04	0.15
Trumpeter Swan[ST]	***Cygnus buccinator***	**0.00**	**0.00**	**0.09**	**0.04**	**0.03**
Unidentified Warbler	*Parulidae (gen, sp)*	0.00	0.00	0.09	0.04	
American Kestrel	***Falco sparverius***	**0.05**	**0.00**	**0.00**	**0.02**	
Clay-colored Sparrow	***Spizella pallida***	**0.00**	**0.17**	**0.00**	**0.02**	
Great Blue Heron	***Ardea herodias***	**0.05**	**0.00**	**0.00**	**0.02**	
Green Heron	*Butorides virescens*	0.00	0.00	0.05	0.02	
Hairy Woodpecker	***Picoides villosus***	**0.05**	**0.00**	**0.00**	**0.02**	
House Finch*	*Carpodacus mexicanus*	0.00	0.00	0.05	0.02	
Least Flycatcher[SGCN]	***Empidonax minimus***	**0.00**	**0.00**	**0.05**	**0.02**	
Nashville Warbler	*Vermivora ruficapilla*	0.00	0.00	0.05	0.02	
Northern Cardinal	*Cardinalis cardinalis*	0.00	0.00	0.05	0.02	
Orchard Oriole	*Icterus spurius*	0.00	0.00	0.05	0.02	
Pied-billed Grebe	***Podilymbus podiceps***	**0.00**	**0.00**	**0.05**	**0.02**	

		Passerine Surveys Relative Abundance (Individual birds per 10-minute point count)				Raptor and Large Bird Surveys (Individual Birds per Hour Obs.)
Common Name	**Scientific Name**	**Cropland (22 surveys)**	**Grassland (6 surveys)**	**Riparian/Grassland (22 surveys)**	**All Habitats (50 surveys)**	**Cropland (60 Hours)**
Red-bellied Woodpecker	*Melanerpes carolinus*	0.00	0.00	0.05	0.02	
Red-headed Woodpecker[SGCN]	***Melanerpes erythrocephalus***	**0.00**	**0.00**	**0.05**	**0.02**	
Tennessee Warbler	***Oreothlypis peregrina***	**0.00**	**0.00**	**0.05**	**0.02**	
Turkey Vulture	*Cathartes aura*	0.00	0.00	0.05	0.02	0.15
Unidentified Blackbird	*Icteridae (gen, sp)*	0.00	0.17	0.00	0.02	
Upland Sandpiper[SGCN]	***Bartramia longicauda***	**0.05**	**0.00**	**0.00**	**0.02**	
White-breasted Nuthatch	*Sitta carolinensis*	0.00	0.00	0.05	0.02	
Yellow Warbler	*Setophaga petechia*	0.00	0.00	0.05	0.02	
Unidentified Waterfowl		0.00	0.00	0.00	0.00	112.50
Franklin's Gull[SPC]	***Leucophaeus pipixcan***	**0.00**	**0.00**	**0.00**	**0.00**	**47.22**
Unidentified Gull		0.00	0.00	0.00	0.00	21.18
Double-crested Cormorant	*Phalacrocorax auritus*	0.00	0.00	0.00	0.00	5.30
Ring-billed Gull	*Larus delawarensis*	0.00	0.00	0.00	0.00	1.65
American White Pelican[SPC]	***Pelecanus erythrorhynchos***	**0.00**	**0.00**	**0.00**	**0.00**	**0.93**
Snow Goose	*Chen caerulescens*	0.00	0.00	0.00	0.00	0.85
Greater White-fronted Goose	*Anser albifrons*	0.00	0.00	0.00	0.00	0.67
Northern Harrier[SGCN]	***Circus cyaneus***	**0.00**	**0.00**	**0.00**	**0.00**	**0.63**
Bald Eagle[SPC]	***Haliaeetus leucocephalus***	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**
Unidentified Hawk	*Accipitridae (gen, sp)*	0.00	0.00	0.00	0.00	0.05
Northern Pintail[SGCN]	***Anas acuta***	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**
Unidentified Raptor		0.00	0.00	0.00	0.00	0.03

Appendix 3. Bat Acoustic Monitoring Site Photos

Photo 1. Tower 2 pulley assembly (tower 3 utilizes same system).

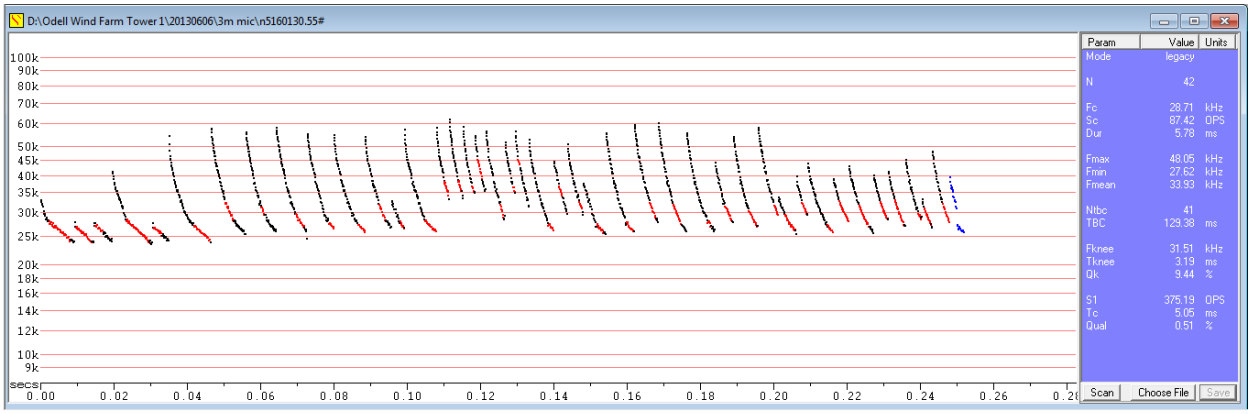
Photo2. Tower 2 50m microphone on tower (tower 3 utilizes same system).

Photo 3. Tower 2 3m microphone, monitoring assembly and landscape setting.

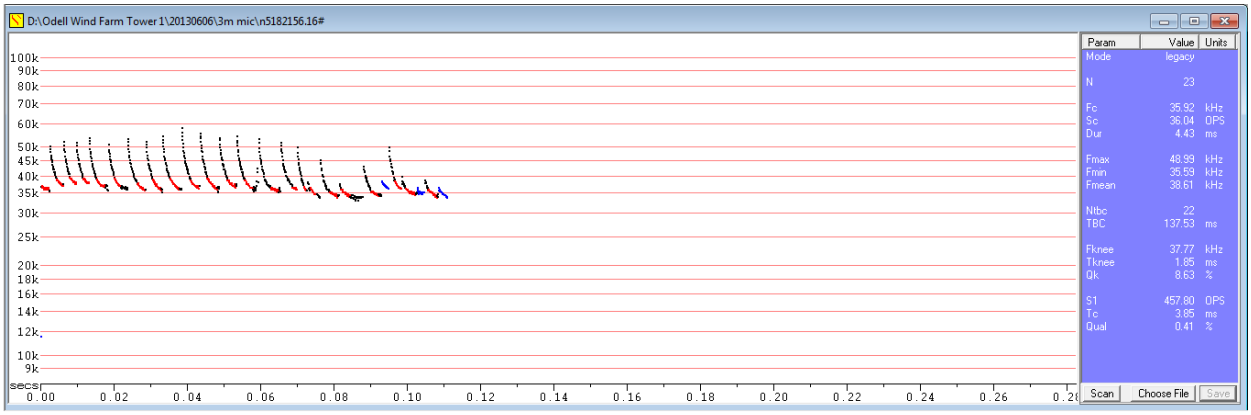
Photo 4. Tower 3 3m microphone, monitoring assembly, and landscape setting.

Appendix 4. Voucher Calls from the Site

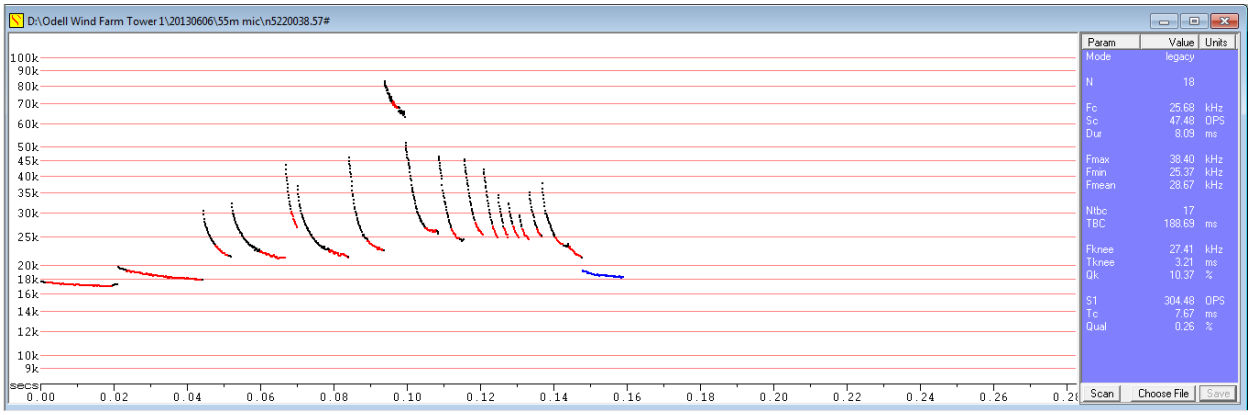
1. **Big Brown (*Eptesicus fuscus*), Tower 1 3m, 5/16/2013, 01:30.**



2. **Eastern Red Bat (*Lasiurus borealis*), Tower 1 3m, 5/18/2013, 21:56.**



3. **Hoary Bat (*Lasiurus cinereus*), Tower 1 55m, 5/22/2013, 00:38.**



Appendix 5. USFWS Site Development and Construction Best Management Practices (USFWS 2012a)

1. Minimize, to the extent practicable, the area disturbed by pre-construction site monitoring and testing activities and installations.

2. Avoid locating wind energy facilities in areas identified as having a demonstrated and unmitigatable high risk to birds and bats.

3. Use available data from state and federal agencies, and other sources (which could include maps or databases), that show the location of sensitive resources and the results of Tier 2 and/or 3 studies to establish the layout of roads, power lines, fences, and other infrastructure.

4. Minimize, to the maximum extent practicable, roads, power lines, fences, and other infrastructure associated with a wind development project. When fencing is necessary, construction should use wildlife compatible design standards.

5. Use native species when seeding or planting during restoration. Consult with appropriate state and federal agencies regarding native species to use for restoration.

6. To reduce avian collisions, place low and medium voltage connecting power lines associated with the wind energy development underground to the extent possible, unless burial of the lines is prohibitively expensive (e.g., where shallow bedrock exists) or where greater adverse impacts to biological resources would result:

   a. Overhead lines may be acceptable if sited away from high bird crossing locations, to the extent practicable, such as between roosting and feeding areas or between lakes, rivers, prairie grouse and sage grouse leks, and nesting habitats. To the extent practicable, the lines should be marked in accordance with Avian Power Line Interaction Committee (APLIC) collision guidelines.

   b. Overhead lines may be used when the lines parallel tree lines, employ bird flight diverters, or are otherwise screened so that collision risk is reduced.

   c. Above-ground low and medium voltage lines, transformers and conductors should follow the 2006 or most recent APLIC "Suggested Practices for Avian Protection on Power Lines."

7. Avoid guyed communication towers and permanent met towers at wind energy project sites. If guy wires are necessary, bird flight diverters or high visibility marking devices should be used.

8. Where permanent meteorological towers must be maintained on a project site, use the minimum number necessary.

9. Use construction and management practices to minimize activities that may attract prey and predators to the wind energy facility.

10. Employ only red, or dual red and white strobe, strobe-like, or flashing lights, not steady burning lights, to meet Federal Aviation Administration (FAA) requirements for visibility lighting of wind turbines, permanent met towers, and communication towers. Only a portion of the turbines within the wind project should be lighted, and all pilot warning lights should fire synchronously.

11. Keep lighting at both operation and maintenance facilities and substations located within half a mile of the turbines to the minimum required:

   a. Use lights with motion or heat sensors and switches to keep lights off when not required.

   b. Lights should be hooded downward and directed to minimize horizontal and skyward illumination.

   c. Minimize use of high-intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights.

   d. All internal turbine nacelle and tower lighting should be extinguished when unoccupied.

12. Establish non-disturbance buffer zones to protect sensitive habitats or areas of high risk for species of concern identified in pre-construction studies. Determine the extent of the buffer zone in consultation with the Service and

state, local and tribal wildlife biologists, and land management agencies (e.g., U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS)), or other credible experts as appropriate.

13. Locate turbines to avoid separating bird and bat species of concern from their daily roosting, feeding, or nesting sites if documented that the turbines' presence poses a risk to species.

14. Avoid impacts to hydrology and stream morphology, especially where federal or state-listed aquatic or riparian species may be involved. Use appropriate erosion control measures in construction and operation to eliminate or minimize runoff into water bodies.

15. When practical use tubular towers or best available technology to reduce ability of birds to perch and to reduce risk of collision.

16. After project construction, close roads not needed for site operations and restore these roadbeds to native vegetation, consistent with landowner agreements.

17. Minimize the number and length of access roads; use existing roads when feasible.

18. Minimize impacts to wetlands and water resources by following all applicable provisions of the Clean Water Act (33 USC 1251-1387) and the Rivers and Harbors Act (33 USC 301 et seq.); for instance, by developing and implementing a storm water management plan and taking measures to reduce erosion and avoid delivery of road-generated sediment into streams and waters.

19. Reduce vehicle collision risk to wildlife by instructing project personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions.

20. Instruct employees, contractors, and site visitors to avoid harassing or disturbing wildlife, particularly during reproductive seasons.

21. Reduce fire hazard from vehicles and human activities (instruct employees to use spark arrestors on power equipment, ensure that no metal parts are dragging from vehicles, use caution with open flame, cigarettes, etc.). Site development and operation plans should specifically address the risk of wildfire and provide appropriate cautions and measures to be taken in the event of a wildfire.

22. Follow federal and state measures for handling toxic substances to minimize danger to water and wildlife resources from spills. Facility operators should maintain Hazardous Materials Spill Kits on site and train personnel in the use of these.

23. Reduce the introduction and spread of invasive species by following applicable local policies for invasive species prevention, containment, and control, such as cleaning vehicles and equipment arriving from areas with known invasive species issues, using locally sourced topsoil, and monitoring for and rapidly removing invasive species at least annually.

24. Use invasive species prevention and control measures as specified by county or state requirements, or by applicable federal agency requirements (such as Integrated Pest Management) when federal policies apply.

25. Properly manage garbage and waste disposal on project sites to avoid creating attractive nuisances for wildlife by providing them with supplemental food.

26. Promptly remove large animal carcasses (e.g., big game, domestic livestock, or feral animal).

27. Wildlife habitat enhancements or improvements such as ponds, guzzlers, rock or brush piles for small mammals, bird nest boxes, nesting platforms, wildlife food plots, etc. should not be created or added to wind energy facilities. These wildlife habitat enhancements are often desirable but when added to a wind energy facility result in increased wildlife use of the facility which may result in increased levels of injury or mortality to them.

APPENDIX G
Odell Wind Farm: Draft Avian and Bat Protection Plan

Odell Wind Farm: Avian and Bat Protection Plan

COTTONWOOD, JACKSON, MARTIN AND WATONWAN COUNTIES, MINNESOTA

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Applied Ecological Services, Inc.

12-0974

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Revision Number	**Document Date**	**Comments**	**Reviser Initials**
0	9/24/2013	Initial Issue as part of the Odell Wind Farm Site Permit Application	

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1. INTRODUCTION

1.1 Background

The Odell Wind Farm, LLC (the Project or Odell) Avian and Bat Protection Plan (ABPP) provides strategies for mitigating risks to birds and bats during the construction and operation phases of the Project. This ABPP serves the purpose of documenting reasonable and prudent measures instituted to prevent or minimize avian and bat mortality in the development of the Project and provides best management practices (BMPs) for construction and operation of the Project to ensure continued efforts to minimize impacts to birds and bats throughout the life of the Project.

The Project site comprises approximately 54 square miles located in portions of Cottonwood, Jackson, Martin and Watonwan counties in southwestern Minnesota (Table 1, Map Exhibit 1). The site is located in cropland, between several existing wind facilities to the south and east of the site. The planned output for the Project is up to 200 megawatts (MW) of wind energy capacity.

The final turbine model has not been selected, but the likely turbine model will have an output between 1.5 and 2.0 MW (between 100 and 133 wind turbines), with tower hub heights of between 78 and 100 m and rotors of between 87 and 110 m in diameter.

The Project's permanent facilities will include:

- wind turbines and related equipment;
- new gravel access roads and improvements to existing roads;
- underground electrical collection lines;
- an operations and maintenance (O&M) building;
- a substation facility;
- a 345/115 kV substation adjacent to the point of interconnect;
- a 115 kV transmission line; and
- up to four permanent meteorological towers (up to 80 m tall).

The Project's temporary facilities will include:

- temporary batch plant area;
- staging/lay down area for construction of the Project;
- staging area for delivery trucks;
- temporary meteorological towers before and after construction; and
- temporary improvements to public roads including wide turn radii.

Table 1. lists the counties, townships, sections, and ranges that are included in the Project area.

Table 1. Project location

County Name	Township Name	Township	Range	Sections
Cottonwood	Lakeside	105N	35W	22, 23, 24, 25, 26, 35, 36
Cottonwood	Mountain Lake	105N	34W	12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
Jackson	Christiania	104N	35W	1, 2, 12
Jackson	Kimball	104N	34W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 17, 18, 19, 20, 21
Martin	Cedar	104N	33W	4, 5, 6, 7, 8, 9, 16, 17
Watonwan	Odin	105N	33W	7, 18

1.2 Purpose

Increased energy demands and the nationwide goal to increase energy production from renewable sources have intensified the development of domestic energy projects, including wind energy facilities. In an effort to reduce the impacts of wind energy projects on bird and bat resources, the U.S. Fish and Wildlife Service (USFWS) recommends that wind energy project proponents develop a Bird and Bat Conservation Strategies (BBCS; also known as an ABPP) document that outlines the project development process and includes monitoring and conservation measures that will be implemented to avoid and minimize impacts to birds and bats at each project they propose to develop.

This document was prepared as part of Odell's efforts to operationalize the USFWS's *Land-Based Wind Energy Guidelines* (USFWS LBWEGS; USFWS 2012a) for the Project. The USFWS Guidelines outline a systematic approach for wind energy developers to assess the potential risk to bird and bat resources during the pre-construction phase of the project, evaluate the impacts to bird and bat resources resulting from the construction and operation of the project, and develop BMPs and mitigation measures to avoid and minimize impacts to bird and bat resources during the preconstruction, construction, and operational phases of the project. For the purposes of this ABPP and its relation to the LBWEGS it should be considered the same as a Bird and Bat Conservation Strategy.

The purpose of this voluntary, project-specific ABPP for Odell is to document and delineate a program designed to reduce potential risks to birds and bats from interactions with Project infrastructure and associated operations during construction and operation. The assessment of the

potential environmental issues related to the development of the Project was initiated at the inception of the project development process, including initial agency consultations and initial assessment of habitat and the potential for occurrence of protected species in the Project site.

This document has been developed for the Odell Wind Farm to ensure compliance with the regulatory framework outlined in Section 1.4 of this document. The ABPP will continue forward as a living document in order to ensure long term compliance with changing environmental conditions and new information. It incorporates recommendations made by the Minnesota Department of Natural Resources (MNDNR) and the US Fish and Wildlife Service (USFWS). It further provides (1) guidance on mitigating the risks to birds and bats during the construction and operation of the Project, and (2) incorporates a framework for complying with federal and state laws and meeting the proposed conditions of the Project's site permits under consideration by the Minnesota Public Utilities Commission (Commission). The processes and procedures set forth are designed to ensure:

- Avian and bat fatalities and secondary effects on wildlife are minimized at the Project site;
- Project-related actions comply with federal and state wildlife regulations;
- If wildlife-related conditions are contained in the Commission site permits, they will be fulfilled;
- Ongoing surveys, monitoring and management efforts are undertaken to avoid and minimize adverse wildlife impacts throughout all phases of the Project;
- Bird and bat injuries and fatalities are effectively documented to provide a basis for ongoing development of avian and bat protection procedures;
- Adequate training is provided to the construction contractor and operations and maintenance staff to implement this ABPP;
- Coordination between the Project developers and operators, wildlife agencies, Minnesota Department of Commerce Energy Facilities Planning Staff (EFP Staff) and the Commission is effective and continuous.

1.3 Regulatory Framework

Odell's intent is to comply with the regulations discussed in this section as well as all other applicable regulations. This document is a guide to help facilitate construction and operations staff compliance with the specific environmental regulations discussed in this section. Of particular note to the Project is the State of Minnesota's Wind Siting Act (Minn. Stat. Ch. 216F), discussed in Section 1.3.2.1 below. This act provides that the site permit application is the environmental document for the wind farm, with no other environmental document required by state or local governments (e.g., an Environmental Assessment, Environmental Assessment Worksheet or an Environmental Impact Statement). A site permit application to the Commission under this act is the source of most of the operational conditions and protocol that define standard procedures at the Project. Additionally, a route permit application will be submitted to the Commission pursuant to Minn. Stat. Ch. 216E.

1.3.1 Federal Law

1.3.1.1 Endangered Species Act

Federal law protects endangered and threatened species under the Endangered Species Act of 1973 (Public Law 93-205, 87 Statute 884, 16 U.S.C. 1531-1544) (ESA). The ESA is administered by the USFWS and the National Oceanic and Atmospheric Administration Fisheries Service (NOAAFS). Listed species and their critical habitats are protected under the ESA, which prohibits the take or trade of listed animals except as authorized under an incidental take permit.

Section 9 of the ESA provides protection for rare and migratory wildlife, specifically under three types of species designations: endangered, threatened and candidate. It is unlawful for anyone to take a threatened or endangered species without a permit. Take includes, but is not limited to, harassing, harming, pursuing, hunting, shooting, wounding, trapping, killing, capturing or collecting protected species within the United States and its territorial seas. More specifically, harm in the definition of take means:

> *…an act which actually kills or injures wildlife [including] habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. (50 C.F.R. 17.3)*

Candidate species are not statutorily protected under the ESA because their listing is hindered by higher-priority listing activities. These species include both animals and plants that carry significant risk factors for the USFWS to deem them as endangered or threatened.

In accordance with Section 7 of the ESA, actions that have a federal nexus, such as involvement of federal land, federal funding or major federal permits, necessitates consultation with the USFWS to determine the effects the action may have on listed species and/or critical habitats. The consultation may be either informal or formal depending on the determination made by the lead federal agency. Consultation to date has been informal, focused on determining whether listed species occur in the study. Neither the Project nor the transmission line involve federal funding, federal land or major federal permitting, and therefore, they do not trigger consultation under Section 7. However, in the course of preparing the Wildlife Assessment and Field Studies Interim Report (Kieweg et al. 2013) and this ABPP, the Project team has worked with USFWS and other wildlife agencies to address agency concerns; these interactions are discussed in the Wildlife Assessment and Field Studies Interim Report (Kieweg et al. 2013).

1.3.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA) assigns legal authority to the USFWS to protect migratory birds from an illegal take. The MBTA protects over 800 species of raptors, diurnal migrants, and passerine migratory birds. The MBTA only regulates direct takings of birds, not habitat modifications.

Incidental take as a result of wind energy development has yet to warrant liability under the MBTA, but other industrial activities (including other energy development sectors) have been recently held liable under this act for incidental take of birds. Thus, the level of direct take, by a wind energy facility, that would invoke prosecution under the MBTA has not been established. Moreover, there is currently no mechanism to grant permission for incidental take under the MBTA.

Guidance, recommendations and regulations regarding wind project development and wildlife impacts are being developed and constantly changing at federal, state and local levels. On March 23, 2012, the USFWS released final guidelines (i.e., LBWEG) to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities (USFWS 2012). The guidelines outline a tiered approach to determine the impacts of a wind energy project on wildlife that includes searches of existing literature and data to identify potential issues of concern, field studies to provide additional data where necessary, and post-construction mortality studies to identify and quantify impacts. This guidance document recommends that wind developers voluntarily adhere to these guidelines and communicate with the USFWS as part of their due diligence process in order to avoid, minimize and mitigate impacts to species protected under the BGEPA and MBTA. In turn, the USFWS will "regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA" (USFWS 2012).

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

1.3.1.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) assigns legal authority to the USFWS to protect Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) from takings, including both lethal take and nonlethal take, such as nest disturbance. Activities that impact either individual eagles or important eagle use areas are regulated. Rules for the issuance of permits for programmatic take under the BGEPA were finalized on September 11, 2009 (USFWS 2009), and guidance for developing wind energy projects related to eagles was published by the USFWS in May 2013 (USFWS 2013).

Programmatic (or incidental) take permits are issued for projects that undertake activities that may disturb or otherwise take eagles on an on-going basis. Individual or "one-time" take permits are issued for the removal of eagle nests, direct take of individual eagles, and grandfathered incidental take permits issued under Section 7 of the ESA. Current programmatic permits last for 5 years, although a proposed rule change by the USFWS issued April 13, 2012 may extend the permit duration to 30 years. The BGEPA permitting process limits the number of permits issued for Bald Eagles under the BGEPA in each region to an estimated 5% of annual productivity for the regional population, and provides separate provisions for a programmatic take permit versus individual instances of a take. For USFWS Region 3 (including Minnesota), the allowable take threshold was 244 (USFWS 2009).

Discussion and research in collaboration with the USFWS on a project by project basis is necessary to determine level of take and the possible need for a programmatic take permit. A key step in assessing risk to eagles at a site is developing an Eagle Conservation Plan (ECP). The wind energy guidance recommends the development of an ECP if known important eagle use areas occur within 10 miles of a site boundary. Important eagle use areas include nests, foraging areas, communal roost sites and the landscape features surrounding such sites that are essential for the continued viability of the eagle use area. The ECP identifies measures taken to avoid and minimize take of eagles to the maximum degree possible, including advanced conservation practices. It also details post-construction monitoring, and adaptive management plans. Because issuing a programmatic take permit is a federal action, the decision to issue a permit will trigger a review under the National Environmental Policy Act (NEPA 1969). This would involve the completion of a document, usually an environmental assessment, and a public comment period.

Additionally, the National Bald Eagle Management Guidelines (USFWS 2007) recommend that wind turbines be sited away from nests, foraging areas and communal roost sites. It also recommends that intensive use activities (e.g., construction, expansion of agriculture) be kept 330 to 660 feet away from nests during the breeding season. In the northern United States, December through April is the most sensitive period of the year. May through August is less sensitive but still an important time because chicks are in the nest or fledging.

1.3.2 State Law

1.3.2.1 State of Minnesota Wind Energy Site Permitting

The Wind Siting Act of Minnesota (Minn. Stat. Ch. 216F) requires that a site permit be issued from the Commission to build and operate a large wind energy conversion system (LWECS). An LWECS is defined as "any combination of [wind energy conversions system] with a combined nameplate capacity of 5,000 kilowatts or more." According to the Statute, the siting of an LWECS must be compatible with environmental preservation, sustainable development, and the efficient use of resources (Minn. Stat. § 216F.03). Further, the criteria considered by the Commission in designating LWECS sites must include the impact of the LWECS on humans and the environment (Minn. Stat. § 216F.05).

1.3.2.2 State of Minnesota Wind Energy Route Permitting

The Commission is charged with routing "high-voltage transmission lines greater than 100 kilovolts." State policy directs the Commission to locate transmission lines so as to preserve the environment and minimize adverse environmental and human impacts, while allowing energy development to proceed (Minn. Stat. § 216E.02). EFP Staff administers the review and analysis of routing applications and provides comments and recommendations to the Commission for decisions. The Commissioner of the Department of Commerce is responsible for conducting an environmental review of the route and alternatives under Minn. Stat. § 216E.03 Subd. 5.

1.3.2.3 State Threatened and Endangered Species Laws

Minnesota's Endangered Species Statute (Minn. Stat. § 84.0895) requires the MNDNR to adopt rules designating species meeting the statutory definitions of Endangered, Threatened, and Special Concern Species (ETSC). The resulting List of Endangered, Threatened, and Special Concern Species is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes the MNDNR to adopt rules that regulate treatment of species designated as endangered and threatened. These regulations are codified as Minnesota Rules, Parts 6212.1800 to 6212.2300. MNDNR defines endangered, threatened, and special concern species as follows:

- *Endangered (E)* – a plant or animal species that is threatened with extinction throughout all or a significant portion of its range in Minnesota.
- *Threatened (T)* – a plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in Minnesota.
- *Special Concern (SC)* – species that are not endangered or threatened, but are extremely uncommon in Minnesota, or have unique or highly specific habitat requirements and deserve careful monitoring of their status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations.

In October 2011, the state developed the Minnesota Department of Natural Resources Guidance for Commercial Wind Energy Projects (MNDNR 2011). The guide outlines the necessary issues to consider when applying for commercial wind energy permits in Minnesota.

2. TIER 1 AND TIER 2: SITE CHARACTERIZATION

Odell followed the LBWEG and conducted Tier 1 and Tier 2 site characterization studies to the best of its abilities, which included analyzing available data in the literature and soliciting information from expert sources. These analyses were used to identify broader environmental and site-development issues. Detailed information from site characterization studies is found in the Wildlife Assessment and Field Studies Interim Report (Kieweg et al. (2013)). Findings and concerns from these studies are summarized briefly below.

2.1 Agency Guidance and Consultation

As part of the planning and design of the project, Odell consulted publicly available guidance materials including:

- Avian and Bat Protection Plan white paper (USFWS 2010);
- Suggested Practices for Avian Protection On Power Lines (APLIC 2006);
- Odell Wind Farm: Wildlife Assessment and Field Studies Interim Report (Kieweg et al. 2013);
- Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area (Johnson et al. 2000);
- Lakefield Wind Project Avian and Migration Studies (Westwood Professional Services 2010, 2011);
- Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource area (Johnson et al. 2000);
- US Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS 2012);
- Summary of Post-construction Monitoring at Wind Projects Relevant to Minnesota (Poulton 2010); and
- American Wind Wildlife Institute and The Nature Conservancy's web based Landscape Assessment Tool.

Appendix 1 provides agency consultation documentation applicable to this ABPP. Natural Heritage Information System (NHIS) review and records of rare species have been obtained several times during the development of this Project. On September 30, 2008, Geronimo Wind Energy requested NHIS review for the North Star Wind Farm. The North Star project encompassed a similar boundary to the Odell Project. A response was received on November 17, 2008. On June 11, 2009, Geronimo Wind Energy requested NHIS review for the Odell Project. The boundary has expanded since the date of this request. A response was received on August 26, 2009. Most recently, on April 8, 2013, Applied Ecological Services (AES) requested NHIS review for the current Project boundary. A response to this request was received on June 24, 2013. Results of these requests are discussed in Section 2.3 below.

Additional communications with the MNDNR have included a letter dated October 28, 2009 from Kevin Mixon in which the MNDNR provided a preliminary review of the Project, and a conference call on April 28, 2013, with the MNDNR to review proposed wildlife surveys. The MNDNR has indicated that, as proposed, the Odell site is likely to have low impacts to wildlife.

Existing data on Bald Eagle nest locations was requested from the USFWS on March 28, 2013, and a response was received on May 16, 2013. A teleconference occurred on May 13, 2013, with the USFWS to discuss potential impacts to Bald Eagles at the site and proposed survey methods. The USFWS responded with eagle recommendations via e-mail on May 16, 2013.

2.2 Historical Environmental Context

The Project and transmission line are located on the western edge of the Minnesota River Prairie Subsection of the Prairie Parkland Province of the Minnesota DNR's Ecological Classification System (MNDNR 2006). The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota and into eastern South Dakota.

Prior to agricultural clearing, the Odell site and the surrounding landscape were covered in prairie and wet prairie with oak openings and barrens on fire-protected uplands, and river bottom forest along protected waterways (Marschner 1974). The most recent glacial period left the region pocked with small wetlands and kettlehole lakes.

Today approximately 90% of the former natural lands support agriculture. Remaining natural lands are highly fragmented and generally associated with the region's water features. Near the site these water features include the Des Moines River 4–5 miles west of the site, the judicial ditch just north of the site and the South Fork of the Watonwan River, which flows through the site. Small remnant prairies occur in the area along railroad right-of-ways and in a few scattered isolated patches. Within the cropland complex small natural patches include grasslands along drainage ditches, fence rows, and woodlots and wind breaks associated with farmsteads.

Many of the larger remaining natural areas are protected through ownership or easement. Protected areas near the site include Kilen Wood's State Park 6 miles to the southwest along the Des Moines River, Banks Wildlife Management Area (WMA) immediately west of the site, Bennett WMA, Regehr WMA and Sulem Lake WMA located north of the site, Fish Lake & Thompson State Wildlife Refuge and Laurs Lake WMA located west of the site, and Fossum WMA located east of the site. Along many of the riparian corridors land is protected as grassland as part of the Reinvest in Minnesota (RIM) program (Map Exhibit 2).

A small fraction of the area is developed. Windom, located approximately 3 miles west of the site, is the largest nearby community. Mountain Lake and Bingham Lake are located to the north. Bergen is located near the site's southwest corner. Other development is found at individual farmsteads. Habitat cover at the site follows these general patterns, and a more detailed discussion of land cover at the site can be found in Section 2.3.

In the early 1800s, the county's abundant wildlife included large herds of Bison (*Bison bison*) and American Elk (*Cervus canadensis*). The numerous wetlands provided habitat for large numbers of waterfowl and waterbirds, including Trumpeter Swan (*Cygnus canadensis*), Canada Goose (*Branta canadensis*), Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Canvasback (*Aythya valisineria*), Blue-winged Teal (*Anas discors*), Gadwall (*Anas strepera*), Redhead (*Aythya americana*), Northern Shoveler (*Anas clypeata*), Wilson's Snipe (*Gallinago delicata*), American Bittern (*Botaurus lentiginosus*), Sora (*Porzana carolina*), Virginia Rail (*Rallus limicola*) and Western Grebe (*Aechmophorus occidentalis*). In upland grassland, birds such as Marbled Godwit (*Limosa fedoa*), Upland Sandpiper (*Bartramia longicauda*), Bobolink (*Dolichonyx oryzivorus*), Western Meadowlark (*Sturnella neglecta*), and Greater Prairie Chicken (*Tympanuchus cupido*) thrived (MNDNR 2006).

With the plowing of the prairie and the draining of wetlands, the large herds of ungulates have been eliminated and many of the other formerly conspicuous wildlife is now rare. There are 116 Species in Greatest Conservation Need (SGCN) that are known or predicted to occur in the subsection, which represent 40% of the SGCN species identified for the state (MNDNR 2006). These are species that are rare, declining, or vulnerable, or dependent upon habitats that are rare, declining or vulnerable. Habitat loss and degradation is a problem for nearly 90% of SGCN identified for the subsection (MNDNR 2006). To persist, these rare species generally require extensive habitat, many large habitat patches near each other, or high quality habitat. While habitat large and high quality habitat is generally lacking from the site, protected areas around the site do provide potential habitat for some of these SGCN species.

In general, however, the wildlife encountered near the Odell site is adapted to agriculture and development. Commonly encountered wildlife species include White-tailed Deer (*Odocoileus virginianus*), Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), Mallard (*Anas platyrhynchos*), Canada Goose (*Branta canadensis*), Red-winged Blackbird (*Agelaius phoeniceus*), Common Grackle (*Quiscalus quisculua*), Common Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*),the introduced House Sparrow (*Passer domesticus*), House Finch (*Carpodacus mexicanus*), Rock Pigeon (*Columa livia*), Ring-necked Pheasant (*Phasianus colchicus*), and European Starling (*Sturnus vulgaris*). The agricultural landscape and developments of the region have determined the type of wildlife present, supporting chiefly those that can adapt to intensive human land use.

2.3 Current Habitat Cover at the Odell Project Site

Habitat cover mapping was used for a habitat-by-habitat assessment of collision and habitat displacement risk. A habitat cover map was created to define and visualize the locations where different bird and bat habitats were present. Habitat cover types are summarized in Table 2.

Table 2. Habitat cover types at the Odell project

Land Classification (combined NLCD data)	Area (acres)	Percent of Total
Developed	1,634.4	4.7
Cropland	31,626.9	91.4
Barren Land	12.0	0.03
Grassland	1,028.2	3.0
Upland Forest	60.3	0.2
Emergent Wetland	177.4	0.5
Open Water	52.8	0.2
Total	34,591.9	100.0

The Minnesota County Biological Survey (MCBS) identified two native prairies on the site. In the northeastern corner of the site there is a 70-acre mesic/wet prairie complex. Along South Fork Watonwan River there is a 120-acre dry hill prairie. When these prairie patches are combined with other non-native grasslands, grassland habitat comprises 3% of the site. The larger non-native grasslands at the site are protected with RIM easements.

Natural habitats at the site are concentrated along the riparian corridors of South Fork Watonwan River in the center of the site, North Fork Elm Creek in the south of the site, and Cedar Run in the southeastern corner of the site. These habitats consist primarily of grassland (3.0%) and emergent wetland (0.5%) with scattered shrub-scrub and small patches of forested habitat (0.2%). Natural habitats are also concentrated along the northern boundary of the site in Bennett and Banks WMA's. The National Wetland Inventory shows additional wetlands not identified by the National Land Cover Database (NLCD) data. Most of these are small scattered wetlands located in cropland habitat.

Only 4.7% of the site is developed, consisting primarily of roads, farmsteads and home sites. Most of the farmsteads have windbreaks and wood lots with mature trees. The town of Windom is located approximately 4 miles west of the site and the town of Mountain Lake is located approximately 2 miles to the north.

2.4 Endangered, Threatened, Special Concern and SGCN Species

The 2008 Minnesota NHIS database query reported records for Sullivant's milkweed and prairie bush clover near the site, and five native plant community locations. The records for Sullivant's milkweed and prairie bush clover were associated with railroad prairies approximately 2 miles northwest of the site (Map Exhibit 2). Three of the four known prairie locations (a dry hill prairie and a mesic prairie) were railroad prairies in this general vicinity. The fourth known location, a mesic prairie, is in the northwestern portion of the site. The final identified native plant community is a basswood–bur oak (green ash) forest located a half mile outside the site's northern boundary. In 2009, the NHIS search identified records for phlox moth and Sullivant's milkweed associated with the mesic prairie remnant in the northwestern corner of the site.

The MCBS has completed a survey of this area for native plant communities. Native plant communities have been identified associated with Banks and Bennett WMA's on the northern boundary of the site (Map Exhibit 2). Additionally, a dry hill prairie with moderate biodiversity significance has been identified in the center of the site along the South Fork of Watonwan.

Impacts to the above-mentioned plant and insect species and native plant communities can be avoided by avoiding areas where these features exist and by applying industry-standard best practices.

Odell identified the presence of habitat for protected or sensitive species, including wetlands, grasslands, prairie, depressions, and other habitats utilized by ETSC, SGCN, or concentration areas used by species covered by the federal MBTA. Many of these lands are within or near WMAs that are either adjacent or in proximity to the Project, such as Banks, Bennett, Regher

and Sulem Lake WMAs along the Project's northern border. Turbines will be sited outside of or away from these lands.

Odell coordinated early with wildlife agencies, conducted surveys and identified avian flight paths within and around the site (Kieweg et al. 2013). The Project will be sited away from avian flyways between and among WMAs and outside of identified flight path corridors, as demonstrated and documented by avian use surveys performed on the site.

3. FIELD STUDIES

Odell began conducting USFWS Tier 3 field studies in the spring of 2013 to obtain additional data on the site. Odell contracted with AES to perform Tier 3 studies and anticipates completing this work in early 2014. These activities serve to inform Odell of the types and extent of wildlife present within and adjacent to the Project. Survey results will also inform Project infrastructure siting, as well as the extent of future surveys to comply with regulatory programs such as the ESA, MBTA, and BGEPA.

Avian ETSC, SGCN, or BGEPA protected species observed during 2013 Tier 3 analyses include:

- American White Pelican (SC)
- Bald Eagle (BGEPA)
- Bobolink (SGCN)
- Brown Thrasher (SGCN)
- Franklin's Gull (SC, SGCN)
- Least Flycatcher (SGCN)
- Northern Harrier (SGCN)
- Northern Pintail (SGCN)
- Red-Headed Woodpecker (SGCN)
- Trumpeter Swan (SC, SGCN)
- Upland Sandpiper (SGCN)

Odell designed the Tier 3 surveys to describe the distribution and abundance of species in and near the proposed Odell site to understand the relative risk of collision and habitat displacement among habitat types and to enable decisions to use or avoid different areas in the site. Since wind turbines will most likely be sited in cropland, the analyses focused on cropland habitats relative to other habitats in or near the site. Overall, nearly 145 hours of surveys will be completed at the site, including those described below.

3.1 Birds

3.1.1 Passerines

Point count surveys were designed to assess passerine species abundance and richness at the site during the spring and fall migrations and during the breeding season. The passerine migration surveys coincide with the beginning of the passage of long-distance migrants through the region, but short-distance migrants were also represented. The breeding survey took place in June, at the peak nesting time for long-distance migrants, with short-distance migrants and resident birds present, but at later stages of nesting.

3.1.2 Raptors

Raptor and large bird migration point count surveys were conducted twice at 30 locations in spring 2013. Two additional surveys of these same 30 points are proposed for fall 2013. Point locations are distributed throughout the site. These surveys are designed to assess species richness and abundance during the period when raptors and other large birds are migrating in significant numbers.

Observations for eagles will be recorded during and between all avian surveys. To date, 68.33 hours of eagle specific survey hours have been completed and 144.93 hours are proposed in total by the end of the survey period in 2013. Eagle observations are also counted during other avian point count surveys. Observations of eagles were recorded the same as for other raptors, except the flight path for eagles will also be recorded. Thus far, overall observed eagle use has been low in and near the site. [It would be helpful if we could add a sentence or two highlighting that only x BEs were documented in surveys and that no BE use areas were documented.]

3.1.3 Waterfowl and Waterbirds

High numbers of waterfowl and waterbirds were observed on the site during the spring migration. Canada Goose was the most common species, followed by Franklin's Gull. Mallard, Double-crested Cormorant and Ring-billed Gull were also common. Waterfowl activity was concentrated in and near protected wetlands in the northwestern portion of the site.

3.1.4 Sensitive Bird Species

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

Sensitive species are similar to the species of concern as defined in the USFWS recommendations (2012a); however, the AES-defined sensitive species emphasize the conservation significance of a species. For example, mourning dove is protected by the MBTA and some state game laws, but its population is large and at low risk from wind energy

development. Consequently, it is a "species of concern" to the USFWS, but not a "sensitive species" in the AES analysis.

During the spring 2013 surveys, AES observed 66 different species of birds at or near the Odell site in spring 2013 (Appendix 2 of the Wildlife Assessment and Field Studies Interim Report, (Kieweg et al. 2013)). Of the 61 native bird species seen in the survey, 24 species (39%) were classified as sensitive by criteria described above. These species already experience problems unrelated to wind energy development, which raises concern for their conservation.

Sensitive bird species were uncommon overall at the Odell site and least common in cropland habitat, although this trend was not significant. Of the sensitive species identified at the site, only Vesper Sparrow was commonly found in cropland. Special Concern species are Trumpeter Swan, Franklin's Gull, and American White Pelican, which are from groups that have generally had low mortality at wind facilities, and are predicted to have a low risk of mortality at the site. Bald Eagle is likely to have a low risk of mortality at the site. The natural habitats concentrated in the site's riparian corridors tended to be the most important to sensitive species. Placing turbines in cropland at a distance from the riparian corridor would present the lowest risk to sensitive bird species. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

3.2 Bats

3.2.1 Acoustic Monitoring Methods and Results

Bat activity data were collected using full spectrum acoustic monitoring and data logging platforms (Song Meter SM2Bat+, Wildlife Acoustics, Inc., Concord, MA, USA). The Song Meter SM2Bat+ records full spectrum bat echolocation calls over time to compact flash cards (CF cards). One detector with two microphones was deployed on each of three met towers for the 2013 season. The three met towers were located in or near the proposed site in the agricultural landscape. The detectors were programmed to record calls from sunset to sunrise each day. From April 29, 2013, to June 6, 2013, the two microphones at the met tower 1 recorded a total of 134 bat calls in 39 nights of recording. The mean number of calls per detector-night for the high and low microphones combined was 1.7 (134 bat calls/78 detector-nights).

Met Towers 2 and 3 were installed on June 5, 2013, and did not record any calls in the one-day sampling period when data were collected. The complete season of data will be analyzed and reported following the end of the 2013 survey season.

Acoustic monitoring detected three species of bats (Big Brown, Hoary, and Eastern Red) and two unidentified groups of bats (high and low echolocation frequencies). Unidentified low-frequency bats may have included the Hoary, Big Brown and Silver-haired Bats. The unidentified high-frequency bats likely included Eastern Red Bat and possibly Tri-colored Bat or *Myotis* species. If *Myotis* species were present in the unidentified high-frequency group they would most likely be Little Brown Bat, but could possibly be Northern Long-eared Bat. Both are present in the

region, but the most common *Myotis* species in cropland settings is thought to be Little Brown Bat. It is more general in its habitat preferences than other Myotis species and tends to forage along water, in cropland and over woodlots, rather than in the interior of woodlots. Northern Long-eared Bat typically forages in or above forests, and could occur at the site in migration. Forested breeding habitat for this species is absent from the site. Both the Northern Long-eared Bat and Little Brown Bat have been petitioned for emergency listing under the ESA (Bat Conservation International 2011). On June 29, 2011, the USFWS published a 90-day finding for Northern Long-eared Bat indicating that there was substantial scientific evidence to consider its listing, and a status review for this species was initiated (USFWS 2011). The review is expected to be completed in 2013.

Bat activity typically is greater at low elevations (<5m) than at the high elevation of the rotor swept area (RSA) (e.g., Arnett et al. 2006). This pattern of activity was observed at Odell with 64.9% of calls at 3 m and 35.1% of calls at 55 m. At the low elevation, Hoary Bat was the most common species (27.6% of calls at 3 m). Big Brown and Eastern Red Bats were also common at the low elevation (24.1% and 11.5% of calls at 3 m, respectively).

At the high elevation Hoary Bat also was the most common species (70.2% of calls at 55 m). More Hoary Bat calls were recorded at the high elevation than at the low elevation (57.9% versus 42.1%, respectively), as is frequently reported for this species (e.g., Baerwald and Barclay 2009). Eastern Red Bat was also present at the high elevation (6.4% of calls at 55 m), but was present in greater numbers at the low elevation (76.9% versus 23.1%, respectively). Big Brown Bats were recorded at the high elevation in low numbers, but were much more common at the low elevation. No *Myotis*, Silver-haired, or Tri-colored Bats were recorded at either elevation during the spring period.

4. WILDLIFE RISK ASSESSMENT

The MNDNR identified the Odell project as a low-risk site. Potential risks to wildlife discussed in this report are summarized below as issues that may require further consideration, or as issues that do not warrant further consideration.

4.1 Issues That May Require Further Consideration

While the level of overall risk to wildlife at this site is low, the following potential issues may require further consideration. BMPs are recommended by the USFWS (2012) for such issues and are acknowledged here. In addition to these recommendations, site-specific recommendations derived from literature and the 2013 surveys are provided below. These conclusions will be reevaluated upon completion of Tier 3 assessments at the Odell site.

4.1.1 Migratory Bats

Regulatory Framework: There are no bat species currently protected under the federal or state ESA.

Migratory tree bats that have experienced mortality at other wind sites are present at the site in low numbers during spring migration. There are two species not documented in spring acoustic monitoring but possibly present at the site, Tri-colored Bat and Northern Long-eared Bat, both listed as special concern in Minnesota. Big Brown Bat (present at the site) was listed as special concern in August 2013 (MNDNR 2013)

Spring season bat activity at the Odell site was at the low end of that reported from other wind energy projects, although bat activity is typically at its lowest during spring migration and the breeding period. Three species of bats (Big Brown, Eastern Red, and Hoary) were documented during acoustic monitoring. Two of these are migratory tree bats (Hoary and Eastern Red Bat). Mortality for these species is sometimes in proportion to the pre-construction abundance indicated by bat call activity. It is likely that mortality will occur at the Odell site, and that mortality will be similar to other wind energy projects in agricultural regions of the Midwest with low-to-moderate bat activity. Hoary and Eastern Red Bats may experience the greatest mortality.

Risk of mortality at the Odell site is likely to be greatest on nights in the July 15-September 15 period which correspond to the passage of the largest numbers of migratory tree bats and an increase in the abundance of Big Brown Bats. Due to changing weather conditions, each night carries a different potential for risk. During the periods of peak passage, weather conditions that are most conducive to high mortality rates occur with warm temperatures (>50F) and low wind speeds (<6.5m/s) (Baerwald et al. 2009, Arnett et al. 2010, Good et al. 2011, Cryan and Brown 2007). In addition, risk is higher on the first night following the passage of a low pressure system when the prevailing wind shifts from a southerly to a northerly direction (Cryan and Brown 2007, Good et al. 2011).

4.1.2 Minnesota County Biological Survey Sites of Moderate Significance

Regulatory Framework: None

The Minnesota County Biological Survey has identified six significant sites within the Project area. One is a prairie-wetland complex considered of high significance and located in the northeastern portion of the site. Four are considered of moderate significance, and one is considered below the standard of statewide significance. Impacts to the high and moderate quality natural areas should be avoided during construction and operations.

4.1.3 Henslow's Sparrow

Regulatory Framework: State Endangered Species Act, MBTA

A record exists for Henslow's Sparrow on the southern edge of the Bennett WMA. This species could also be present in the larger grasslands at the site. Based on flight behavior direct collision

mortality for this species is likely to be low. Habitat displacement effects for this species are unknown. A buffer of large grassland habitat patches would reduce potential for direct and indirect impacts to this species.

4.1.4 Migratory Passerine Birds

Regulatory Framework: MBTA

Passerine bird mortality during spring and fall migration is typically the greatest source of bird mortality at wind energy developments. Migratory passerine use of the site in spring was typical of Midwestern agricultural habitats, and mortality for these species is predicted to be similar to that at other Midwestern wind energy developments.

4.1.5 Breeding Bird Collision

Regulatory Framework: MBTA

In southwest Minnesota, there are few at-risk bird species likely to be present in cropland where turbines will be placed. Analysis of point count data from the breeding season will be used to reevaluate the conclusion that breeding bird collisions will be minimal. Sensitive bird species were uncommon at the site, particularly in cropland. Post-construction mortality for breeding birds is expected to be similar to mortality at other Midwestern wind energy projects.

4.1.6 Waterfowl and Waterbirds

Regulatory Framework: MBTA

Southwestern Minnesota is known for significant activity during the waterfowl migration, and activity at the site was high during the April migratory period. Activity was particularly high along the site's western and eastern boundaries where open water wetlands are concentrated. Canada Goose, Franklin's Gull, Mallard, Double-crested Cormorant, and Ring-billed Gull were commonly observed species. Collision risk is minimal for waterfowl and waterbird species because studies and observations indicate that waterfowl and waterbirds can see and avoid turbines during flight. However, due to the high activity level, turbine placement should avoid areas of high waterfowl activity.

The greatest risks will thus occur in the northwestern portion of the flight between the protected wetlands and during inclement weather when visibility is poor. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

4.1.7 Trumpeter Swan, Franklin's Gull, American White Pelican (all state special concern)

Regulatory Framework: MBTA

Three birds of state special concern were observed at the site in the spring migratory period. Trumpeter Swan was observed near a wetland on the site's western boundary. Franklin's Gull was observed in significant numbers throughout the site during one week of spring migration.

American White Pelican flocks were occasionally observed crossing the site during the spring migration. Collision risk for all of these species is minimal as they are likely able to see and avoid turbines, and waterfowl/waterbird mortality has been low at most wind facilities.

4.1.8 Regionally Sensitive Bird Species (Species of Greatest Conservation Need)

Regulatory Framework: MBTA

Seven Minnesota River Prairie ecoregional SGCN species were observed during the spring migratory period. These are in addition to the three species having state status discussed above. These species are considered vulnerable, declining, or rare. None of them was common at the site. Bobolink and Northern Harrier were the most frequently observed species. Northern Harrier typically has had low mortality at wind facilities likely due to its flight behavior, which is usually observed to be below 20m. Bobolink was observed in grassland habitat at the site. By siting turbines in cropland habitat away from large grassland patches, impacts to this species can be reduced. Of the remaining SGCN species only Upland Sandpiper was observed in cropland habitat, and mortality for sandpipers is typically low.

The more or less permanent grasslands and pastures on the Odell site are possibly important to already at-risk grassland bird species. Wind development can reduce breeding densities of these species through habitat displacement. Large and clustered grassland habitats should be avoided when siting turbines. With respect to waterfowl, most foraging is expected to occur near the protected open water wetlands along the site's northern and western boundaries where the greatest waterfowl activity was observed during the spring migration. However, habituation to turbines is likely to occur, reducing the impact of wind development over time. In addition, thousands of acres of cropland remain outside the site. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

4.1.9 Northern Long-eared Bat

Regulatory Framework: Federal Endangered Species Act

Northern Long-eared Bat has been proposed for listing under the ESA. This species is experiencing steep population declines due to White Nose Syndrome. A decision on listing is expected late in 2013. This species is known to occur throughout Minnesota, although it prefers forested habitat. Due to lack of significant forest habitat it is unlikely to breed at the site, although it could be present during migration. If Northern Long-eared Bat is listed, the listing could be effective by late 2014 and require coordination with the USFWS. Coordination would establish potential impacts of the Project and identify appropriate actions to address impacts.

4.2 Issues Requiring No Further Consideration

Based on pre-construction data collected at and for the evaluation area and site, the following issues do not warrant further consideration.4.2.1 Prairie Bush Clover (federal and state threatened) and Poweshiek Skipperling (federal candidate, state special concern)

Regulatory Framework: Federal and State Endangered Species Acts

Prairie Bush Clover and Poweshiek Skipperling are possibly present in some of the Project's counties. These species are both found in remnant prairie habitat. If the Project avoids prairie remnants, impacts to these species are extremely unlikely.

4.2.1 Phlox Moth and Sullivant's Milkweed

Regulatory Framework: State Endangered Species Act

Records of the state special concern Phlox Moth and state threatened Sullivant's Milkweed occur at a prairie in the northeastern portion of the site. Additional prairie remnants occur in the site and could contain these or other rare prairie features. If impacts to prairie remnants are avoided during construction and operations, impacts to these species are not expected,

4.2.2 Grassland Bird and Waterfowl Habitat Displacement

Regulatory Framework: None

Some grassland bird species (e.g., Bobolink, Savannah Sparrow) appear to avoid wind turbines, reducing their nesting density within 200m of turbines and potentially affecting local populations (Johnson et al. 2000). Forman et al. (2002) detected a reduction in grassland breeding bird density at up to 400m due to highway noise; whether noise from with turbines has a similar effect is not known. Grassland habitat in and near the Odell site is concentrated along the site's riparian corridors, the judicial ditch north of the site, the South Fork of the Watonwan River in the center of the site, the North Fork of Elm Creek in the south of the site, and the Cedar Run in the southeastern corner of the site. There are also three moderate-sized grasslands (90-140 acres) located in or near the northeastern portion of the site. These locations have a greater potential to provide habitat for grassland birds than small grasslands. While habitat displacement during the breeding season is a possibility, suitable grassland is limited at this site.

Waterfowl use agricultural fields in and near the site during migration. Waterfowl have been observed to avoid foraging near wind turbines, although habituation to the presence of wind turbines has been observed. Due to the likelihood of habituation and the availability of agricultural land for foraging outside of the wind facility, impacts to waterfowl habitat are likely to be minimal.

4.2.3 Bald Eagle

Regulatory Framework: BGEPA, MBTA

The Bald Eagle is protected under the BGEPA. However, in August 2013 the MNDNR removed this species from its list of endangered, threatened, and special concern species, changing its status from special concern to no status (MNDNR 2013). There is one known nest within 10 miles of the site along the Des Moines River. This nest was active during the first portion of the breeding season in 2013, but abandoned during the second portion of the breeding season. No

other nests were identified in a stick nest survey of the site and a 2-mile buffer area around the site.

Bald Eagles were observed at nearby Fish Lake during the site visit in April. There were three observations of Bald Eagles during the raptor and large bird survey. One observation was outside the site boundary, another observation was over 800m from the observation point. These observations would not typically be used in calculating risk per the USFWS risk model. One Bald Eagle was observed within 800m of a point in the site, flying below 200m. This Bald Eagle observation would typically be used in the USFWS risk model (USFWS 2013).

The site, with its limited forest and lack of open water habitat, does not contain high quality Bald Eagle nesting or foraging habitat. Although uncommon in southwest Minnesota, the Bald Eagle population is expanding in the state, and it is possible that Bald Eagles may establish additional nesting territories within 10 miles of the site at some point in the future; however, it is unlikely that Bald Eagles will nest within the site itself. If present, it is likely to be an uncommon migrant or rare winter visitor.

A guidance document for eagles for wind energy development was completed by the USFWS (2013). The guidance recommends a sequence of investigative steps, leading to a conservation plan that includes mitigation, should impacts to eagles warrant mitigation. The steps include calculation of eagle nest density within 10 miles of the Project boundary, documentation of eagle use of the area, creation of an impact model, and calculation of mitigation needs. A continuous but fully mitigated level of taking (programmatic take) can be permitted under the Bald and Golden Eagle Protection Act.

4.2.4 Raptor Collision

Regulatory Framework: MBTA

There are no known raptor migration routes near the site nor are topographic features likely to concentrate raptor migration. Observed raptor passage rates were very low during spring migration. Fall migration passage rates will be investigated during raptor/large bird surveys in October and November 2013. Survey data indicate that the raptors observed at the site during spring migration occurred in much lower numbers than those observed at major migration sites. Soaring raptors, which might have a greater collision risk than powered-flight raptors, were primarily of two common species: turkey vulture and red-tailed hawk. Due to the generally low raptor use of the site, it is unlikely that the Odell site is part of a spring raptor migration route. These preliminary conclusions will be reevaluated after the collection of breeding and fall migration data.

5. AVOIDANCE AND MINIMIZATION MEASURES

5.1 Pre-construction Siting and Design

5.1.1 Turbine Siting

Wind turbines and associated facilities for the Project will be sited with consideration for the topographic and environmental characteristics of the site, efficiency of selected turbine models, and minimization of impacts to area residents. Siting also considers the Commission General Wind Turbine Permit Setbacks and Standards for LWECS permitted pursuant to Minnesota Statute § 216F.08 and the setback requirements of Cottonwood, Jackson, Martin and Watonwan counties. Table 3 enumerates setbacks that will be adhered to in siting the Project. See Map Exhibit 3 for potential turbine layout.

Table 3. Project setback requirements

Turbine Setback Requirement	Distance for Setback	Authority
Wind Access Buffer – Prevailing Wind Directions	5 x rotor diameter	PUC General Permit Standards
Wind Access Buffer – Non-Prevailing Wind Directions	3 x rotor diameter	PUC General Permit Standards
Residences	1,000 feet , or the minimum distance required to meet the state noise standard of 50 dB(A), whichever is greater. *	Odell
	750 feet and sufficient distance to meet the state noise standard	Jackson County**
	500 feet, or the minimum distance required to meet the state noise standard of 50 dB(A), whichever is greater.	PUC General Permit Standards
Other Structures	1.25 times their height	Jackson County
Public Roads and Trails	Minimum 250 feet	PUC General Permit Standards
Road ROW including Public Trails	Equal to height of structure including blades with a 250' minimum	Jackson County
Noise Requirements	Distance must meet the state noise standard of 50 decibels (dB(A))***	Minnesota Pollution Control Agency ("MPCA")

Participating Project Boundaries	Equal to height of structure including blades	Jackson County
Non-participating Project Boundaries	3 RD on non-prevailing wind axis and 5 RD on prevailing wind axis	Jackson County
Other Existing WECS and Internal Spacing	3 RD on non-prevailing wind axis and 5 RD on prevailing wind axis	Jackson County
Wetlands (Cowardin classification), Types III, IV and V (If listed on PWI map shoreland setbacks apply)	Equal to height of structure including blades	Jackson County
Protected Waters	See Jackson County Development Code, Shoreland Section 610	Jackson County

*** PUC General Permit Standards identify the minimum setback from residences as 500 feet, or the minimum distance required to meet the state noise standard of 50 dB(A), whichever is greater. Odell follows the practice of siting turbines at least 1,000 feet from residences, unless other arrangements have been made with specific residents (while still complying with the MPCA's limit of the 50 dB(A) nighttime L50 noise level).**

**** Jackson County setbacks were applied only (1) to turbines located in Jackson County and (2) when Jackson County's setback was more stringent than the PUC General Permit Standards.**

***** Noise standards are regulated by the MPCA under Chapter 7030. These rules establish the maximum night and daytime noise levels that effectively limit wind turbine noise to 50 dB(A). The MPCA standards require A-weighting measurements of noise; background noise must be at least 10 dB lower than the noise source being measured.**

The layout and design of the Project will maximize energy generation while minimizing impacts to the land and surrounding community. The Project will adhere to a voluntary setback of a minimum of 1,000 feet from nonparticipating occupied structures, unless other arrangements have been made with specific residents. A 250-foot setback has been incorporated from all public and private rights-of-way, and all turbines will be sited a minimum of five rotor diameters (RD) from the Project perimeter and nonparticipating properties in the prevailing wind direction and three RD in the non-prevailing wind direction.

The Project will be designed in an environmentally conscientious manner, with input from wildlife agencies and relevant site-specific information gathered during avian surveys. As currently planned the Project will either meet or exceed state and local siting requirements, and will meet the concerns of wildlife agencies. To minimize adverse impacts to avian species, nearly all wind turbines and associated facilities will be sited on cropland.

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

5.1.2 Collection and Transmission Lines

The collector system is to be buried to minimize impact to existing farm operations, and any disruption to drainage tile will be avoided to the extent possible during construction. Any damage to tile, as a result of construction activities, will be repaired.

The Project design for electrical facilities will be based upon the Avian Power Line Interaction Committee's (APLIC 2006) guidelines for minimizing risk of electrocution of birds from power lines. Electrocution is commonly a concern with electrical facilities, and the electrocution of large birds, such as raptors, is more commonly associated with distribution lines. Electrocution occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Adequate spacing of the transmission line design diminishes the risk of raptor electrocution, and the Projects will implement such a design so as to eliminate the risk of electrocution. To the extent practicable, the collector system will be placed underground, thereby eliminating the risk of electrocution.

Odell will include in its transmission line design the use of flight diverters (FDs) in locations where the transmission line crosses grassland or large unfarmed wetlands. Historically, utilities have had success in reducing collisions on transmission lines by marking the shield wires with FDs. FDs are preformed, spiral-shaped devices made of polyvinyl chloride that are wrapped around the shield wire and are designed to increase its visibility.

5.2 Construction

5.2.1 Minimizing Temporary Disturbance

Areas of construction and temporary ground-disturbance activities will be minimized to the extent practicable. Temporary disturbances during construction of the Project include crane pads at each turbine location, temporary crane paths, temporary lay-down areas at the base of each turbine, trenching-in the underground electrical collection system, and storage or stockpile areas. The majority of this work will occur within tilled and cultivated agricultural fields, thereby minimizing impacts to quality habitat and habitat fragmentation. In areas where temporary ground-disturbance activities occur, such as temporary crane paths or the installation of underground infrastructure, preconstruction vegetation will be restored.

Clearing of perennial vegetation and any potential avian nesting cover will be avoided to the extent practicable. Construction activities will take place outside of avian nesting periods, to the extent practicable.

Management measures will be implemented to restore areas that are impacted due to temporary construction activities. After all practicable avoidance measures are taken to reduce temporary impacts to permanently vegetated areas, any temporarily disturbed areas will be re-vegetated to blend with existing permanent vegetation. Construction teams will be made aware of, and

attempt to prevent spreading of, invasive species via the movement of people, materials and equipment into and out of the site to prevent the spread and colonization of any new populations of invasive species. Control measures include washing off any soil, dirt and debris on equipment, such as wheels and turbine components, as well as footwear, if necessary, prior to moving equipment over native prairie land, as soil may be embedded with roots or seeds of invasive plant species.

During construction, the Project will follow regulations set forth by the MPCA to comply with National Pollution Discharge Elimination System (NPDES) Guidelines. These rules are reflected in the construction erosion and sediment control BMPs described below. A Stormwater Pollution Prevent Plan (SWPPP) will be prepared prior to construction and will, as necessary, incorporate the following BMPs:

- Disturbed areas will be minimized and silt fence will be installed at the down gradient edge of disturbed area, prior to disturbance, to limit sediment flow and pollution to natural areas outside the construction zone.
- If streams are within the area of construction, additional silt fence must be placed along the edge of the stream 3 m (10 ft) from edge of channel, if possible, as a primary sediment break. If natural vegetation along the edge of stream is to be disturbed, silt curtain must be placed at the edge of said stream, in a fashion proper with rate of flow, as a secondary precaution. If natural vegetation is not to be disturbed then it should provide necessary filtration to preclude the need of silt curtain in the stream.
- If soil is disturbed outside of the agricultural till area, the soil must be stabilized within fourteen (14) days after continuous disturbance ceases. If said area is along special or impaired water (e.g., a public water) the area must be stabilized within seven (7) days of disturbance. If soil is disturbed around a culvert or other water discharge location, the area must be stabilized within 24 hours of disturbance. Erosion and sediment control devices require weekly inspections to ensure that they are staying effective. In the event of a half inch (½") or greater rainfall in a 24-hour period, inspection must occur within 24 hours.
- If failures are found, any discharge associated with said failure must be cleaned up as soon as possible and no later than seven (7) days from time of discovery.
- Any track out from vehicles traveling through the site onto roadways must be cleaned up within 24 hours.
- Upon construction completion, disturbed areas must be stabilized within 14 days.
- Material stockpiling will be kept to specified areas and will be surrounded with silt fence at least 2.4 m (8 ft) from the edge of the stockpile to provide a barrier for potential erosion and sediment run-off from the stockpile yard. Hazardous material will be handled per the individual material guidelines as well as on-site spill kits.

5.2.2 Site Maintenance

Proper caution and safety measures will be exercised to minimize risks to avian and bat populations near and at the site. To minimize the risk of wildfire that could destroy bird and bat

habitat, or that could be injurious to construction personnel, the contractor will be responsible for maintaining a clean and orderly site. Flammable chemicals, petroleum and other materials with the potential for combustion will be handled and stored in a safe manner. Accumulation of outdoor storage or waste will be addressed immediately so as not to attract birds and bats. The site manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document.

5.2.3 Nest Management

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

By siting turbines, collector lines and other facilities in agricultural lands, impact to bald eagles and grassland dependent species are minimized. However, in the absence of other suitable nest sites, other species such as some songbirds and raptors will use artificial structures for nesting. State and federal laws and regulations prohibit removal of regulated species' nest at certain times of the year without first obtaining authorization from state and federal wildlife agencies. It is unlawful to destroy nests when eggs or young birds are in them. Odell employees will be trained to understand that no impacts to occupied nests can occur unless there is an immediate safety threat, in which case, coordination with the USFWS and MNDNR will need to occur. While some nests are benign and need no management, others may need to be managed to reduce the risk of equipment failure, bird collisions, and electrocution.

5.2.4 Training

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

- environmental compliance,
- threatened & endangered species, and species of concern,

- avian and bat issues,
- sediment and erosion control BMPs,
- vegetation management and noxious weeds,
- wetland and water resources,
- hazardous materials,
- water crossings, and
- cultural and historic resources.

Expected formal training opportunities include:

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

5.2.5 Wildlife Concerns

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

The contractor will be required to have a proper safety program in place and to ensure that construction and operations crews have been adequately trained to that effect. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be injurious to construction personnel, construction crews will exercise proper caution and safety measures while handling and storing flammable chemicals, petroleum, and other materials with the potential for combustion.

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

Avian Species. The primary concern for avian species during the construction phase is related to disturbance of SC and SGCN species during the nesting period (April 1-July 31). Construction personnel will be trained to identify potential nesting habitat in grasslands and wetlands and to contact the site manager prior to disturbance. The site manager will coordinate any necessary

special avoidance methods with the environmental inspector, and will notify the construction personnel when construction can continue.

General Wildlife Resources. Construction personnel will be trained to identify and avoid impacts to wildlife in general. Training in general wildlife awareness will be required of all construction personnel.

5.2.6 Construction Monitoring Plan

Odell will have a construction Environmental Inspector (EI) who will coordinated construction monitoring and ensure training of staff on proper monitoring techniques. The EI will provide guidance on site regarding compliance with this document, the associated regulatory structure, and other permits as applicable. The EI's training plan will include ensuring construction personnel are aware and capable of identifying:

- SGCN species;
- potential bird nesting areas;
- potential bat roosting/breeding habitat and; and
- general wildlife issues.

Awareness training makes construction personnel responsible for observing and then reporting potential issues to the EI so that the EI can coordinate with construction management staff to avoid and minimize impacts to these resources.

5.2.7 Road Minimization and Traffic Plan

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

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

During the operational phase of the Project, traffic volume will be minimal, consisting mainly of local traffic and routine trips by technicians to check and maintain wind generation and transportation equipment.

5.2.8 Collection and Transmission Lines

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

Raptors, waterfowl and other bird species may be affected by the construction and placement of the collection transmission lines. Avian collisions with transmission structures are a possibility in areas where there are agricultural fields that serve as feeding areas, wetlands, and open water. As such, transmission structures will not be located within these wetland areas to the extent feasible and whenever avoidance of wetland areas is not feasible, FDs will be installed on the portions of above-ground transmission lines crossing those areas.

5.2.9 Storm Water Pollution Prevention Plan (SWPPP)

A SWPPP will be utilized as a resource to ensure control measures are taken to prevent erosion and runoff during construction of the project. Of particular concern is runoff into sensitive habitats as well as runoff into streams and roadside ditches. The measures within the SWPPP will comply with the requirements of the MPCA General Permit for Storm Water Associated with Construction Activity under the NPDES/State Disposal System Permit Program.

6. OPERATION AND MAINTENANCE

6.1 Avian and Bat Mortality

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

Poulton (2010) provides results from several publicly available post-construction avian and bat mortality monitoring studies at LWECS across the U.S. (Table 4). To this can be added Erickson et al.'s (2001) average mortality rate of 2.9 birds/turbine/year across all U.S. wind farms and CEIWEP's (2007) average of 2.2 birds/turbine/year in the Upper Midwest. CEIWEP's summary also reported mortality of 0.8-8.6 bats/MW/year in non-forested areas of the U.S.

Table 4. Avian and bat fatality rates at selected wind farms (from Poulton 2010)

Location	Wind Farm Name	Nameplate Capacity (MW)	No. Turbines	Adjusted Bird Fatalities		Adjusted Bat Fatalities	
				Per MW per Yr	Per Turbine per Yr	Per MW per Yr	Per Turbine per Yr
Minnesota	Buffalo Ridge	Approx. 235	354	1.43-5.93	0.5-4.45	0.76-2.72	0.26-2.04
Minnesota	Lakefield	205.5	137	2.75	4.13	19.87	29.80
Wisconsin	Blue Sky Green Field	145	88	7.17	11.83	24.6	40.5
Wisconsin	Kewaunee	20.46	31	1.95	1.29	6.45	4.26
Iowa	Top of Iowa (2003, 2004)	80.1	89	0.49, 1.07	0.44, 0.96	7.34, 9.81	6.60, 8.83
Wyoming	Foote Creek Rim	41.4	69	2.50	1.5	2.23	1.34
Alberta, Canada	Summerview	70.2	39	1.06	1.91	10.27	18.49
Maine	Mars Hill	42	28	1.65	2.47	0.12	0.17
Range		***20-235***	***28-354***	***0.49-7.17***	***0.44-11.83***	***0.12-24.6***	***0.17-40.5***

An avian use study (Kieweg et al. 2013) was initiated in spring 2013 to define species in the Project area and estimate the mortality risk level. The AES study uses the hierarchical data collection and decision-making process in the USFWS LBWEG (USFWS 2012).

6.2 Operational Procedures

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

1. *Minimize Lighting.* All unnecessary lighting, except those required for safety by the FAA and other lights needed for safety and security purposes, will be turned off. USFWS's draft Wind Turbine Guidelines recommend that wind turbine lighting be designed such that the blinking lights illuminate simultaneously to prevent disorientation of birds and bats. This measure is less likely to attract insects to a constant light source, and thus the birds and bats that feed on them. Further, the USFWS recommends the use of minimum

intensity, maximum off-phased strobe lights where necessary constantly lighted sources, such as L-810 obstruction lights, are not recommended. The FAA recommends synchronized flashing or blinking red lights (L864), and generally recommends lighting only the perimeter of the wind farm project with lighting gaps of no more than 0.5 mile between lights, and no more than one mile across turbine clusters, as well as lighting turbines that are isolated from strings or clusters of other turbines. Minimizing the duration of the flash and maximizing the time between flashes is also beneficial. Turbines within the Project site will be lighted in compliance with FAA minimum standards. In keeping with the USFWS's draft Wind Turbine Guidelines, the use of motion- or infrared-activated lights on building facilities will be investigated as a method to reduce attraction of insects, birds and bats. The use of high-intensity lights such as spotlights, steadily-burning bright lights, and sodium vapor lights will be minimized.

2. *Limit Foraging Opportunities.* Foraging opportunities for raptors and other scavengers will be limited by:

    - regular clearing of road kill around the Project site to remove scavenger food sources;
    - removing rock and brush piles adjacent to avian risk infrastructure that could create prey habitat;
    - Provide written training materials to livestock operations within the Project about carcass disposal methods that minimize raptor scavenging opportunities;
    - prohibiting food waste littering by employees.

    In addition to these measures, general farming practices such as tilling, harvesting and mowing will provide another measure that will limit the accumulation of surface habitat and thereby deter avifauna.

3. *Overhead Utilities Maintenance.* APLIC (2006) guidelines for overhead utilities maintenance will be followed where possible.
4. *Meteorological Towers.* Temporary met towers will be removed and replaced with a non-guyed permanent lattice tower for meteorological monitoring. In the event that temporary towers are installed as part of an operational assessment of the Project their guy wires will be marked with marker balls to improve visibility to birds and reduce collision risk.
5. *Minimize Fire Risk.* Fire risk will be minimized by utilizing spark arrestors on all electrical equipment, and by restricting smoking to designated areas.
6. *Proper Hazmat Handling.* Hazardous materials will be handled in accordance with federal and state regulations.

6.3 Tier 4 – Post-construction Avian and Bat Monitoring

Post-construction avian and bat fatality monitoring will be performed in compliance with the final Site Permits issued by the Commission. Quarterly reports will be prepared summarizing fatality monitoring. These reports will also be made available to project partners and utilized for decision-making purposes. Reporting protocol is discussed in Section 6.3.2 of this document.

Upon the commissioning of the project, a site-specific Wildlife Incident Reporting System (WIRS) will be implemented. The WIRS will be designed to provide a means of recording avian and bat casualties found in the wind project to increase the understanding of wind turbine and wildlife interactions. The WIRS will provide a set of standardized instructions for wind farm personnel to follow in response to wildlife incidents in the Project area. Each incident will be documented on a data sheet and reported by Project staff to the designated environmental affairs contact per the requirements of the Site Permit. The data will be logged into and maintained within a tracking spreadsheet by the environmental affairs staff, and regular review of the reported incidents will be undertaken by the same. Site personnel will be required to receive training on WIRS procedures as well as how to complete and submit the WIRS report.

The long-term operational effort will consist of managerial, operations, and maintenance staff documenting and reporting of mortality discovered during the course of wind farm operation. Quarterly reports are due by the 15th of each January, April, July and October commencing the day following commercial operation and terminating upon the expiration of the permits. Each report shall identify any dead or injured avian and bat species, locations of find and the date the species was discovered. A Geographical Information System (GIS) may also be used and can generate maps, make identification of problem areas by tracking both the specific locations where mortalities may be occurring, as well as the extent of such mortalities. Issue rectification and design configurations can also be tracked.

6.3.1 Mortality Surveys

Odell will coordinate with MNDNR and USFWS during the site permitting process to determine if formal mortality surveys are needed and to identify the purpose of those surveys. Odell operations staff will be trained to observe the site for dead or injured birds and bats and will be required to follow the protocol in Figure 6.1 in the event that a dead or injured bat or bird is found. Odell operations team will have a designated environmental inspector (EI) who will be responsible for coordinating the implementation the protocol provided in Figure 6.1. The DNR has indicated the Odell site is low risk and Odell has endeavored to make the site as low risk as possible with the minimization techniques discussed herein and in Odell's site permit application to the Commission. Because of the large amount of data available at the proximate Lakefield Wind Farm and the low risk of the site it is unlikely that formal mortality surveys at Odell will yield new, useful information that could inform project operations.

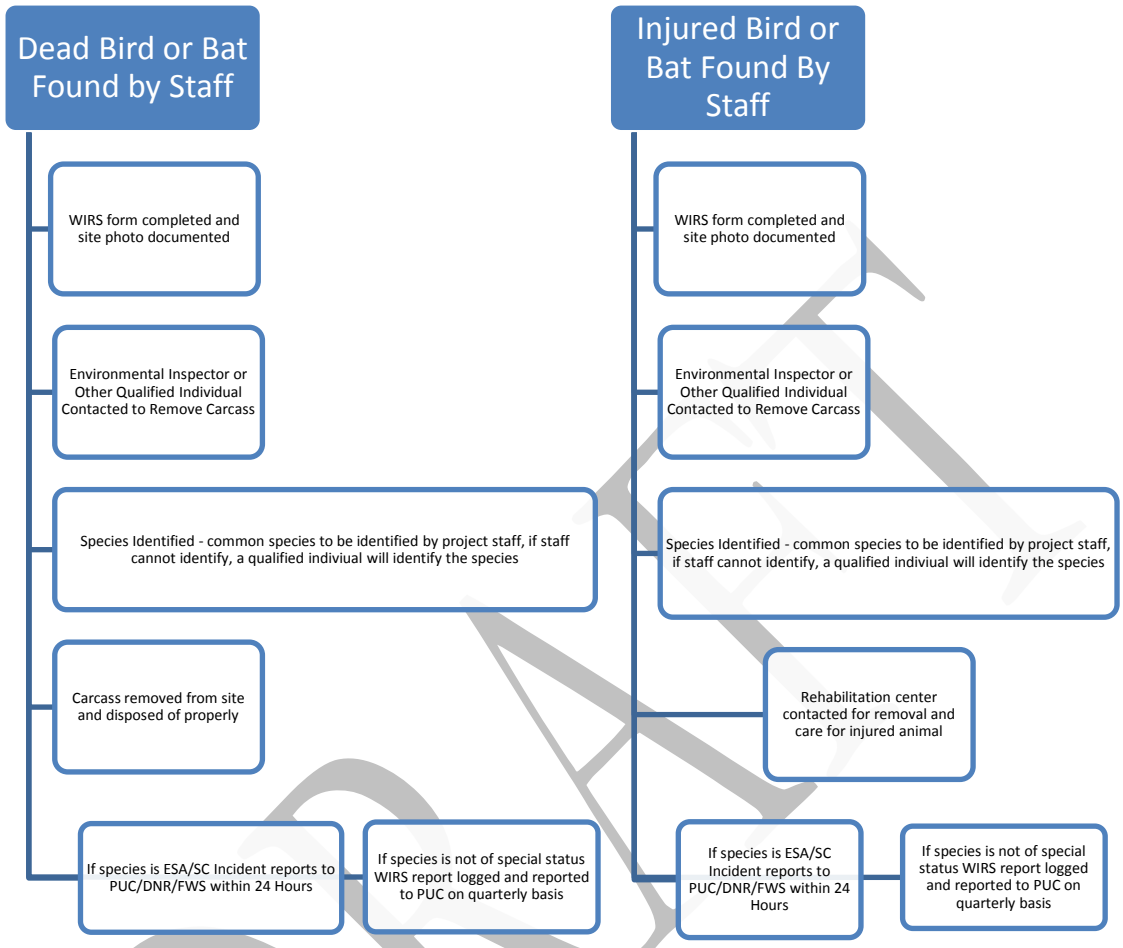
Compliance with the BGEPA and MBTA, allowing the 'possession' of the bird/carcass requires the possession of a Salvage, Rehabilitation, Special Purpose, Scientific Collecting, or related permits. The issuance and use of Federal Migratory Bird permits also requires annual reporting to USFWS. Contacts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

USFWS
Deanne Endrizzi
Office of Migratory Bird Permits
US Fish and Wildlife Service
5600 America Boulevard West, Suite 990
Bloomington, MN 5437-1458

MN State Salvage Permit
Laurie Naumenn
Permit and Promotions Specialist
Nongame Wildlife Program Information Officer
Division of Ecological and Water Resources
Department of Natural Resources
Box 25, 500 Lafayette Rd.
St. Paul, MN 55155
Telephone Number 651-259-5148

If dead or injured wildlife are discovered, a protocol will be followed to comply with the state site permit reporting requirements of the Project (Figure 1). The Project will have a qualified individual such as a wildlife biologist available to review site photos and identify species in the event that a staff person is not capable of performing a field identification.

Figure 1. Wildlife carcass and injury discovery process



6.3.2 Reporting

Mortality results will be compiled and reported quarterly on the 15th of January, April, July, and October. Each report shall identify any dead or injured avian and bat species, locations of find by turbine number, and the date the species was discovered. Additionally, quarterly reports will be prepared summarizing the fatality monitoring for the Project. These reports will also be made available to Project partners and utilized for decision-making purposes.

In accordance with the Projects' site permits, in the event that five or more dead or injured non-protected avian or bat species or a single dead or injured state threatened, endangered, species of special concern, or federally listed species are discovered in the vicinity of the rotor swept area, the Commission, USFWS and DNR shall be notified within 24 hours.

6.3.3 Post-construction Permitting Efforts

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

The BGEPA and the Eagle Conservation Plan Guidance (USFWS 2013) for wind development sites provides steps for voluntary compliance. Odell will continue to collect additional preconstruction eagle use data over the course of an entire year and up to two miles from the Project boundaries. The ongoing study will focus on Important Eagle Use Areas (IEUA) as defined by the BGEPA which states important eagle-use areas are:

> *...an eagle nest, foraging area, or communal roost site that 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.*

The information collected to date suggests the Project is not likely to result in a take of an eagle and no IEUA are present with or adjacent to the Odell site. Therefore, Odell has not prepared an Eagle Conservation Plan and will not seek an eagle take permit at this time. If additional information suggests an eagle take is likely, Odell will consult with the USFWS to determine appropriate steps to avoid eagle impacts.

6.4 Quality Control and Adaptive Management

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

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

The Project owners will consider adaptive management measures based on data gathered in the WIRS. If results indicate that reevaluation is necessary, the effort will first focus on adherence to the operations, maintenance, and monitoring protocols described in this document. All human

activities occurring on site will be reexamined to identify opportunities for improvement of study protocols and mitigation approaches.

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

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

6.5 Key Resources

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

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

Table 5 lists contacts that will serve as key resources during the construction and operations phases of the Project. These include contacts for the Odell Wind Project, area biologists, rehabilitation centers, etc.

Table 5. List of key resources

Organization Type	Name	Address	Phone
Rehabilitation Center	The Raptor Center / College of Veterinary Medicine, University of Minnesota	1920 Fitch Avenue St. Paul, MN 55108	612.624.4745
Rehabilitation Center	Wildlife Science Center	5463 West Broadway Avenue Forest Lake, MN 55025	651.464.3993
Government Agency	Minnesota Dept. of Natural Resources	500 Lafayette Road St. Paul, MN 55155	651.296.5484
Government Agency	U.S. Fish & Wildlife Service Twin Cities Field Office	4101 American Boulevard East Bloomington, MN 55425	612.725.3548
Government Agency	Minnesota Department of Commerce / Energy Facility Permitting	85 7th Place East, Suite 500 St. Paul, MN 55101	800.657.3794
Owner	Odell Wind Farm, LLC	Address TBD – Operations & Maintenance Facility Building	TBD

7. SUMMARY

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

Table 6. Summary of ABPP components

ABPP Component	Phase	Project Action	Status and Notes
Risk Assessment	Preconstruction	Assess available data addressing areas of high avian/bat use, avian/bat mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, evidence of perching on utility structures by large birds, effectiveness of existing procedures, institute remedial actions and other factors that can reduce avian and bat contacts with Project facilities.	Evaluation largely completed; Tier 1 and 2 studies.
Permit Compliance	Preconstruction	Ensure compliance with siting and preconstruction regulations such as WTGAC, ESA, BGEPA, MBTA and state requirements. Obtain salvage, monitoring, recovery, and transportation permits for post construction operations	Tier 3 studies underway. Have identified contacts and salvage permit requirements for post-construction monitoring.
Design Standards	Preconstruction	Minimize the areas of construction and temporary ground-disturbance activities, incorporate avian and bat-safe structures and protocols.	Institute siting designs that avoid high use flight paths between WMA's and WPA's and other high-use areas.
Training	Construction and Operation	Train appropriate personnel, including managers, supervisors, engineers, wildlife biologists, dispatchers, and operations and maintenance personnel in avian and bat issues related to wind farm operation.	

ABPP Component	Phase	Project Action	Status and Notes
Nest Management	Construction and Operation	Train appropriate personnel to ensure uniform treatment of avian nest issues and procedures.	
Wildlife Incident Reporting	Construction and Operation	Institute Wildlife Incident Reporting procedures and maintain database for quarterly reporting to regulating agencies.	Developed Wildlife Incident Reporting forms and procedures to monitor wildlife interaction.
Quality Control	Construction and Operation	Review existing practices and ensure quality control. Update this plan annually	
Key Resources	Construction and Operation	Identify area USFWS and MNDNR biologists, engineers, planners, and operation personnel who are trained in avian interaction problems.	Identified agency personnel and rehabilitation centers for injured wildlife.
Mortality Reduction Measures	Operation	Identify retrofit or rectification efforts, and where new construction warrants, pay special attention to bald eagles, bats, and other wildlife issues where mortality or injuries are being documented.	

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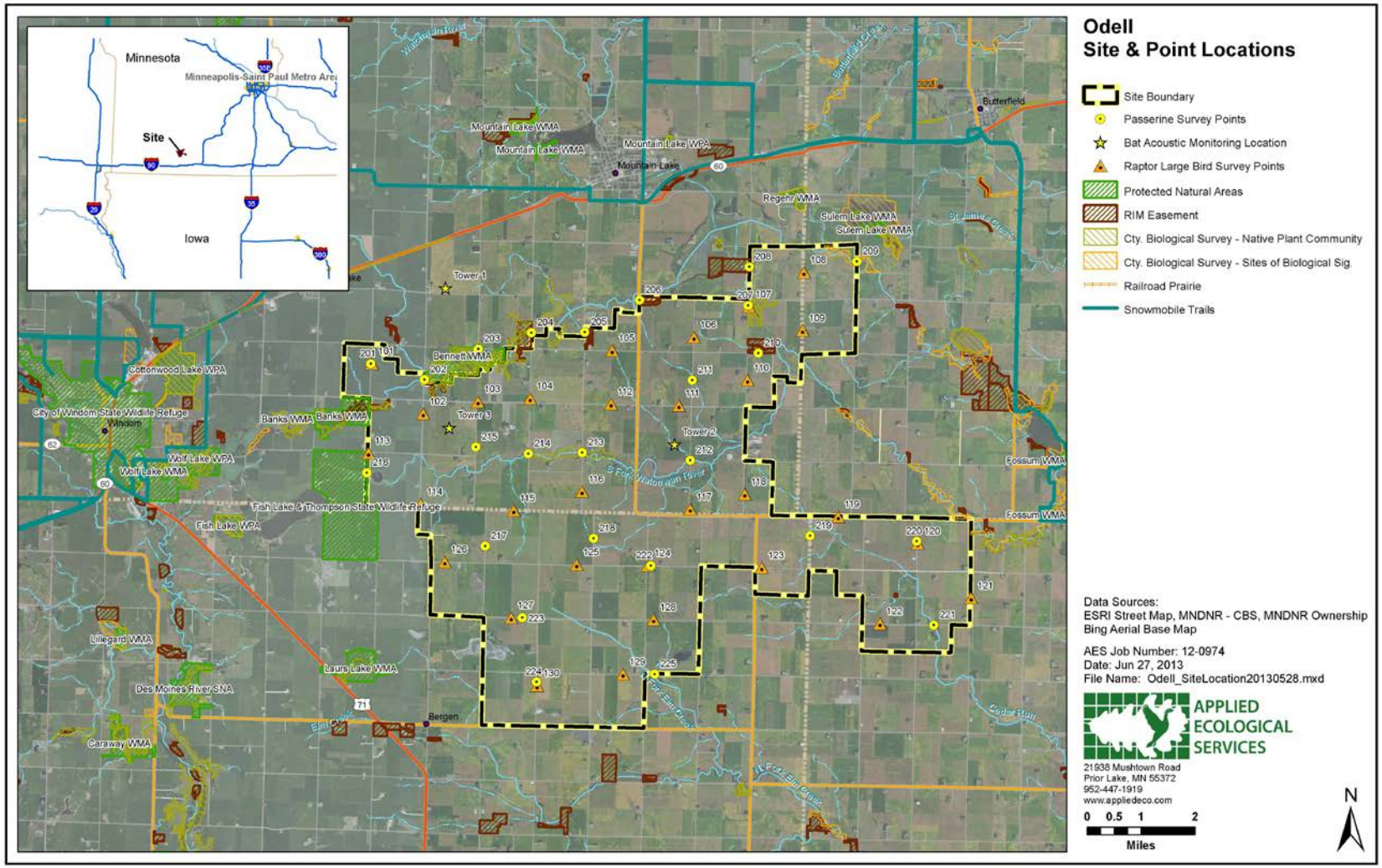
Map Exhibit 1. Odell Site with Survey Locations



Map Exhibit 2. Odell Site Habitats with Survey Locations