Appendix C-9: Avian, Bat, and Sensitive Species Risk Assessment (June 5, 2013)

June 5, 2013

Ms. Melissa Peterson
Project Manager
EDF Renewable Energy
10 Second Street NE, Suite 400
Minneapolis, Minnesota 55413

Re: *Avian, Bat, and Sensitive Species Risk Assessment*
Stoneray Wind Project
Burns & McDonnell Project No. 62823

Dear Ms. Peterson:

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) is providing environmental support services for EDF Renewable Energy (EDF), formerly enXco Development Corporation, for a proposed 105-megawatt (MW) wind energy facility, Stoneray Wind Project, to be located in Pipestone and Murray counties in southwestern Minnesota (Project) (Figure 1). The Project will consist of up to 62 wind turbine generators (WTGs), access roads, an underground electrical collector system, and a small electrical switchyard situated within the Project area. The Project area is generally located east of Pipestone, southeast of Holland, and west of Lake Wilson, with the town of Woodstock, Minnesota within the Project area. The Project area consists of all or portions of the following Sections (Table 1), which are also depicted in Figure 2.

Table 1. Project Location

Township	Range	Sections
107N	44W	8, 15-29, 32-36
107N	43W	30, 31
106N	44W	1-17, 19-21, 23-26
106N	43W	5-8, 17-20, 29, 30

This Avian, Bat, and Sensitive Species Risk Assessment (ABSSRA) was developed based on review of the current Project area (June 2013 revision), available literature and desktop information, and information gathered from natural resource agencies. The Project area encompasses approximately 29,500 acres. The original Project area was approximately 22,400 acres in size. Only a small fraction of the expanded Project area will be disturbed for construction, and an even smaller portion will host Project facilities. The expansion of the Project area will allow greater flexibility and provide for alternative WTG locations to be considered. Sensitive natural resources, such as expansive wetlands, prairie remnants, wet meadows, etc. would be avoided and all state set-back requirements would be incorporated into infrastructure layout.

This study was performed to identify and assess avian, bat, and sensitive species that could occur in or around the Project area that may be affected by the Project. Project facilities have not been sited, therefore, this study can be used to aid in siting Project facilities to best avoid and/or minimize potential adverse effects on the identified species and their habitats.

For purposes of this report, sensitive species are considered species that are federally-listed as threatened, endangered, or candidate species by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*). Additionally, species state-listed as threatened, endangered, or species of special concern (for Pipestone and Murray counties) by the Minnesota Department of Natural Resources (MDNR) under the Minnesota Rules Chapter 6134 and Parts 6212.1800-6212.2300 and Minnesota's Endangered Species Statute - 84.0895 are included in this analysis. Although sensitive species known to occur in Pipestone and Murray counties are the primary focus, this assessment also considers avian and bat species that are not federally or state-listed in the Project area. These include migratory birds and raptors protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668) and the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703) in addition to common bat species, as well as State special concern species that have been recorded within the Project area based on information obtained from the MDNR-Natural Heritage Information System (NHIS) and MDNR Minnesota County Biological Survey (MCBS).

Regulatory Background

According to the USFWS (USFWS 2011) federally-listed species are defined as:

> *Endangered - "The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range."*
>
> *Threatened - "The classification provided to an animal or plant likely to become endangered within the foreseeable future throughout all or a significant portion of its range."*
>
> *Candidate – "Plants and animals that have been studied and the Service has concluded that they should be proposed for addition to the Federal endangered and threatened species list. These species have formerly been referred to as category 1 candidate species." From the February 28, 1996 Federal Register, page 7597, "Those species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list but issuance of the proposed rule is precluded."*

State-listed species are defined by MDNR (MDNR 2011) as:

> *"A species is considered endangered if the species is threatened with extinction throughout all or a significant portion of its range within Minnesota."*

> *"A species is considered threatened if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota."*
>
> *"A species is considered a species of special concern if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its 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."*

The federal ESA defines and lists species as "endangered" and "threatened" and provides regulatory protections for those species listed. The ESA provides a program for conservation and recovery of threatened and endangered species, and ensures conservation of designated critical habitat the USFWS has determined is required for the survival and recovery of listed species. The ESA directs all federal agencies to use their existing authorities to conserve species listed as federally threatened and endangered, in consultation with the USFWS. The goal is to ensure that their actions do not jeopardize the listed species or destroy or adversely modify critical habitat. The ESA sets forth requirements for consultation to determine if a proposed action could potential affect a federally threatened or endangered species.

Under the MBTA it is unlawful to pursue, capture, kill, or possess any migratory bird or part, nest, or egg of any such bird listed in wildlife protection treaties between the U.S., Canada, Mexico, Great Britain, Japan, and Russia (countries of the former Soviet Union). In 2012, 1,007 avian species fell under the jurisdiction of the MBTA (50 CFR Part 10 9282-9314). The only species not under the jurisdiction of the MBTA are the European starling, house sparrow, and rock pigeon, as well as selected non-migratory game species. A total of 170 game bird species are also included in the jurisdiction of the MBTA and within the 1,007 total avian species. Not all species designated as game birds are hunted in any particular state or where they are present. Approximately 60 of the 170 avian species designated as game species are pursued for sport and/or sustenance. The game bird species are also managed by federal and state agencies to maintain huntable populations.

The BGEPA is administered by the USFWS and provides protections to bald eagles (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*), their nests, eggs, and parts, as well as certain habitats. Under the BGEPA, it is unlawful for any person to take, possess, sell, purchase, barter, offer for sale, transport, export, or import any bald or golden eagle live or dead, or any part, nest or egg without a valid permit authorizing those activities. "Take" is defined as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to

cause, based on the best scientific information available: injury to an eagle; a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with the normal breeding, feeding, or sheltering behavior."

Many of the same species protected under federal law are also protected under State regulations, which can include the following:

- Minnesota Endangered Species Statute - 84.0895 Protection of Threatened and Endangered Species
- Minnesota Rules, Chapter 6134 - Endangered, Threatened, Special Concern Species
- Minnesota Rules, Parts 6212.1800 to 6212.2300 (Permits)

The Minnesota Endangered Species Statute (Section 84.0895) imposes a variety of restrictions for species designated as endangered or threatened. Under this statute a person may not take, import, transport, or sell any portion of an endangered or threatened species of wild animal or plant. Additionally, a person may not sell or possess with intent to sell an article made with any part of the skin, hide, or parts of an endangered or threatened species of wild animal or plant, except under a few exceptions. This statute requires the MDNR to adopt rules that designate species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of protected species is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes the MDNR 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, and are regulated with the use of permits. Species of special concern are not protected by Minnesota's Endangered Species Statute.

Impacts to sensitive species or their preferred habitats should be avoided and/or minimized if possible. If impacts to these species or their habitat is likely to result in take, federal and/or state agency coordination and possible take permits may be required to avoid criminal and/or civil penalties. Impacts to sensitive species or to their habitat, agency coordination, or the pursuit of a take permit could result in development and operational constraints, adverse schedule impacts, and increase Project costs.

Methods

In an effort to identify avian, bat and sensitive species within and near the Project area and assess the potential risks the Project may have on these species a variety of information was collected and reviewed, including, but not limited to:

- Federal and state sensitive species list (by county)
- Desktop habitat assessment

- Desktop wetland assessment
- Land use/cover data
- Federal and state regulations
- MDNR-NHIS Database
- MDNR-MCBS Database
- USFWS and MDNR Correspondence
- Species specific information
- Historic wind turbine avian and bat mortality data

Sensitive species lists (by county) were obtained from the USFWS (USFWS 2013a) and MDNR (MDNR 2013a) websites. In addition, the MDNR provided species occurrence information, including rare features that could potentially host sensitive species or be considered sensitive by the state.

Results

To conduct this desktop assessment available land use, habitat, and wetland, type data was reviewed and compared to sensitive species habitat and known species occurrences. The results of this assessment are discussed in the sections below.

General Setting

The Project area extends across approximately 29,500 acres in rural southwestern Minnesota (Figure 2) where the region is dominated by agricultural land uses, particularly row crop cultivation. The majority of the Project area is located between Holland and Woodstock as well extending south of Woodstock and east of Hatfield, Minnesota. The Project area has gently rolling topography that is intersected by numerous county roadways that extend both east to west and north to south within and near the Project area. State roads (State Highways 30 and 23) also occur within and near the site. Population centers of Holland and Woodstock are located near the northwest and central portions of the site, respectively.

There are numerous wind energy facilities existing in and surrounding the Project area. Smaller scale wind energy facilities (*i.e.*, one to three wind turbines, typically) in the general area include:

- Boeve Windfarm
- Fey Windfarm
- JJN Wind Farm
- K-Brink Windfarm
- Kas Brothers Windfarm
- Moulton, Chandler Hills Wind Farm Phase II

- Windcurrent Farms LLC Windfarm
- Woodstock Municipal Wind

Larger wind energy facilities, which consist of eight or more wind turbines, also exist near the Project area, including:

- Breezy Bucks (I, II) Salty Dog (I, II) Roadrunner, Wind Dog, Wally's Wind Farm
- Chanarambie Wind Project
- Fenton Wind Power Project
- Lake Benton II Wind Farm
- Minnesota Windshare Wind Project
- Moraine Wind Power Project
- Ridgewind Wind Farm
- Valley View Wind Farm
- Viking Wind Project
- Westridge Wind Farm

Land Use and Features

Based on data collected from National Land Cover Data (NLCD) (USDA 2013) (Figure 3), National Wetland Inventory (NWI) (USFWS 2008), Minnesota Public Waters Inventory (PWI) (Figure 4), MDNR, and USFWS, the Project area is comprised of many land cover types (Table 2). This table also provides a breakdown of the various land cover types and their approximate quantity within the Project area. It is estimated that approximately 74 to 77% of the Project area is comprised of cultivated lands.

To supplement this desktop data and to ascertain if the data was relatively accurate, Burns & McDonnell conducted a survey from public roadways on October 14, 2011, for the initial Project area that included approximately 22,400 acres (Figure 4). Based on the survey, the desktop data appeared relatively accurate, with a few exceptions. The NLCD data overestimates both grass and range lands, while underestimating cultivated croplands. Additionally, there appear to be more acres of herbaceous emergent wetlands than is indicated on both the NLCD and NWI (USFWS 2013b) datasets. Although difficult to accurately estimate without performing a pedestrian survey, it was estimated that 50 to 200 acres of additional wetland areas and 50 to 150 acres of additional cultivated cropland could occur in areas that were classified as grass or range lands in the initial Project area. It is possible that the initial Project area could contain 850 to 1050 acres of wetland areas and 22,425 to 22,525 acres of cropland. The expanded Project area likely contains additional wetlands that have not been evaluated as well; however, a windshield survey has not been completed for the expanded area and cannot be accounted for at the time of reporting.

Table 2. Land Cover Estimates Within the Project Area

Land Cover Type	Acreages
NLCD	
Developed, Open Space	1,409
Developed, Low Intensity	51
Developed, Medium Intensity	17
Developed, High Intensity	1
Barren Land	17
Deciduous Forest	48
Shrub/Scrub	1
Grassland/Herbaceous	3,838
Pasture/Hay	1,620
Cultivated Crops	22,379
NLCD Total	29,381
Wetlands	
Palustrine Emergent Wetland (PEM)*	657
Palustrine Forested/Shrub Wetland (PSS)*	7
Palustrine Pond (PUB)*	23
Riverine Wetland (R)*	1
PWI Wetland*	63
RIM Wetland Areas*	14
NLCD Wetland	62
Wetlands Total	827
USFWS Data	
Trosky Till Plain Area 5*	5,589
USFWS Data Total	5,589
MDNR Natural Communities	
Marsh*	5
Wet Meadow*	37
Calcareous Fen*	3
Upland Prairie*	435
MDNR Natural Communities Total	480

*These land cover types overlap with the NLCD. NLCD for the Project area encompasses the entire Project area.

In addition to land cover and wetland data, National Hydrology Data (NHD) (USGS 2011) (Figure 5) was also obtained for this assessment. This data, along with USGS topographic maps and aerials, indicate numerous watercourses occur within the Project boundary, with which many of the wetland areas are associated. The most notable watercourses are the Rock River, East Branch Rock River, and North Branch Chanarambie Creek. Relatively large waterbodies (lake,

reservoir, etc.) are not located within close proximity to the site. The closest large waterbodies or reservoirs appear to be Lake Wilson, approximately four miles east, and Current Lake, approximately nine miles northeast of the Project area.

Watercourses were not considered within the land cover estimates in Table 2; however, these features are important ecological resources and could host or support wildlife. The Project area contains approximately 96 linear miles of intermittent streams and 13 linear miles of perennial streams. Additionally, approximately 3 linear miles of other types of streams (categorized as connectors to lakes and wetlands) are also within the Project area. Federal Emergency Management Agency (FEMA)-designated floodplains (FEMA 2011) within the Project area are also associated with many of these streams (Figure 5).

MDNR data indicates there have been four state-designated rare natural community types recorded in the Project area, which includes five marshes,
37

June 5, 2013

Ms. Melissa Peterson
Project Manager
EDF Renewable Energy
10 Second Street NE, Suite 400
Minneapolis, MN 55413

Re: *Initial Desktop Sensitive Habitat Assessment*
Stoneray Wind Project
Burns & McDonnell Project No. 62823

Dear Ms. Peterson:

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) is providing environmental support services for the EDF Renewable Energy (EDF), formerly enXco Development Corporation, for the proposed 105-megawatt (MW) Stoneray Wind Project, to be located in Pipestone and Murray counties in southwestern Minnesota (Project) (Figure 1). The Project will consist of up to 62 wind turbine generators (WTGs), access roads, an underground electrical collector system, and a small electrical switchyard situated within the Project area. The Project area is generally located east of Pipestone, southeast of Holland, and west of Lake Wilson, with the town of Woodstock, Minnesota within the Project area. The Project area consists of all or portions of the following Sections (Table 1), which are also depicted in Figure 2.

Table 1. Project Location

Township	Range	Sections
107N	44W	8, 15-29, 32-36
107N	43W	30, 31
106N	44W	1-17, 19-21, 23-26
106N	43W	5-8, 17-20, 29, 30

The purpose of this report is to inform EDF of potential sensitive habitats within or adjacent to the current Project area and make specific recommendations for their consideration during Project siting. The Project area encompasses approximately 29,500 acres. The original Project area was approximately 22,400 acres in size. Only a small fraction of the expanded Project area will be disturbed for construction, and an even smaller portion will host Project facilities. The expansion of the Project area will allow greater flexibility and provide for alternative WTG locations to be considered. Sensitive natural resources, such as expansive wetlands, prairie remnants, wet meadows, etc., would be avoided and all state setback requirements would be incorporated into infrastructure layout.

wet meadows, three calcareous fens, and 435 upland prairie segments (Figure 6 and Table 2) (MDNR 2013a, 2013b). Many of these features are located in the north or west portions of the Project area and appear associated with streams. The exact locations of some feature occurrences cannot be specifically provided in this report because of limitation uses of MDNR data.

Based on MDNR data, two state-managed properties occur within the Project area (Figure 7) (MDNR 2013a, 2013b). This property is a Conservation Reserve Enhancement Program (CREP) area located in the central part of the Project area (T107N, R44W, Section 35). The Casey Jones State Trail is also an area managed by the State of Minnesota that bisects the west and central portions of the Project area, east to west (T106, R43W, Sections 5, 6, 7, 8 and T106, R44W, Sections 1, 2, 3, 4, 5, 7, and 8). The Terrace Wildlife Management Area (WMA) is located along the western boundary of the Project area (T106N, R44W, Section 6 and T107N, R44W, Section 31). The Van Beek WMA is located along the eastern boundary of the Project area (T107N, R44W, Section 24). The Salt & Pepper WMA is located along the southern boundary of the Project area (T106N, R43W, Section 29). Additionally, MDNR data indicates there are two "terrestrial communities" within the Project area (MDNR 2013a, 2013b).

Four state-managed WMAs, four RIM conservation easements, and five CREP conservation easements are also located along the boundary or within one mile of the Project area (Figure 7). Some of these state-managed lands are known to or could potentially host sensitive species and habitats. These areas include:

- Holland WMA (T107N, R44W, Section 5)
- Terrace WMA (T106N, R44W, Section 6 and T107N, R44W, Section 31)
- Van Beek WMA (T107N, R44W, Section 24)
- Salt & Pepper WMA (T106N, R43W, Section 29)
- Wetland Preserve (RIM) (T107N, R43W, Section 18)
- Marginal Cropland (RIM) (T107N, R44W, Section 7)
- Marginal Cropland (RIM) (T107N, R44W, Section 13)
- Unspecified RIM (T106N, R43W, Section 2)
- Native Prairie Bank (CREP) (T106N, R43W, Section 32)
- Native Prairie Bank (CREP) (T106N, R43W, Section 32)
- Native Prairie Bank (CREP) (T106N, R43W, Section 33)
- Native Prairie Bank (CREP) (T106N, R43W, Section 33)
- Native Prairie Bank (CREP) (T106N, R43W, Sections 32 and 33)

The Audubon Society has designated Important Bird Areas (IBA) throughout the United States. The IBA program is focused "To identify and conserve areas that are vital to birds and other

biodiversity." Two IBAs are included in the northwest and southeast portions of the Project area (Figure 8).

From data collected and reviewed, there do not appear to be USFWS-owned lands, Waterfowl Production Areas (WPAs), MDNR Designated Wildlife Lakes, MDNR Migratory Waterfowl Feeding and Resting Areas (MWFRAs), State Game Refuges, or State Wild, Scenic, and Recreational Rivers (WSRs) within one mile of the Project area. However, there are areas within and adjacent to the Project area that are considered Minnesota Working Lands Initiative (WLI) areas and Minnesota County Biological Survey (MCBS) Sites of Biological Significance (Figure 7). The WLI is a public/private partnership with MDNR for wildlife development on working farms that aims at promoting general wildlife habitat. The MCBS is a survey conducted by the MDNR to obtain biological data, including areas that could be of biological significance or importance.

Species Assessment Summary

From information collected, the study identified four species listed or considered for listing under the ESA (Table 3). Within the four species included in the analysis, one species is listed as endangered, one is threatened, and two are candidate species for protection. Federal candidate species are often evaluated on a similar level as threatened or endangered species by the USFWS because they could become listed as threatened or endangered at some point in the future. However, a candidate species is not afforded protection under the ESA. Also considered is the northern long-eared bat (*Myotis septentrionalis*), which may be listed as a result of petitions for listing and status reviews of this species in 2010 and 2011.

A total of 45 state-listed species are known or are likely to occur within Pipestone and Murray counties. Within the 45 state-listed species, 9 are listed as endangered, 11 are threatened (Table 4), while 25 are considered special concern (*i.e.*, therefore not state-protected). A list of special concern species is included at the end of this report (Appendix A). Additionally, three of the four species included or considered for federal protection are also included under state protection. These four species include the state-endangered western prairie fringed orchid (*Platanthera praeclara*) (threatened federal species), the state-threatened Dakota skipper (*Hesperia dacotae*) (federal candidate species), the Poweshiek skipperling (*Oarisma poweshiek*) (federal candidate species), and the state-special concern Topeka shiner (*Notropis topeka*) (federal endangered species).

Table 3. Federally Listed Species or Species Proposed for Listing Known or Likely to Occur Pipestone and Murray Counties

Species	Federal Status	Habitat	County

Table 3. Federally Listed Species or Species Proposed for Listing Known or Likely to Occur Pipestone and Murray Counties

Species	Federal Status	Habitat	County
Dakota skipper *(Hesperia dacotae)*	candidate	Native dry-mesic to dry prairie, dominated by mid-height grasses, such as little bluestem (*Schizachyrium scoparium*), prairie dropseed (*Sporobolus heterolepis*), and side-oats grama (*Bouteloua curtipendula*). Larval stages require clump grasses that are not annually maintained (*i.e.*, little bluestem) and adults prefer flowering plants in the coneflower genus (*Echinacea* spp.). Most productive sites feature some topographic variation.	Pipestone & Murray
Poweshiek skipperling *(Oarisma poweshiek)*	candidate	Occurs in wet to dry native prairie, but not in sand prairie. Larval stages require clump grasses that are not annually maintained (*i.e.*, little bluestem, sideoats grama) and adults prefer flowering plants in the coneflower genus (*Echinacea* spp.). Non-native, grass-dominated habitats composed of Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), or redtop (*Agrostis gigantea*) are not suitable habitat.	Pipestone & Murray
Topeka shiner *(Notropis topeka)**	endangered	Inhabit slow-moving, small to mid-size prairie streams with sand, gravel, or rubble bottoms; prefer pool and oxbow areas that are outside main channel courses. These pools are in contact with groundwater and usually contain vegetation and areas of exposed gravel.	Pipestone & Murray
Western prairie fringed orchid *(Platanthera praeclara)*	threatened	Remnant native prairies, wet prairies & sedge meadows; full sunlight on moist, calcareous till or sandy soils; not in areas with a significant history of cattle grazing.	Pipestone

Sources: MDNR 2013a, USFWS 2013a
*Critical habitat has been designated.

Table 4. State Threatened or Endangered Species Known or Likely to Occur in Pipestone and Murray Counties

Species	State Status	Habitat	County
Blackfoot quillwort *(Isoetes melanopoda)*	endangered	An unusual aquatic microhabitat associated with bedrock outcrops of Sioux quartzite.	Pipestone
Blanding's turtle *(Emydoidea blandingii*)	threatened	Wetland complexes and adjacent sandy uplands are necessary to support viable populations. Aquatic habitats can include meandering streams and rivers, fens, prairie marshes, backwaters, and oxbows. Upland habitats can include adjacent agricultural fields.	Pipestone & Murray
Burrowing owl *(Athene cunicularia)*	endangered	Open, grazed pastures or native, mixed-grass prairies populated by burrowing mammals. Areas of intensive agricultural use are usually avoided.	Pipestone & Murray
Chestnut-collared longspur *(Calcarius ornatus)*	endangered	Relatively dry and moderately grazed upland prairie, away from trees and shrubs.	Pipestone
Dakota skipper *(Hesperia dacotae)*	threatened	Native dry-mesic to dry prairie, dominated by mid-height grasses, such as little bluestem, prairie dropseed, and side-oats grama. Larval stages require clump grasses that are not annually maintained (*i.e.*, little bluestem) and adults prefer flowering plants in the coneflower genus. Most productive sites feature some topographic variation.	Pipestone, Murray
Hair-like beak-rush *(Rhynchospora capillacea)*	threatened	Calcareous fens (small, fragile, groundwater-maintained wetlands that have a deep accumulation of peat). Spring fens within large peatland complexes of forested regions.	Pipestone, Murray
Hairy water clover *(Marsilea vestita)*	endangered	Margins of shallow prairie pools and ephemeral rainwater pools on rock outcrops. These areas are sparsely vegetated and receive direct sunlight. Can include outcrops in heavily grazed pastures.	Pipestone
Henslow's sparrow *(Ammodramus henslowii)*	endangered	Uncultivated grasslands and old fields with stalks for singing perches and a substantial litter layer. Do not typically occupy heavily grazed areas.	Pipestone
Lichen species *(Buellia nigra)*	endangered	Non-calcareous rock outcrops in exposed sunny areas, sometimes near the edge of hardwood forests.	Pipestone
Loggerhead shrike *(Lanius ludovicianus)*	threatened	Native and non-native grasslands, including native prairie, pastures, old fields, shelterbelts, farmyards, and cemeteries.	Pipestone, Murray

Table 4. State Threatened or Endangered Species Known or Likely to Occur in Pipestone and Murray Counties

Species	State Status	Habitat	County
Mud plantain *(Heteranthera limosa)*	threatened	An unusual aquatic microhabitat associated with bedrock outcrops of Sioux quartzite.	Pipestone
Northern cricket frog *(Acris crepitans)*	endangered	Shallow wetlands, lakes, streams, or rivers; rarely found in large lakes, wide rivers, or polluted sites. Prefer open areas with muddy shorelines and abundant emergent vegetation.	Pipestone
Ottoe skipper *(Hesperia ottoe)*	threatened	Native dry-mesic to dry prairie dominated by mid-height grasses, such as little bluestem, prairie dropseed, and side-oats grama. Includes prairies on deep sands, on steep bedrock-controlled slopes, and on slopes and hills in unsorted glacial till.	Pipestone
Short-pointed umbrella-sedge *(Cyperus acuminatus)*	threatened	The edge of shallow rock pools and the muddy margins of ponds and lakes.	Pipestone
Slender plantain *(Plantago elongata)*	threatened	An unusual aquatic microhabitat associated with bedrock outcrops of Sioux quartzite.	Pipestone
Sullivant's milkweed (*Asclepias sullivantii)*	threatened	Undisturbed, mesic tallgrass prairies.	Murray
Trumpeter swan *(Cygnus buccinator)*	threatened	Small ponds and lakes or bays on larger water bodies with extensive beds of cattails, bulrush, sedges, and/or horsetail.	Murray
Western prairie fringed orchid *(Platanthera praeclara)*	endangered	Remnant native prairies and sedge meadows with full sunlight on moist, calcareous till or sandy soils. Not in areas with a significant history of cattle grazing.	Pipestone
Wilson's phalarope *(Phalaropus tricolor)*	threatened	Wet prairie, rich fen, and other grass- or sedge-dominated wetlands. The presence of short vegetation in or adjacent to shallow pools of open water is an important microhabitat feature. Can include flooded pastures and municipal wastewater stabilization ponds.	Murray
Wolf's spike-rush *(Eleocharis wolfii)*	endangered	Habitat in Minnesota is poorly known, but previous observations made on the margins of rock pools in rock outcrops. Habitat in other range includes marshes and swamps.	Pipestone

Source: MDNR 2013a, USFWS 2013a

Federally-Listed Species Review

According to MDNR data, the Topeka shiner, Dakota skipper, and poweshiek skipperling have been recorded within the Project area or within a one-mile buffer of the Project. However, the

western prairie fringed orchid and northern long-eared bat have not been recorded (MDNR 2013a, 2013b).

Topeka Shiner

The Topeka shiner is the only federally protected species that has designated critical habitat within the Project boundary. According to the Federal Register (dated July 27, 2004), critical habitat has been designated for this species in both Pipestone and Murray counties, including reaches of four streams within the Project area (Figure 6). These reaches are associated with the following watercourses:

- Rock River (4a)
- East Branch Rock River (4aa)
- Unnamed Tributary (4bb)
- North Branch Chanarambie Creek (4x)

The MDNR data indicated that there are records of Topeka shiners occurring in streams within the Project area (MDNR 2013a, 2013b). The exact locations of the occurrences cannot be provided in this report because of limitation of uses for MDNR data. Prairie streams are not anticipated to be directly or indirectly impacted during construction and operation of the Project because construction would follow all applicable best management practices (BMPs); therefore, the potential risk of impacting this species is relatively low because this species is confined to flowing streams. The USFWS recommends avoiding these areas, but if they cannot be avoided, consultation with the USFWS must occur to comply with the federal ESA. This species is sensitive to sedimentation and stream impacts; thus, erosion and sedimentation control BMPs must be implemented during construction. In addition, the USFWS has generated a list of recommendations for Projects that could affect Topeka shiner habitat during construction (USFWS 2008). Access roads, crane paths, and Project infrastructure would avoid impacting Topeka shiner critical habitat.

Western Prairie-Fringed Orchid

According to MDNR species information, the western prairie fringed orchid, a federally protected species, is almost exclusively found in remnant native wet prairies and sedge meadows. The majority of the MDNR-recorded occurrences in Minnesota are located in full sunlight on moist, calcareous till or sandy soils, none of which have a significant history of cattle grazing. The risk of affecting this species is low because the majority of the Project area is cultivated agricultural land and grazed pasture. Based on its known life-history, this species usually appears in late April to early May; however, identification in the early-season or vegetative state is very difficult. The species generally flowers in early to mid-July through early August, depending on location and recent moisture and temperature constraints. There are three growing stages that may be present for an individual in a given year; immature/not flowering

vegetative, mature/not flowering vegetative, and flowering vegetative. If potential suitable habitat is found to exist in the Project area and cannot be avoided, a western prairie fringed orchid presence/absence survey should be conducted.

Dakota Skipper

As a candidate species for listing under the ESA, the Dakota skipper is not currently federally protected, but it is state protected as threatened. From MDNR species information, the Dakota skipper prefers native dry-mesic to dry prairie with mid-height clump grasses in Minnesota. The root areas of the mid-height grasses are used by the larval stages of the species and include primarily little bluestem (*Schizachyrium scoparium*), prairie dropseed (*Sporobolus heterolepis*), and side-oats grama (*Bouteloua curtipendula*). Adult life stages of the species require coneflower species (*Echinacea* spp.) for foraging, among others. The risk of affecting this species is low because the majority of the Project area is cultivated. However, Project infrastructure may require routing to avoid remnant native prairies containing these herbaceous species, to the extent practicable. If potential suitable habitat exists and cannot be avoided, a Dakota skipper presence/absence survey should be conducted or time-of-year restrictions may need to be implemented to avoid the brief flight period for the species. Based on its behaviors and known life-history, survey timeframes for this species may be limited to portions of late June and early July.

Poweshiek Skipperling

As a candidate species for listing under the ESA, the Poweshiek skipperling is not currently federally protected under the ESA. Additionally, it is a state special concern species and is, therefore, not state-protected at this time. According to MDNR, this small butterfly species occurs in wet to dry native prairie in Minnesota, but not in sand prairie. This species uses habitat similar to that required for the Dakota skipper. Similar to the Dakota skipper, the risk of affecting this species is low because the majority of the Project area is cultivated. However, Project infrastructure may need to be routed to avoid remnant native prairies containing these herbaceous species, to the extent practicable. If impacts to native prairie are possible, a presence/absence survey for this species might be warranted or time-of-year restrictions may need to be implemented to avoid the brief flight period for the species. Based on its behaviors and known life-history, survey timeframes for this species may be limited to portions of late June and early July.

Northern (Long-eared) Bat

The northern bat (also known as the northern long-eared bat and the northern myotis,) was petitioned to be federally listed as threatened or endangered under the ESA (January 21, 2010). The 90-day review by the USFWS indicated that listing the northern long-eared bat may be warranted. An additional 12-month status review was initiated (June 29, 2011) for the species to determine whether listing the northern long-eared bat under the Act is warranted. At the time of

reporting the USFWS had not released the findings from the status review. If the USFWS review of the species indicates that it should be listed, an additional review to designate critical habitat would begin and the species would become federally protected. According to the USFWS, this species has been historically known as being associated with densely wooded areas; however, more recent species information has indicated that it also inhabits open areas near riparian corridors, as long as roosting locations are available, which include loose bark, snags, buildings, or signs (76 FR 38095-38106 2011-06-26). In some counties in Minnesota, it is considered a state special concern species, but not in Pipestone, Murray, or neighboring counties. It is unlikely that this species is present in the Project area; however, if it does occur, potential adverse effects to this species would be reduced by locating wind turbines away from forest edges, wetlands, and riparian areas.

State-Listed Species Review Within the Project Area

Considering the 20 state-protected species (threatened or endangered) listed for Pipestone and Murray counties, none of these protected species have been recorded within the Project area, according to MDNR data (Table 5) (MDNR 2013a, 2013b). Six non-state-protected special concern species and two state-managed communities have also been recorded within the Project area, which include the dry hill prairie (southern), and a calcareous fen. The special concern and state monitored species included marsh arrow-grass (*Triglochin palustris*), northern grasshopper mouse (*Onychomys leucogaster*), plains topminnow (*Fundulus sciadicus*), regal fritillary (*Speyeria idalia*), Topeka shiner, and upland sandpiper (*Bartramia longicauda*). The Topeka shiner is federally protected under the ESA and upland sandpiper is federally protected under the MBTA.

Table 5. MDNR Species and Community Types With A Managed Status Within the Project Boundary

MDNR Species or Community Type	Federal Status	State Status	Number of Occurrences
Calcareous Fen Community	none	state monitored	1
Marsh arrow-grass	none	state monitored	1
Dry Hill Prairie Community (Southern)	none	state monitored	1
Northern grasshopper mouse	none	state monitored	1
Plains topminnow	none	special concern	7
Regal fritillary	none	special concern	1
Topeka shiner	endangered	special concern	3
Upland sandpiper	none	state monitored	1

Source: MDNR 2013a, USFWS 2013a

State-Listed Species Review Within One Mile of the Project Area

No state-listed endangered species have been recorded within one mile of the Project boundary. The Blanding's turtle (*Emydoidea blandingii*), Dakota skipper, and hair-like beak rush (*Rhynchospora capillacea*), each designated as state-threatened species, have had a single recorded occurrences within one mile of the Project boundary. Within the list of 25 non-protected special concern species, six have been recorded within one mile of the Project boundary, some with multiple occurrences. These species include the plains topminnow, Poweshiek skipperling, prairie moonwort (*Botrychium compestre*), red three-awn (*Aristida purpurea* var. *longiseta*), regal fritillary, and Topeka shiner. Four species that are state monitored have occurrences within one miles of the Project boundary including: marsh arrow-grass, Richardson's ground squirrel (*Urocitellus richardsonii*), upland sandpiper, and western harvest mouse (*Reithrodontomys megalotis*). One state-managed community type, calcareous fens, has also been recorded within one mile of the Project boundary (Table 6).

Table 6. MDNR Species and Community Types With A Managed Status Within One Mile of the Project Boundary

MDNR Species or Community Type	Federal Status	State Status	Number of Occurrences
Blanding's turtle	none	threatened	1
Calcareous Fen Community	none	state monitored	2
Dakota skipper	threatened	threatened	1
Hair-like beak-rush	none	threatened	1
Marsh arrow-grass	none	state monitored	1
Plains topminnow	none	special concern	1
Poweshiek skipperling	candidate	special concern	2
Prairie moonwort	none	special concern	1
Red three-awn	none	special concern	1
Regal fritillary	none	special concern	1
Richardson's ground squirrel	none	state monitored	1
Topeka shiner	endangered	special concern	3
Upland sandpiper	none	state monitored	2
Western harvest mouse	none	state monitored	1

Source: MDNR 2013a, USFWS 2013a

The three species federally listed or proposed for listing in Tables 5 and 6 include the Topeka shiner, Dakota skipper, and the poweshiek skipperling. These were previously discussed and thus will not be discussed again in the sections below that briefly summarize the state-listed species recorded within a mile of the Project boundary.

Blanding's Turtle

Information on the Blanding's turtle, a state-threatened species, and its preferred habitat is available and includes the riparian areas around prairie streams (MDNR 2013a, 2013b). This information is not included in figures for this document to comply with the usage requirements of the MDNR data. State-designated Blanding's turtle priority areas extend into multiple locations within the Project area. Time-of-year land disturbance restrictions or monitoring during construction may be required if the designated Blanding's turtle priority area would be impacted by the proposed Project. These restrictions would limit the potential impact to this species.

Hair-like Beak-rush

According to MDNR, the primary habitat for this state-protected plant species is calcareous fens (MDNR 2013a, 2013b). Calcareous fens are rare, small, groundwater-maintained wetlands that have a deep accumulation of peat, and spring fens within large peatland complexes of forested regions. Fens are a state-managed resource; thus, they should be avoided to the extent possible. If fens will not be impacted, the potential adverse impacts to this species would be low. If impacts to fens are possible, a survey for this species might be warranted.

Marsh Arrow-grass

This species of a sedge-like plant is widespread in North America, with a relatively scattered distribution or known occurrences. This species persists in fen or fen-like habitats often found in relatively small isolated wetlands with a consistent source of calcareous groundwater. Habitat capable of supporting this species is similar to the habitat described for the hair-like beak-rush. When located, marsh arrow-grass is often found intermixed with other sedge species. If impacts to fens are possible, a survey for this species might be warranted.

Northern Grasshopper Mouse

The northern grasshopper mouse is found in dry areas, prairies, and grasslands. This species often prefers disturbed areas such as lands used for row-crop agriculture. This species requires multiple burrows that are each used for different purposes. Habitat capable of supporting this species is likely present in the Project area; however, this mobile small mammal is adaptable to numerous disturbed areas and not likely to be impacted by Project activities.

Plains Topminnow

Based on MDNR data, the plains topminnow has had seven recorded occurrences within the Project area (MDNR 2013a, 2013b). As indicated previously for the Topeka shiner, the risk of adverse impacts to prairie fish species or their potential aquatic habitats is low as long as stream impacts are avoided or minimized. If streams will be impacted, at a minimum a field habitat assessment should be conducted to determine if suitable stream habitat exists in the location of the proposed stream impact. If suitable plains topminnow habitat and stream conditions exist, a

species presence/absence survey may be warranted. Impacts to stream channels can usually be avoided by using typical industry methods for boring or directional drilling the electrical collection system cabling and other utilities under stream channels.

Prairie Moonwort

According to MDNR, this non state-protected plant species is primarily found in dry prairies, dry hill prairies, dry bedrock bluff prairies, and sand-gravel prairies (MDNR 2013a, 2013b). In most instances, the prairie habitats where this species are found have no history of agricultural practices and may be considered relatively high quality prairie. Various types of prairie (*e.g.*, native, wet, dry) in the Project area are state-managed and should be avoided to the extent possible. If avoided, impacts to this species would be low. If impacts to high quality prairie are expected, a presence/absence survey for this species might be warranted.

Red Three-awn

In western Minnesota, this non state-protected plant species primarily grows in dry and dry-mesic prairies (MDNR 2013a, 2013b). However, it can also appear in grasslands that have been used previously for grazing or have been degraded by erosion. The majority of the Project is cultivated land; therefore, impacts to this species should be low. If prairies or grasslands will be impacted by the Project, a presence/absence survey may be warranted.

Regal Fritillary

In Minnesota, this non state-protected butterfly species is strongly associated with native prairies (both upland and wet prairies) (MDNR 2013a, 2013b). Various types of prairie (*e.g.*, native, wet, dry) are state managed and should be avoided to the extent possible. If disturbance to these habitat types are avoided, impacts to this species would be low. If impacts to prairie are possible, a presence/absence survey for this species might be warranted.

Richardson's Ground Squirrel

This ground squirrel, also known as the "flickertail", is a burrowing mammal that prefers sandy and well-drained soils. The Richardson's ground squirrel is commonly confused with the Franklin's ground squirrel (*Poliocitellus franklinii*). This species is unlikely to be present in high abundances in the Project area due to the dominant land use in the area being crop land and, therefore, disturbing soils that may be used by the species. Impacts to the Richardson's ground squirrel are not likely as result of the Project.

Upland Sandpiper

According to the MDNR, the upland sandpiper can be found in open country including prairies and grasslands (MDNR 2013a, 2013b). Native prairies or large portions of uncultivated and open land are required for this species. This species is not common within its range in Minnesota. This species is unlikely to be present in high abundances in the Project area due to

the dominant land use in the area being crop land and, therefore, disturbing soils that may be used by the species. Impacts to the upland sandpiper are not likely as result of the Project.

Western Harvest Mouse

The western harvest mouse prefers grassy and bushy areas, old fields, and thick areas in woodlands or near riparian areas within its range in southern Minnesota (MDNR 2013a, 2013b). This nocturnal and uncommon mouse is active throughout the year. This species is not common within its range in southern Minnesota. This species is unlikely to be present in high abundances in the Project area due to the dominant land use in the area being crop land and, therefore, disturbing soils that may be used by the species. Impacts to the western harvest mouse are not likely as result of the Project.

General Avian Species Review

Although no federally-protected birds are listed for Pipestone and Murray counties, 1,007 species in 2012 are afforded protection under MBTA (50 CFR Part 10 9282-9314). Bald eagles and Golden eagles are also afforded protection under BGEPA.

Studies on the anthropogenic causes of avian mortality have shown that there are many taxonomic groups of birds involved and there are also many causes. The development of wind energy facilities has focused the attention of state and federal agencies on the impacts of wind farms on avian populations. Erickson et al. (2005) estimates that wind turbines cause less than 0.003% of the total anthropogenic bird deaths. However, it is easier to examine wind farm-related avian deaths than other anthropogenic causes such as predation by domestic cats or collisions with vehicles and buildings.

The results of avian mortality studies at five upper Midwest wind farms (Table 7) illustrate an annual mortality rate of 1.44 to 5.93 mortalities per MW.

Table 7. Annual Midwest Avian Mortality at Wind Farms

Facility	MW	Raptor Mortality/MW	All Bird Mortality/MW	Reference
Wisconsin	20	< 0.01	1.97	Howe et al. (2002)
Buffalo Ridge I	22	0.04	3.27	Johnson et al. (2002)
Buffalo Ridge I	107	< 0.01	3.03	Johnson et al. (2002)
Buffalo Ridge II	104	< 0.01	5.93	Johnson et al. (2002)
Top of Iowa	80	0.01	1.44	Koford et al. (2004)

Source: Adapted from Erickson et al. 2005.

Songbirds (Passerines) represent the most often reported fatalities of bird species at these wind farms. Avian mortalities associated with these studies depicted a mortality composition that is dominated by Passerine species (Table 8).

Following reviews of historic avian mortality data for wind projects in the general upper Midwest region (Table 7) it is anticipated that this Project would not pose a higher avian mortality risk than the existing wind energy projects that collected the reviewed mortality data. This report does not address potential cumulative avian mortality impacts as a result of numerous wind farms currently operating within the general region. Following industry standards with

Table 8. Annual Midwest Avian Mortality at Wind Farms by Bird Type

Bird Type	Percent of Mortality
Passerines	78
Waterfowl	6
Waterbirds	5
Rails/Coots	3
Raptors/Vultures	2

Source: Adapted from Erickson et al. 2005.

wind generation energy projects, there is a risk of avian mortality. However, based on historic avian mortality data and lack of large significant migratory stopover locations (*i.e.*, lakes, reservoirs, etc.) in the Project area or immediate vicinity, impacts to migratory birds should not be greater than those experienced at the existing wind energy facilities in the upper Midwest. Siting wind turbines away from identified grasslands, wooded areas, wetlands, streams or riparian areas would likely reduce the potential avian mortality.

The larger water bodies in the region include Lake Wilson approximately 4 miles east, Current Lake approximately 9 miles northeast, West Twin and East Twin lakes approximately 10 miles north, Lake Benton approximately 13 miles north, Lake Sarah approximately 13 miles northeast, and Lake Shetek approximately 16 miles east of the Project area, respectively. As a result of the lack of large water bodies or water courses in the vicinity of the Project area, it is anticipated that the likelihood of the area being host to bald eagles is low. In addition, the Project area and surrounding area are largely cultivated with routine human activity; thus reducing the likelihood of golden eagles utilizing the area. Impacts to bald and gold eagles are not anticipated as a result of the Project.

The closest recorded observation of a whooping crane, according to USFWS 2009 data, is approximately 50 miles west of the Project area in north-central Lake County, South Dakota. One adult was observed at this location in April 1995. It is anticipated that the Project will pose a low risk to whooping cranes based on the lack of historic observations in the area and the

Project being located over 100 miles from the 200-mile wide primary whooping crane corridor where 95% of whooping cranes have been recorded.

Bat Species Review

Seven species of bats are known to occur in Minnesota; all are generally found throughout the state according to MNDR. The seven species, along with some general information, are described in Table 9. Currently, there are no bats included on the USFWS or MDNR sensitive species lists for Pipestone and Murray counties. According to USFWS, the northern myotis has been petitioned to be federally listed. The timetable for listing, or even the location (counties), is unknown at this time. In addition to the northern myotis, one other bat species in Minnesota, the tricolored bat (*Pipistrellus subflavus*; also known as the eastern pipistrelle), has been listed as a state special concern species in some counties, but not within Pipestone, Murray, or their neighboring counties.

The natural history of many bat species is poorly understood. Factors such as population size, migratory habits, and mating behaviors need to be studied in order to assess the impacts of anthropogenic factors. Typically, migratory tree bats represent the majority of species found during mortality studies. Fatalities peak in the late summer and fall during periods of relatively low wind speeds with passing weather fronts when the bats are migrating and mating. Bat fatalities are believed to happen both because of direct collision and barotrauma, which is internal organ damage caused by rapid air-pressure reduction near moving turbine blades (Baerwald et al. 2008). Overall bat mortality rates in the U.S. average 3.4 fatalities per WTG per year (AWEA 2004). Bat fatalities were highest at Buffalo Mountain (in Tennessee), where the rate is almost 40 fatalities per MW per year; however, most facilities reported fatality rates of less than 10 fatalities per MW per year (National Wind Coordinating Collaborative 2010). Mortality rates (Table 10) for a few wind farms in the upper Midwest ranged from 0.8 to 8.6 fatalities per MW per year (Johnson 2005).

Bat species reported as fatalities at wind farms in the upper Midwest are primarily tree bats (Johnson 2005). The eastern red bat and hoary bat comprise almost 80% of the estimated fatalities of all bat species in the upper Midwest from the studies considered (Table 11).

Anticipated impacts to bat populations at the proposed Project area are difficult to ascertain based upon limited information. However, based on the potential habitat at the Project area and preferred habitat descriptions from MDNR, risk of mortality to bat populations is likely relatively low at the proposed Project area. The Project area has limited forested habitat and rock outcroppings that could be used for roosting; thus, existing bat populations are probably small. However, bat mortality studies conducted for some existing upper Midwestern wind farms (Table 10) reveals some of the higher mortality rates were for WTG areas located in cropland. This could be based on many factors, which were not analyzed as part of this assessment. This report does not address potential cumulative bat mortality impacts as a result of numerous wind farms currently operating within the general region of the state and neighboring states.

Although it is anticipated that the potential adverse impacts to bats is low based on suitable habitat, locating WTGs away from forest edges, wetlands, streams, and grasslands, would likely reduce potential adverse impacts to bats. Additional field studies may be warranted to better assess existing habitat and potential use of the area by bats. As a result, a field habitat assessment and acoustical bat monitoring may be warranted.

Table 9. Bat Species in Minnesota

Species	Habitat/Roosts/Hibernacula	Roosts	Migration
Big brown bat (*Eptesicus fuscus*)	Caves, tunnels, crevices, hollow trees, buildings, wooded areas.	Singly or in small clusters	May migrate or winter in northern areas (common in buildings in winter). Many migrate short distances (less than 80 km) to find mines or caves for hibernation.
Eastern pipistrelle (*Pipistrellus subflavus*)	Caves, mine tunnels, crevices, buildings, wooded areas near water. In the summer, generally roost singly, often in trees, but some males and non-reproductive females also roost in their winter hibernaculum.	Singly or in small clusters	Migrate or hibernate in north.
Eastern red bat *(Lasiurus borealis)*	Requires trees and shrubs for roosting, occasionally enters caves. Has regular feeding hours, tends to feed same area over and over (100-yard route).	Solitary, but feeds in pairs	Migrates south in groups.
Hoary bat (*Lasiurus cinereus*)	Wooded areas. They are solitary and roost in trees, occasionally in caves.	Solitary	Migrates south.
Little brown bat (*Myotis lucifugus*)	Forested areas. Day roosts in tree cavities and crevices. Feed near or over water, mainly on aquatic insects such as caddis flies, mayflies, and midges.	Colonial	Most migrate in fall, caves or suitable location.
Northern long-eared bat (*Myotis septentrionalis*)	Thinly forested areas, around buildings or trees, occasionally caves. In summer the species is often associated with forested habitats, especially around wetlands. Summer roosts are believed to include separate day and night roosts. Day roosts may be under loose tree bark, in buildings, or behind signs or shutters, and night roosts may include caves, mines, and quarry tunnels.	Small colonies	Hibernates in Minnesota in caves and mines.
Silver-haired bat (*Lasionycteris noctivagans*)	Can occur in both grassland and forest, and are abundant in old-growth forest. Occasionally in buildings and caves. They start foraging after sunset, finding their prey at treetop level or over streams and ponds.	Solitary	Likely migrate southward in winter, can enter torpor, thus some may not migrate.

Sources: Burt and Grossenheider 1976, MDNR 2013a, Smithsonian National Museum of Natural History 2011.

Table 10. Midwest Monitoring Studies of Bat Mortality Factors

Facility	Landscape	Est. Fatalities/MW/YR	Reference
Buffalo Ridge I	Cropland, CRP, grassland	0.8	Osborn et al. (2003)
Buffalo Ridge II	Cropland, CRP, grassland	2.5	Johnson et al. (2003)
Buffalo Ridge III	Cropland, CRP, grassland	2.9	Johnson et al. (2004)
Lincoln, WI	Cropland	6.5	Howe et al. (2002)
Top of Iowa	Cropland	8.6	Jain (2005)

Source: Adapted from Johnson 2005.

Table 11. Midwest Annual Bat Fatalities by Species

Species	Fatalities
Hoary bat	309 (59.1%)
Eastern red bat	106 (20.3%)
Silver-haired bat	35 (6.7%)
Unknown	30 (5.7%)
Big brown bat	19 (3.6%)
Little brown myotis	17 (3.3%)
Eastern pipistrelle	7 (1.3%)
Total	523

Source: Adapted from Johnson 2005.

Summary and Conclusions

There are four species federally-listed or candidates for federal listing and 45 state-listed species for Pipestone and Murray counties. Three of these species (Dakota skipper, poweshiek skipperling, and Topeka shiner) have been recorded within the Project boundary. Additionally, the poweshiek skipperling and Topeka shiner have been recorded within one mile of the Project boundary. Bald and golden eagles have not been recorded within the Project area. A variety of avian species protected by the MBTA likely use the Project area during seasonal migrations or throughout the year.

The State of Minnesota lists 45 species with various levels of state oversight in Pipestone and Murray counties. Nine of these species are listed as endangered, 11 are listed as threatened, and 25 are listed as special concern. There are no state endangered or threatened species that have occurrences in the Project area. Six non-state-protected special concern species and two state-managed communities have also been recorded within the Project area, which include the dry hill prairie (southern), and a calcareous fen. The special concern and state monitored species included marsh arrow-grass, northern grasshopper mouse, plains topminnow, regal fritillary, Topeka shiner, and upland sandpiper. The Topeka shiner is federally protected under the ESA

and upland sandpiper is federally protected under the MBTA. Numerous bat species likely use the Project area during their migration, foraging, or reproductive periods of the year.

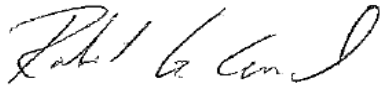
Based on this desktop review, it is anticipated that the Project would have a low risk to most federal and state monitored species listed for Pipestone and Murray counties. However, for some species, the risk could be moderate depending upon the final location of Project facilities and the type of habitats that could be impacted. Although impacts to avian and bats species are anticipated to be relatively low; the extent of diversity or abundance of these species that may inhabit or migrate through the Project area are not well known. Lack of observations or recordings is not always a good indication of the species occurring in a given area, because there is often a lack of surveys or studies conducted for that given area. To identify potential sensitive habitats within and adjacent to the Project footprint and proposed disturbance areas that could host sensitive species, particularly native prairie remnants, wetlands, calcareous fens, or wooded areas, a field habitat assessment should be conducted. In addition, to get a better understanding of avian and bat use for the area, avian studies (*i.e.*, raptor stick nest survey and avian point count survey) and bat studies (*i.e.*, acoustical surveys) may need to be conducted in the Project area where suitable habitat occurs.

To reduce the adverse risk to sensitive species, the following should be considered when developing the Project:

- Avoid or minimize impacts to areas not used for cultivation
- Conduct field habitat assessments (general and species-specific) to identify sensitive habitats (*i.e.*, wetlands, streams, prairies) and locate Project facilities away from sensitive areas, particular native prairies, wetlands, streams, and forested areas
- Conduct a wetland delineation for the proposed project footprint and any proposed land disturbance areas to determine impacts to specific types of habitats (if sensitive areas cannot be avoided)
- If habitat is present and cannot be avoided for federal- or state-monitored or -listed species, then specific surveys (presence/absence surveys) may be warranted
- If Project facilities are to be located within or near sensitive areas, consider cable boring or drilling under sensitive areas to minimize land disturbance and restore disturbed areas back to pre-construction condition where possible
- Utilize underground collection cabling systems
- Use BMPs during construction and operation, particularly near sensitive habitats
- Use modern technology (*i.e.*, tubular towers, lower RPM WTGs, tubular towers)
- If field surveys are necessary, coordination with pertinent federal and state agencies should be conducted early in the process as there are MDNR recommended protocols or time of year restrictions for conducting surveys

If you have any questions or require any additional information, please contact me by phone at (816) 363-7251 or by email at reverard@burnsmcd.com.

Sincerely,



Robert G. Everard
Environmental Project Manager

Enclosures

cc: Andy Kim, EVS
Justin Bailey, Burns & McDonnell

Literature Cited

American Wind Energy Association (AWEA). 2004. Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts. American Wind Energy Association and the American Bird Conservancy. May 18-19, 2004. Washington, D.C. 107 pp. + append.

Baerwald, E.F., G.H. D'Amours, B.J. Klug, and R.M.R. Barclay. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. Current Biology 18:R695-R696.

Burt, W.H. and R.P. Grossenheider. 1976. Peterson Field Guides: Mammals. Houghton Mifflin Company, Boston, MA.

Erickson, W.P., G.D. Johnson, and D.P. Young. 2005. A Summary of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191.

Federal Emergency Management Agency (FEMA). 2011. Website: http://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay?catalogId=10001&storeId=10001&categoryId=12001&langId=-1&userType=G&type=1&future=false (Accessed from September 2011 to October 2011).

Johnson, G.D. 2005. A review of bat mortality at wind-energy developments in the United States. Bat Research News (46)2: 45-49.

Minnesota Department of Natural Resources (MDNR). 2011. Website: http://www.dnr.state.mn.us/rsg/filter_search.html (Accessed from September 2011 to June 2013).

Minnesota Department of Natural Resources (MDNR). 2013a. Endangered, threatened, and special concern species. Website: http://www.dnr.state.mn.us/rsg/definitions.html (Accessed from August 2011 to June 2013).

Minnesota Department of Natural Resources (MDNR), Data Deli. 2013b. MDNR GIS data. Website: http://deli.dnr.state.mn.us/data_search.html (Accessed from September 2011 to June 2013).

National Wind Coordinating Collaborative. 2010. Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions. Retrieved January 7, 2010, from http://www.nationalwind.org/publications/bbfactsheet.aspx.

Smithsonian National Museum of Natural History. 2011. Website: http://www.mnh.si.edu/mna/search_name.cfm (Accessed from September 2011 to October 2011).

U.S. Department of Agriculture (USDA). 2013. National Land Cover Data. Website: http://datagateway.nrcs.usda.gov/ (Accessed from September 2011 to June 2013).

U.S. Fish and Wildlife Service (USFWS). 2011. Glossary. Website: http://www.fws.gov/midwest/endangered/glossary/index.html (Accessed from September 2011 to June 2013).

U.S. Fish and Wildlife Service (USFWS). 2013a. Threatened and endangered species list. Website: http://www.fws.gov/midwest/Endangered/lists/minnesot-cty.html (Accessed from August 2011 to June 2013).

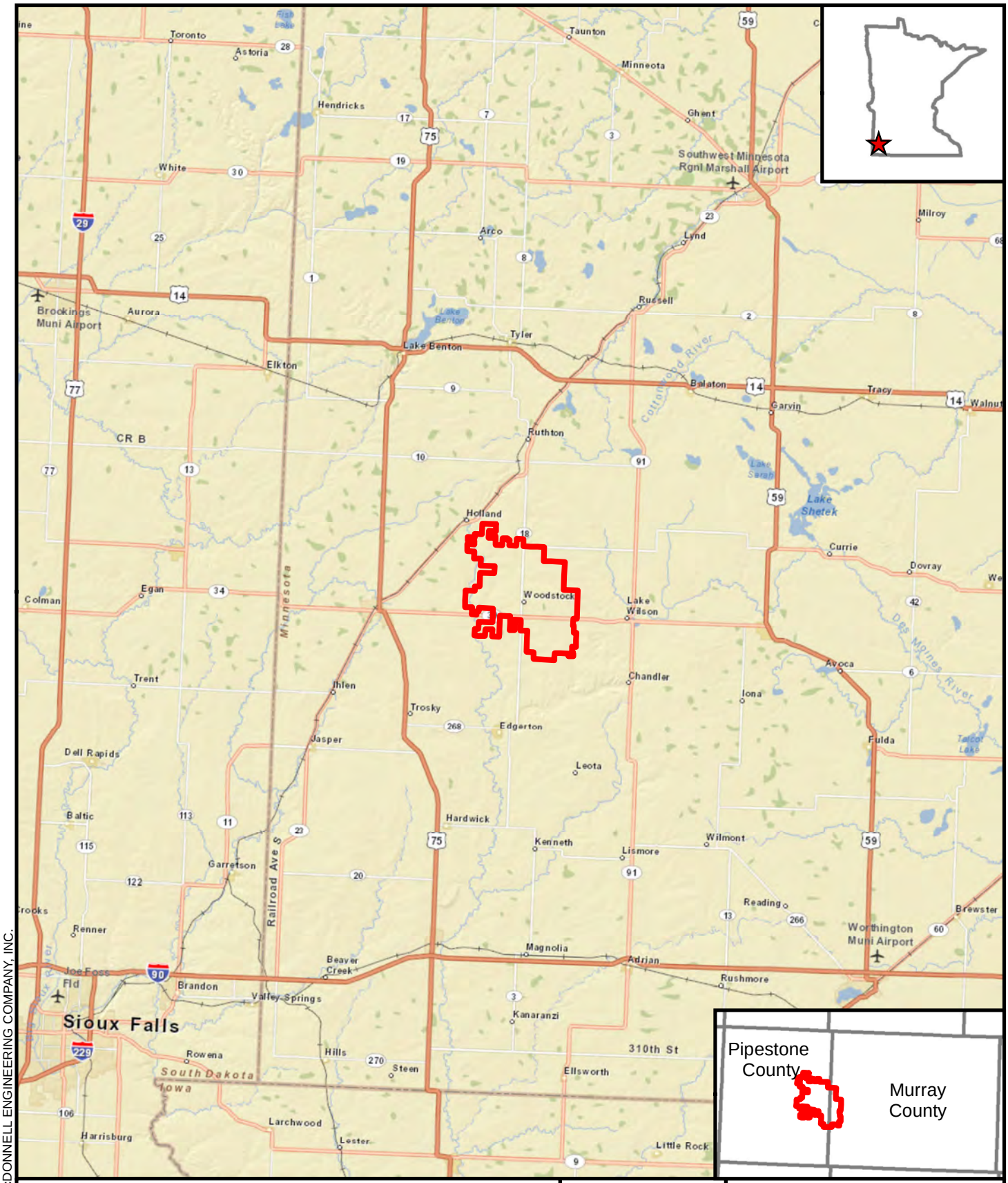
U.S. Fish and Wildlife Service (USFWS). 2013b. National Wetland Inventory data. Website: http://www.fws.gov/wetlands/Data/Mapper.html (Accessed from September 2011 to June 2013).

U.S. Fish and Wildlife Service (USFWS). 2009. Whooping crane observation data set.

U.S. Fish and Wildlife Service (USFWS). 2008. Recommendations for Projects Affecting Waters Inhabited by Topeka Shiners (*Notropis topeka*) in Minnesota. Website: http://www.fws.gov/midwest/endangered/section7/s7process/fish/TOSHConstructionGuidelines MN26June2008.pdf. (Accessed November 2011).

U.S. Geological Survey (USGS). 2011. National Hydrology data. Website: http://nhd.usgs.gov/data.html (Accessed from November 2011 to June 2013).

FIGURES



NORTH

0 5 10 Miles

Legend

Proposed Project Boundary

Burns & McDonnell SINCE 1898

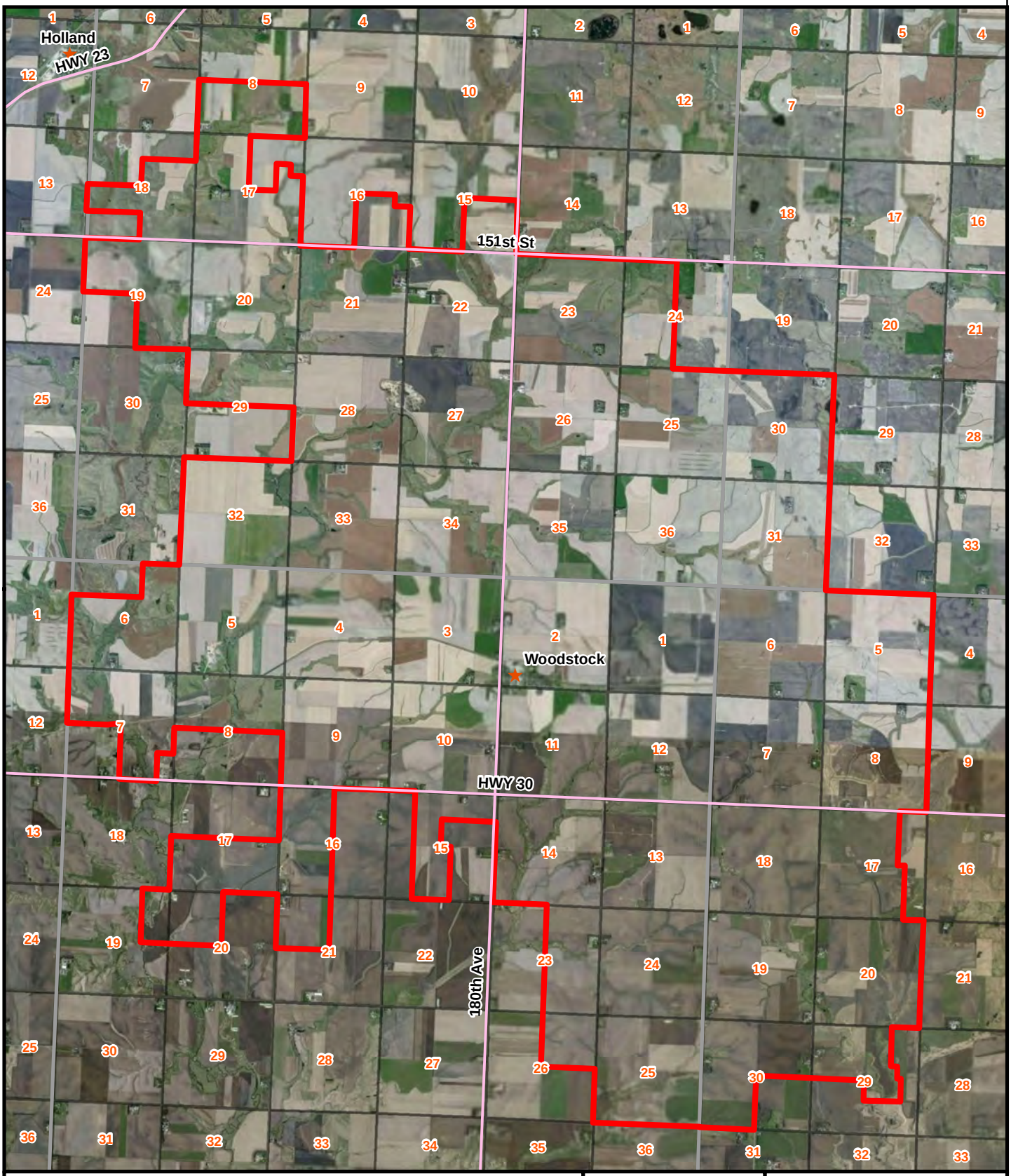
Figure 1
General Location Map
Stoneray Wind Project
Murray & Pipestone Counties, Minnesota

Path: R:\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Project_Location.mxd tbeemer 6/4/2013

COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.

Source: ESRI (2013) and Burns & McDonnell (2013)

Issued: 6/4/2013



Legend

- Proposed Project Boundary
- Township and Range Sections
- Town
- Major Roads

NORTH

0 0.5 1 Miles

Figure 2
Project Boundary & Township and Range Sections
Stoneray Wind Project
Murray & Pipestone Counties, Minnesota

Source: ESRI (2013), and Burns & McDonnell (2013)

Issued: 6/4/2013

Path: R:\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig2.mxd tbeemer 6/4/2013
COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.

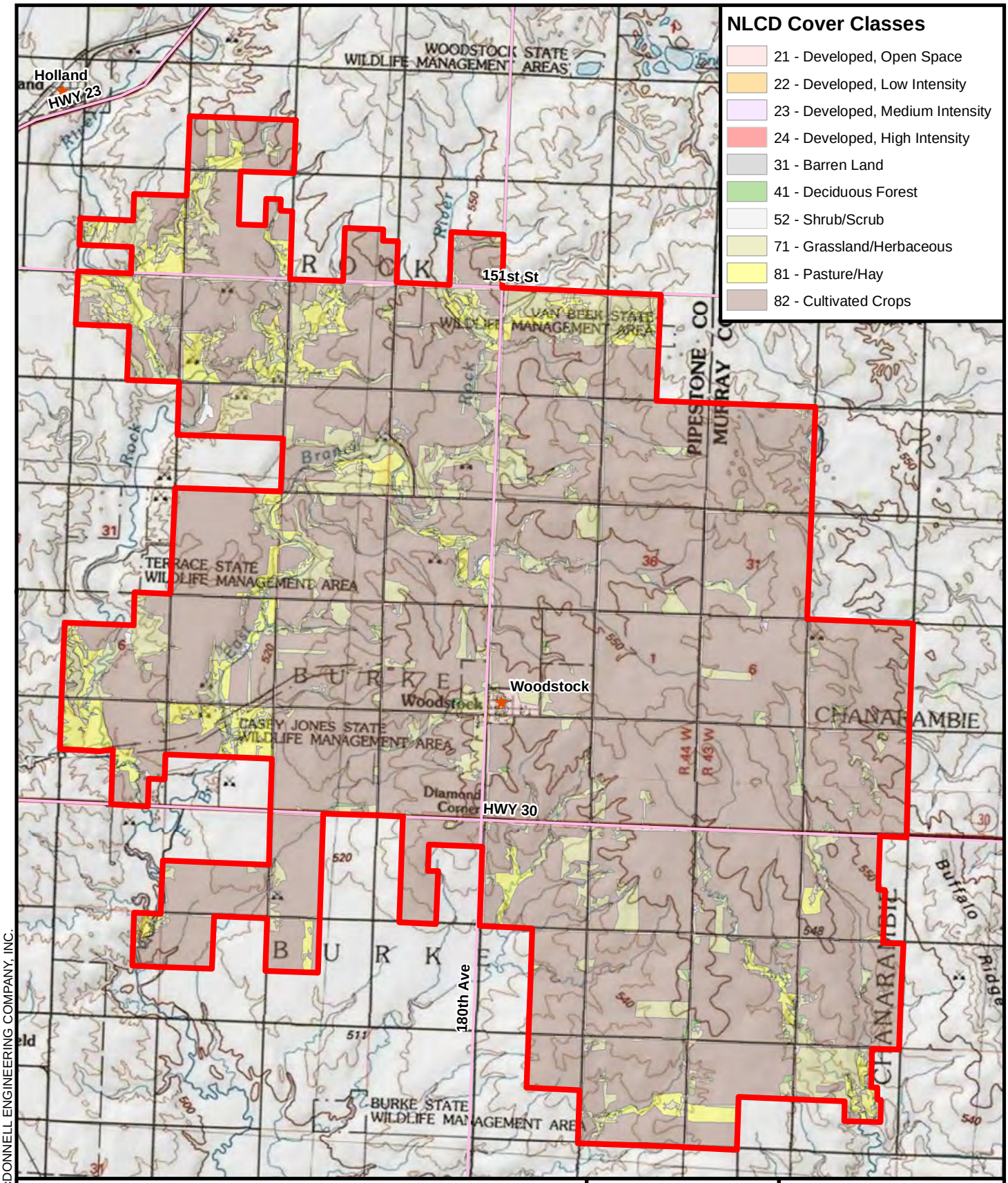
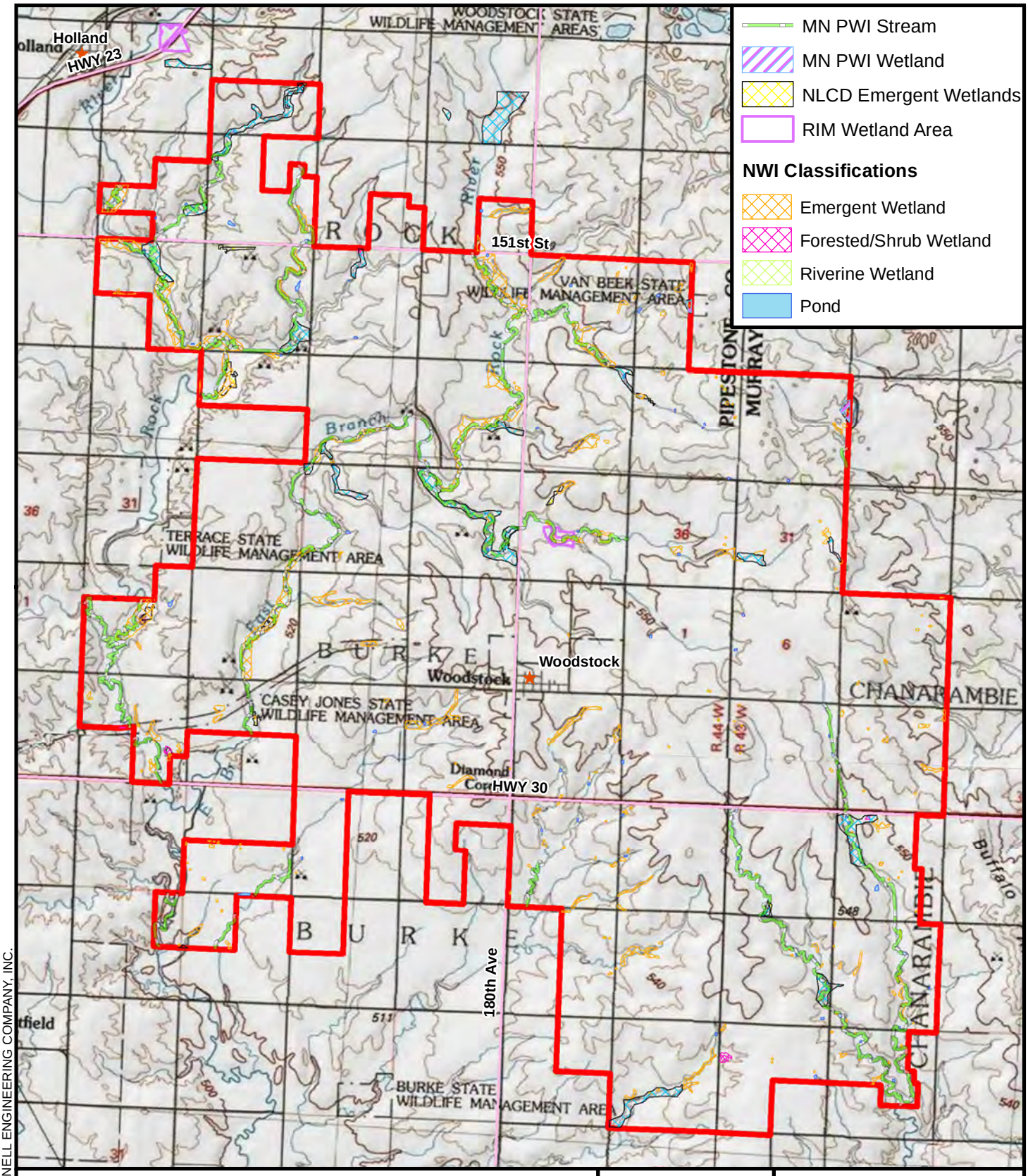


Figure 3
National Land Cover Data Map
Stoneray Wind Project
Murray & Pipestone Counties, Minnesota

Source: 1:24,000 Holland & Woodstock Topographical Maps (1967), NLCD (2006), ESRI (2013), and Burns & McDonnell (2013)

Issued: 6/4/2013

Path: R:\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig3.mxd tbeemer 6/4/2013
COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.



Legend

- Proposed Project Boundary
- Additional Estimated Wetland Areas*
- Major Roads
- Town

NORTH

0 0.5 1 Miles

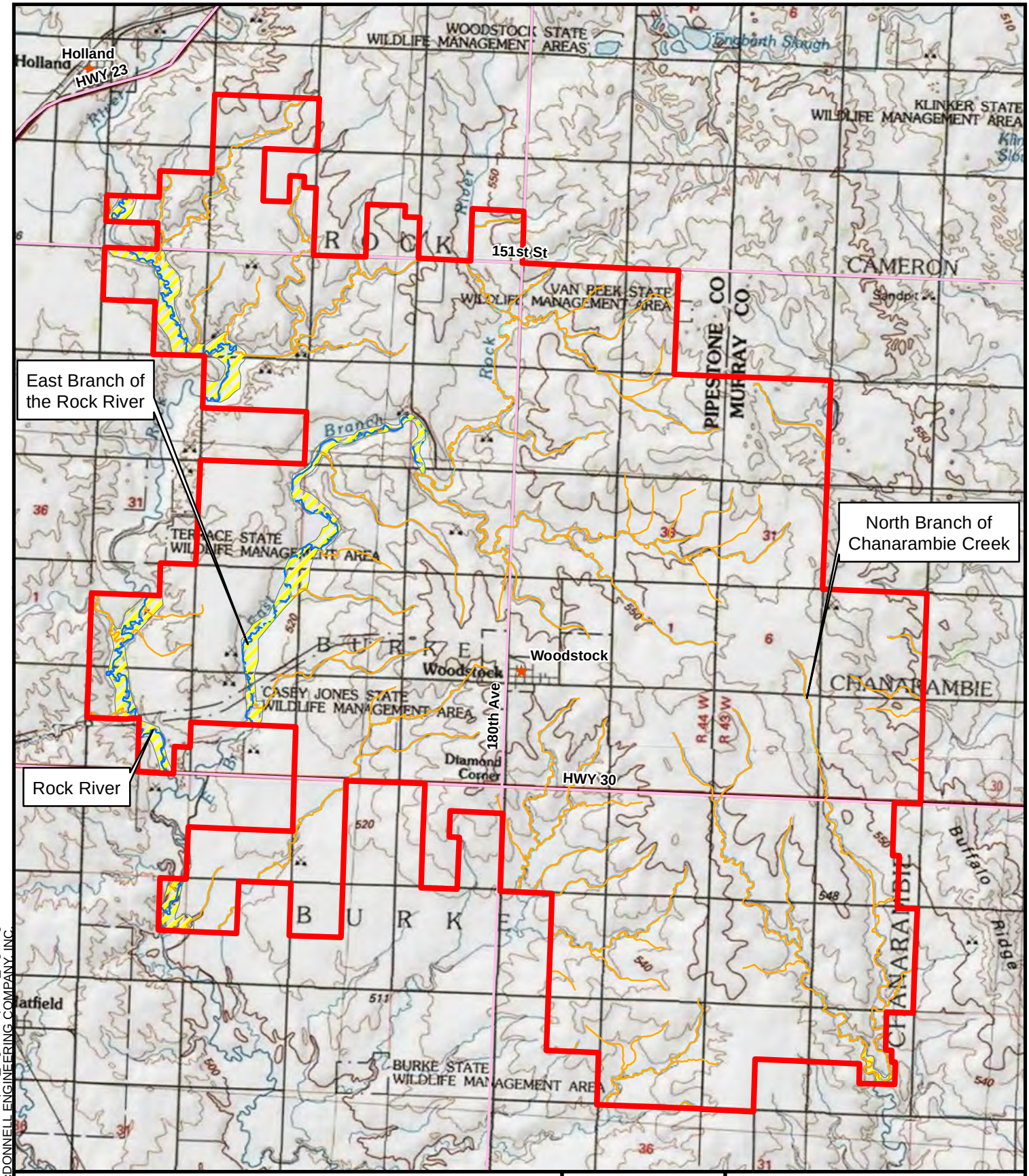
* Data Provided Is Applicable Only For The Initial Project Boundary

Figure 4
Wetland Resources Map
Stoneray Wind Project
Murray & Pipestone
Counties, Minnesota

Source: 1:24,000 Holland & Woodstock Topographical Maps (1967), MN DNR (2011), ESRI (2013), FEMA (1986) and Burns & McDonnell (2013)

Issued: 6/4/2013

Path: R:\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig4.mxd tbeemer 6/4/2013
COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.



Legend

- Proposed Project Boundary
- FEMA Floodplain
- Major Roads
- Town

Stream Type

- Perennial
- Intermittent
- Other

NORTH

0 0.5 1 Miles

Figure 5
National Hydrology Dataset & FEMA Floodplain
Stoneray Wind Project
Murray & Pipestone Counties, Minnesota

Burns & McDonnell SINCE 1898

Path: R:\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig5.mxd tbeemer 6/4/2013

COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.

Source: 1:24,000 Holland & Woodstock Topo Maps (1967), NHD (2010), 1986 FEMA, MnDNR (1983), ESRI (2013), and Burns & McDonnell (2013)

Issued: 6/4/2013

Holland
HWY 23
151st St
Rock River (4a)
East Branch
Rock River (4aa)
Unnamed Tributary (4bb)
Woodstock
North Branch
Chanarambie Creek (4x)
HWY 30
Unnamed
Tributary (4z)
180th Ave

NORTH

0 0.5 1 Miles

Legend

- Proposed Project Boundary
- Town
- Critical Habitat for Topeka Shiner
- Major Roads

Natural Communities

- Marsh
- Calcareous Fen
- Upland Prairie
- Wet Meadow

Rare Species

- Invertebrate Animal
- Vertebrate Animal
- Vascular Plant
- Community

Burns & McDonnell SINCE 1898

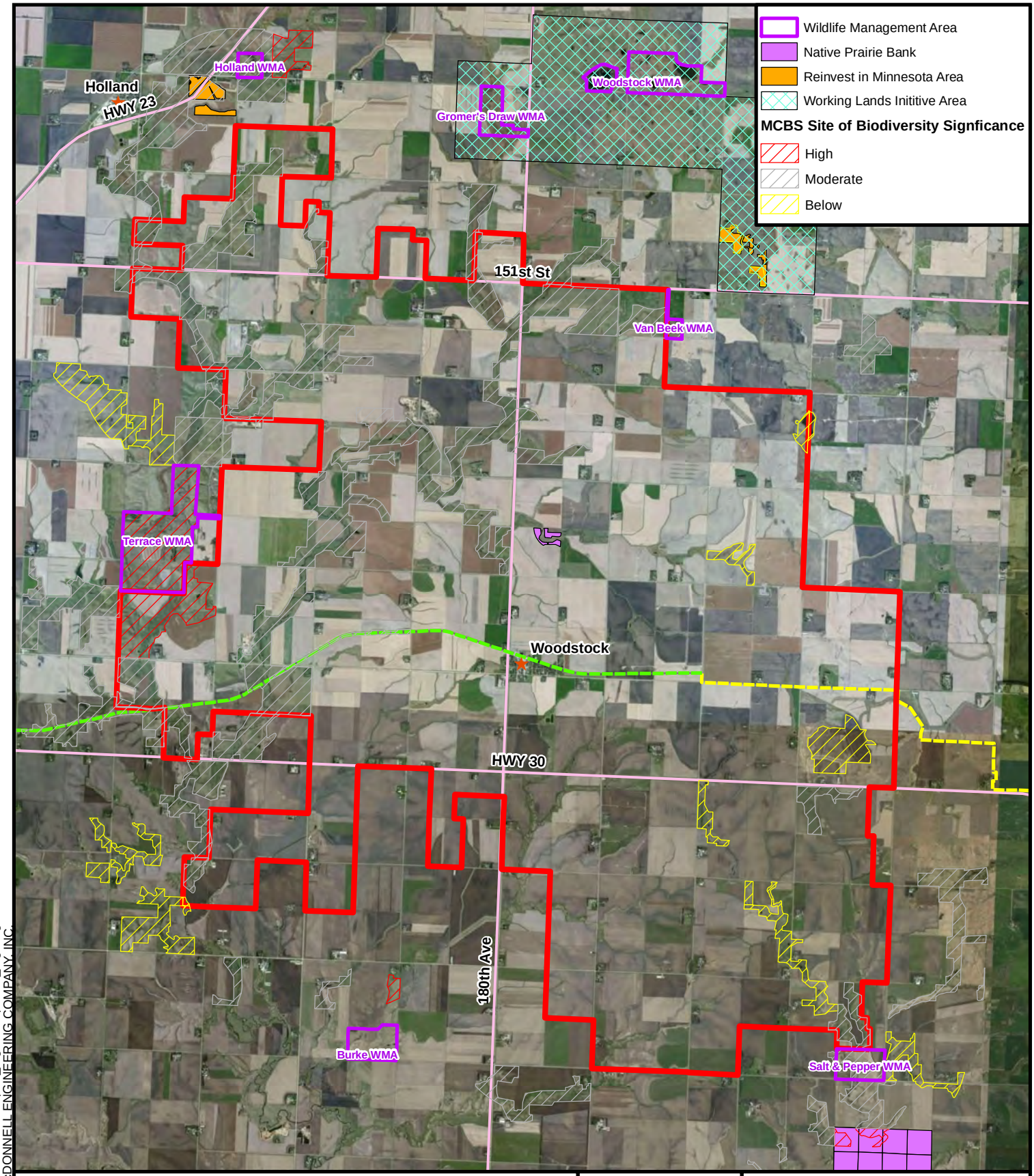
Figure 6
Rare Species & Natural Communities
Stoneray Wind Project
Murray & Pipestone Counties, Minnesota

Source: 1:24,000 Holland & Woodstock Topographical Maps (1967), FWS (2004), MN DNR (2013), ESRI (2013), EDF (2013) and Burns & McDonnell (2013)

Issued: 6/5/2013

Path: \\espsrv\data\Projects\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig6.mxd tbeemer 6/5/2013

COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.



NORTH

0 0.5 1 Miles

Legend

- Proposed Project Boundary
- Town
- Casey Jones State Trail
- Casey Jones State Trail Potential Expansion
- Major Roads

Burns & McDonnell SINCE 1898

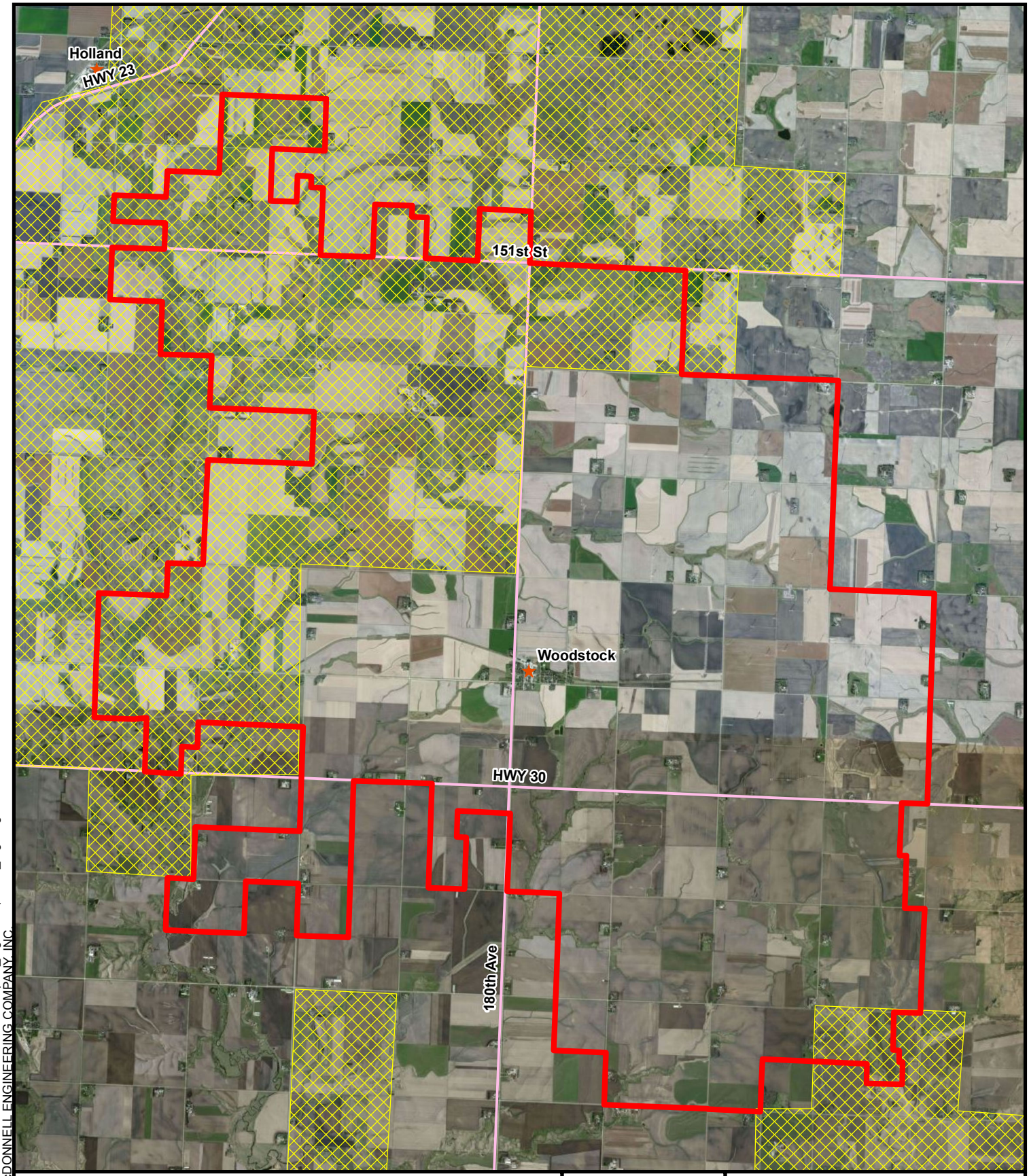
Figure 7
Minnesota Public Lands/ Easements,Working Lands Initiative, Sites of Biological Significance & State Trail Map
Stoneray Wind Project
Murray & Pipestone Counties, Minnesota

Path: R:\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig7.mxd tbeemer 6/4/2013

COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.

Source: MN DNR (2011), ESRI (2013), and Burns & McDonnell (2013)

Issued: 6/4/2013



NORTH

0 0.5 1 Miles

Legend

- Proposed Project Boundary
- Audubon Society Important Bird Area
- Town
- Major Roads

Figure 8
Important Bird Areas
Stoneray Wind Project
Murray & Pipestone
Counties, Minnesota

Source: Audubon Society (2013), ESRI (2013), and Burns & McDonnell (2013)

Issued: 6/5/2013

Path: \\espsrv\data\Projects\enXco\62823\GIS\DataFiles\ArcDocs\Report_Figures\Species_Figs\Fig8.mxd tbeemer 6/5/2013
COPYRIGHT © 2013 BURNS & McDONNELL ENGINEERING COMPANY, INC.

APPENDIX A
PIPESTONE AND MURRAY COUNTIES
MDNR SPECIES OF SPECIAL CONCERN

Appendix A. State Special Concern Species Known or Likely to Occur in Pipestone and Murray Counties

Species	State Status	Habitat	County
Arogos skipper *(Atrytone arogos)*	special concern	Mesic or dry-mesic native prairie.	Pipestone & Murray
Buffalo grass *(Buchloe dactyloides)*	special concern	Southern bedrock outcrops.	Pipestone
Creek heelsplitter *(Lasmigona compressa)*	special concern	Creeks, small rivers, and upstream portions of large rivers. Preferred substrates are sand, fine gravel, and mud.	Pipestone
Few-flowered spikerush *(Eleocharis quinqueflora)*	special concern	Sparsely vegetated wet habitats found in graminoid fens, shorelines of ponds and small lakes, and occasionally in wet prairie openings.	Pipestone & Murray
Forster's tern *(Sterna forsteri)*	special concern	Prefers extensive marshes with an interspersion of emergent vegetation and open water.	Pipestone & Murray
Hall's sedge *(Carex hallii)*	special concern	Best habitats include saline prairies; secondary habitats include mesic and brush prairies.	Murray
A jumping spider *(Marpissa grata)*	special concern	Prefers habitat that contains sedges or emergent vegetation. Most records associated with wetlands, ponds, or rivers.	Murray
A jumping spider (*Phidippus pius)*	special concern	In Minnesota, limited to unplowed prairie sites in the south-central and southwestern portions of the state.	Pipestone
Least weasel *(Mustela nivalis)*	special concern	Variety of habitats including fire-dependent forest, mesic hardwood forest, upland prairie, lowland prairie, river shore, and savanna.	Pipestone & Murray
Leonard's skipper *(Hesperia leonardus)*	special concern	Dry prairie dominated by mid-height and short grasses.	Pipestone & Murray
Mudwort *(Limosella aquatica)*	special concern	A very specialized habitat, including ephemeral pools that develop in shallow depressions in bedrock outcrops and in small depressions in native prairies.	Pipestone
Phlox moth *(Schinia indiana)*	special concern	Observed only in native upland prairie habitat in Minnesota. The crucial habitat feature is the presence of prairie phlox.	Pipestone & Murray
Plains prickly pear *(Opuntia macrorhiza)*	special concern	Occurs on the margins of bedrock exposures and in associated dry prairie communities, specifically in thin, dry soil over granite, quartzite, and gneiss.	Pipestone
Plains topminnow *(Fundulus sciadicus)*	special concern	Spring-fed pools and backwaters of clear to moderately turbid creeks and rivers that have a sand or rock bottom and a heavy growth of aquatic plants.	Pipestone
Poweshiek skipperling *(Oarisma poweshiek)*	special concern	In Minnesota, occurs in wet to dry native prairie, but not in sand prairie. Non-native, grass-dominated habitats such as Kentucky bluegrass (*Poa pratensis*), smooth brome, or redtop (*Agrostis gigantea*) are not suitable for this skipperling.	Pipestone & Murray
Prairie moonwort *(Botrychium campestre)*	special concern	Coarse, well-drained glacial till or in thin loess over bedrock in plant communities that include dry prairies, dry hill prairies, dry bedrock bluff prairies, and sand-gravel prairies.	Pipestone & Murray
Prairie vole *(Microtus ochrogaster)*	special concern	Grassy areas, particularly ones which have well-drained (dry) soil. Mainly restricted to relatively undisturbed, dry grasslands, however, they have been found in other habitats. Suitable ground litter for runways seems to be an important habitat feature.	Pipestone

Red three-awn *(Aristida purpurea* var. *longiseta)*	special concern	Dry and dry-mesic prairies in western Minnesota with well-drained soils dominated by grasses.	Pipestone & Murray
Red-tailed prairie leafhopper *(Aflexia rubranura)*	special concern	Dry to wet mesic prairies in which its host plant, prairie dropseed, is common.	Murray
Regal fritillary *(Speyeria idalia)*	special concern	Strongly associated with native prairie habitat.	Pipestone & Murray
Small white lady's-slipper *(Cypripedium candidum)*	special concern	Primarily deep-soil mesic prairies. Additionally, wet prairies, certain types of sedge meadows, and calcareous fens can also support this species. It does not occur in habitats with a history of livestock grazing or crop production.	Pipestone & Murray
Topeka shiner *(Notropis topeka)*	special concern	Slow-moving, small to mid-size prairie streams with sand, gravel, or rubble bottoms. They prefer pool and oxbow areas that are outside main channel courses. These pools are in contact with groundwater and usually contain vegetation and areas of exposed gravel.	Pipestone & Murray
Tumblegrass *(Schedonnardus paniculatus)*	special concern	Characteristic plant of dry prairies on the Great Plains, but suitable natural habitats in Minnesota seem to be limited to southern bedrock outcrops of Sioux quartzite bedrock, and less often crystalline bedrock, in the southwest corner of the state.	Pipestone
Water-hyssop *(Bacopa rotundifolia*)	special concern	An aquatic species found primarily in small rainwater pools on bedrock outcrops, and occasionally along the margins of shallow ponds, in the prairie region of western Minnesota.	Pipestone
Western white prairie-clover *(Dalea candida* var. *oligophylla)*	special concern	Dry prairies, especially the south- and west-facing slopes of dry hill prairies. The soil in known habitats is sandy or gravelly or sometimes calcareous loam.	Pipestone

Source: MDNR 2013a.