FAGEN, INC.

GRANITE FALLS, MINNESOTA

Palmer's Creek Wind Farm

Acoustic Bat Summary Report

2017

NEW CENTURY ENVIRONMENTAL LLC

Environmental Compliance and Stewardship made Cost Effective

NEW CENTURY ENVIRONMENTAL LLC, COLUMBUS, NE

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Fagen, Inc.
Granite Falls, Minnesota

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Executive Summary

In early summer of 2016, Mike Rutledge of Fagen Engineering contacted Mike Gutzmer of New Century Environmental, LLC (NCE) to aid in the effort of completing a bat report that would capture the diversity/abundance of bat species within the study area of Palmer's Creek to meet due diligence with regulatory agencies, which was done through acoustic monitoring. The client proposed to develop a wind farm within the study area of Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). The study area lies within the Des Moines Lobe Western Corn Belt Plains (47b) ecoregion of Minnesota. Staff of Fagen Engineering deployed five separate ANABAT systems to record bat activity throughout the study area, the first deployment was done with two of the ANABAT recorders during the fall of 2015 and continued through 15 October 2016. Three more ANABAT recorders were launched on 03 August, 2016. The data collected from Fagen Engineering was sent to NCE via Procore Portal. NCE then took the data and processed in zero-crossing through Kaleidoscope version 3.1.8 to confirm presence diversity and abundance of bat species. The software uses a presence/absent indicator by giving each species of bat a p-value. The lower the p-value, the more likely the species of bat is present. Bat presence, in the form of vocalization, was detected, identified by species, and catalogued, thereby allowing us to estimate species occurrences, distribution and relative abundance.

Introduction

In early summer of 2016, Mike Rutledge of Fagen Engineering, LLC contacted Mike Gutzmer of New Century Environmental, LLC (NCE) to aid in the effort of completing a bat report that would capture the diversity/abundance of bat species within the study area of Palmer's Creek to meet due diligence with regulatory agencies. The client proposed to develop a wind farm in Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). Bat fatalities result from wind turbine strikes as they feed on insects at night. The heat from the wind turbines attract insects and therefore bring the bats close to the wind turbine. With decreasing bat populations, the gathering of necessary bat data is crucial for this proposed site. Threatened and Endangered bat species become at risk in wind farm areas. Populations of bat species are experiencing long-term declines, due in part to habitat loss and fragmentation, invasive species, and numerous anthropogenic impacts, increasing the concern over the potential effects of energy development. All studies of bat impacts have demonstrated that fatalities peak in late summer and early fall, coinciding with the migration of many species (Johnson 2005; Kunz et al. 2007a; Arnett et al. 2008). A smaller spike in bat fatalities occurs during spring migration for some species at some facilities (Arnett et al. 2008). However, the seasonal fatality peaks noted above may change as more facilities are developed and studied.

Study Area

The study area is located within Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). The study area lies within the Des Moines Lobe Western Corn Belt Plains (47b) ecoregion of Minnesota. This ecoregion consists of fast fertile plain of deep soils dominated by row crops. The boundaries of the Minnesota River Prairie Subsection coincide with large till plains flanking the Minnesota River. The unit is bounded to the southwest by the Prairie Coteau. A series of moraines define the eastern boundary, the Alexandria Moraine to the northeast and the Bemis moraine to the southeast (Minnesota 2016).

The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota into eastern South Dakota. The Minnesota River forms a broad valley, dividing the area in half. This valley once had a continuous band of floodplain forest that extended upstream as far as Lac Qui Parle, with highly unique bedrock exposures. There are 150 lakes larger than 160 acres in the subsection, most of which are shallow. Before settlement by people of European descent, the predominant vegetation was tallgrass prairie and wetlands. Fire was once a common natural disturbance and critical to maintaining native prairie communities (Minnesota, 2016).

Today, row-crop agriculture is the predominant land use, and prairie remnants and floodplain forests are rare. A major concern is impacts on water quality from intensive agricultural activities, including use of fertilizers and pesticides, expanding use of pattern tiling, and ditching and draining of small wetlands. Continued loss of the small amount of native upland habitat and over-intensive grazing remain a concern (Minnesota, 2016).

Figure 1: Vicinity map of study area. Chippewa county is located in southwestern Minnesota.

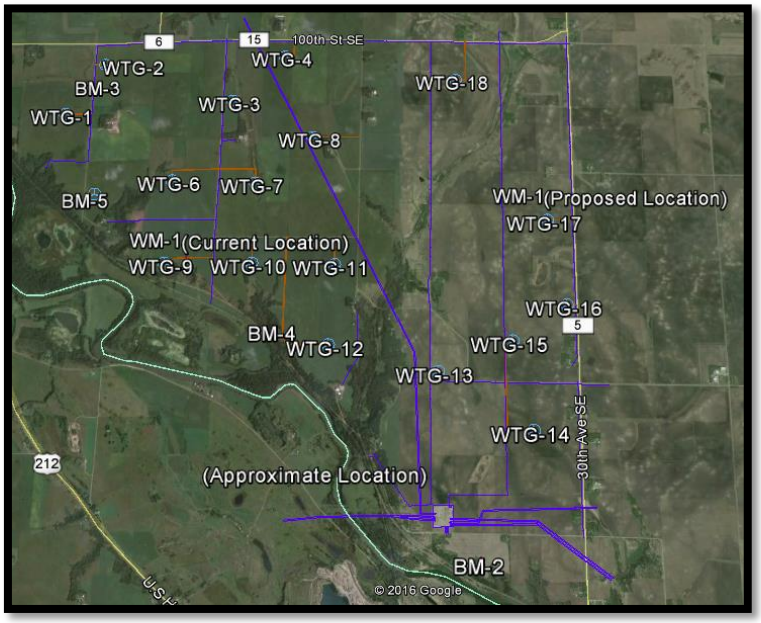

Figure 2: Project location along with bat monitor (BM) locations. BM-1 is not shown on the map but lies next to BM-2.

Methods

Data was gathered in the field by Fagen Engineering, LLC within the study area from five different Anabat acoustic recorders (map in Study Area section shows locations of monitors). Monitors 1 & 2 gathered data throughout the fall of 2015 and were deployed again in May of 2016. Monitors 3-5 were added in September of 2016.

Monitors 1 & 2 were deployed on September 13, 2015 and removed on October 11, 2015. They were deployed again on April 12, 2016 then removed on October 15. Monitor 3, monitor 4 and monitor 5 were deployed on August 3rd, 2016 then removed on October 15th, 2016. The monitors were deployed for 287 trap nights

The data was uploaded through the Procore portal where New Century Environmental staff could access the data to download and process through a program called Kaleidoscope Pro version 3.1.8. The Kaleidoscope classifier uses a source library of user submitted reference calls to compare to recordings. It accepts and displays full-spectrum signals, to match with the calls known bat species. The software uses a presence/absence indicator by giving each species of bat a p-Value of 0 to 1. The lower the P-Value, the more likely the species is present. Variability in the quality of recordings and variations in calls among individual bats creates challenges to acoustic bat classification.

Kaleidoscope Pro has been approved by the U.S. Fish & Wildlife Service for use for presence/absence analysis for Indiana bats (*Myotis sodalis*). Similarly, the approved programs may also be used for presence/absence analysis for northern long-eared bats (*Myotis septentrionalis*). The U.S Geological Survey also tested acoustic matching programs and Kaleidoscope Pro passed their standard validation process (USFWS 2016).

Results

From the five Anabat recording systems, 232,116 sound files were recorded. Visual examination and filtering of files to eliminate extraneous noise (e.g., wind, insects, etc.) resulted in a total of 14,442 bat detections.

Monitor 1 recorded 3,181 files that Kaleidoscope Pro was able to classify as bat passes. The silver haired bat was the most common species at this site being 62% of total detections. The big brown bat was the second most common being 13% of total detections. The federally threatened northern long-eared myotis was detected 4 times (0.001%), but had a P-value of 1 which almost certainly means it was nonexistent at this site. The eastern pipistrelle had a total of 55 (2%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	*Lasionycteris noctivagans*	Least concern	0	1971
EPFU	Big-Brown Bat	*Eptesicus fuscus*	Least concern	0	427
LACI	Hoary Bat	*Lasiurus cinereus*	Least concern	0	347
LABO	Eastern Red Bat	*Lasiurus borealis*	Least concern	0	158
MYLU	Little Brown Bat	*Myotis lucificus*	Least concern	0	219
MYSE	Northern long-eared myotis	*Myotis septentrionalis*	Federally threatened	1	4
PESU	Eastern pipistrelle	*Perimyotis subflavus*	MN species of concern	0	55

Figure 3: Summary of species diversity and abundance for monitor 1.

Monitor 2 recorded 3,004 files that Kaleidoscope Pro was able to classify as bat passes. The silver haired bat was the most common species at this site being 57% of total detections. The second most common was the hoary bat at 30% of detections. The federally threatened northern long eared myotis only had a total of 2 (0.0007%) detections but had a P-value of 1. The eastern pipistrelle had a total of 14 (0.005%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	*Lasionycteris noctivagans*	Least concern	0	1717
EPFU	Big-Brown Bat	*Eptesicus fuscus*	Least concern	0	167
LACI	Hoary Bat	*Lasiurus cinereus*	Least concern	0	887
LABO	Eastern Red Bat	*Lasiurus borealis*	Least concern	0	165
MYLU	Little Brown Bat	*Myotis lucificus*	Least concern	0.14	52
MYSE	Northern long-eared myotis	*Myotis septentrionalis*	Federally threatened	1	2
PESU	Eastern pipistrelle	*Perimyotis subflavus*	MN species of concern	0.01	14

Figure 4: Summary of species abundance and diversity for monitor 2

Monitor 3 recorded 4,870 files that Kaleidoscope Pro was able to classify as bat passes. The hoary bat was the most common species at this site being 75% of total detections. The second most common was the silver haired bat being 8% of total detections. The northern long eared bat had only 1 (0.0002%) detections with a p-value of 1. The eastern pipistrelle had a total of 64 (1%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	*Lasionycteris noctivagans*	Least concern	0.34	401
EPFU	Big-Brown Bat	*Eptesicus fuscus*	Least concern	0	263
LACI	Hoary Bat	*Lasiurus cinereus*	Least concern	0	3672
LABO	Eastern Red Bat	*Lasiurus borealis*	Least concern	0	306
MYLU	Little Brown Bat	*Myotis lucificus*	Least concern	0	163
MYSE	Northern long-eared myotis	*Myotis septentrionalis*	Federally threatened	1	1
PESU	Eastern pipistrelle	*Perimyotis subflavus*	MN species of concern	0	64

Figure 5: Summary of species diversity and abundance for monitor 3

Monitor 4 recorded 1,512 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the silver-haired bat being 46% of total detections. The second most common was the hoary bat being 26% of total detections. The northern long-eared myotis was not recorded at this site. The eastern pipistrelle had a total of 59 (4%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	*Lasionycteris noctivagans*	Least concern	0	688
EPFU	Big-Brown Bat	*Eptesicus fuscus*	Least concern	0	143
LACI	Hoary Bat	*Lasiurus cinereus*	Least concern	0	390
LABO	Eastern Red Bat	*Lasiurus borealis*	Least concern	0	129
MYLU	Little Brown Bat	*Myotis lucificus*	Least concern	0	103
MYSE	Northern long-eared myotis	*Myotis septentrionalis*	Federally threatened	1	0
PESU	Eastern pipistrelle	*Perimyotis subflavus*	MN species of concern	0	59

Figure 6: Summary of species diversity and abundance for monitor 4

Monitor 5 recorded 1,875 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the silver haired bat being 46% of total detections. The second most common was the hoary bat with being 21%) of total detections. The northern long-eared myotis had a total of 2 (0.001%) detections. The eastern pipistrelle had a total of 70 (4%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	*Lasionycteris noctivagans*	Least concern	0	871
EPFU	Big-Brown Bat	*Eptesicus fuscus*	Least concern	0	316
LACI	Hoary Bat	*Lasiurus cinereus*	Least concern	0	403
LABO	Eastern Red Bat	*Lasiurus borealis*	Least concern	0	138
MYLU	Little Brown Bat	*Myotis lucificus*	Least concern	0	75
MYSE	Northern long-eared myotis	*Myotis septentrionalis*	Federally threatened	1	2
PESU	Eastern pipistrelle	*Perimyotis subflavus*	MN species of concern	0	70

Figure 7: Summary of species diversity and abundance for monitor 5.

Discussion

There are seven species of bats that occur regularly in Minnesota; our most common species, the little brown myotis, occurs over most of North America. Along with the Northern myotis and big brown bat, it hibernates in Minnesota caves and mines. In summer, they roost in caves, mines, hollow trees, and buildings. Large groups of these bats hang upside-down in caves. The eastern pipistrelle is the smallest species, weighing only two-tenths of an ounce. It is found in the same Minnesota caves and mines, though it is less common and in fewer numbers.

The silver-haired bat and Eastern red bad are forest dwellers that usually live near water and feed among the trees. Usually a red bat pair will repeatedly fly the same route in search of food. Another woodland species is the hoary bat. It is the largest Minnesota bat, weighing an ounce or more. All three species are somewhat solitary, roost in trees, and migrate south for the winter (Minnesota, 2016).

In early July 2016, a species previously not known to be native to Minnesota, the evening bat, was discovered. Researchers from the DNR Nongame Wildlife Program and Central Lakes College were conducting a survey as part of a project to study summer breeding habits of the state's forest bats. The bat was captured at the Minnesota Army National Guard's Training Site in Arden Hills.

All seven bat species that occur in Minnesota may be found throughout the state.

Common name	Scientific Name	State Status	Federal Status
Northern long-eared myotis	*Myotis septentrionalis*	Threatened	Threatened
Eastern Pipistrelle	*Pipistrellus subflavus*	MN species concern	Not listed
Little brown bat	*Myotis lucifugus*	Not listed	Not listed
Big brown bat	*Eptesicus fuscus*	Not listed	Not listed
Silver-haired bat	*Lasionycteris noctivagans*	Not listed	Not listed
Eastern red bat	*Lasiurus borealis*	Not listed	Not listed
Hoary bat	*Lasiurus cinereus*	Not listed	Not listed
Evening bat	*Nycticeius humeralis*	Newly discovered	Not listed

Figure 8: Bat species found in Minnesota with federal and state conservation status.

There were a total of six bat species documented throughout the course of the study (September-October 2015 and 2016). The eastern pipistrelle (*Pipistrellus sublavus)* was documented at this site and is listed as a species of concern in the state of Minnesota. It was detected in small numbers but was found at every monitor except for monitor 1. The northern long-eared myotis (*Myotis septentrionalis*) is a federally threatened species whose home range lies within the study site. However no confirmed documentation was recorded here. Even though a total of five clicks of which Kaleidoscope classified as MYSE (northern long-eared myotis) the P-value was given a 1 for every monitor indicating the likelihood of presence is near non-existent. All other species documented are of least concern. Of the six species documented the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and big brown bat (*Eptesicus fuscus*) were among the most common followed by the little brown bat (*Myotis lucifugus*) and eastern red bat (*Lasiurus borealis*).

References

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Appendix

Summary Graphs

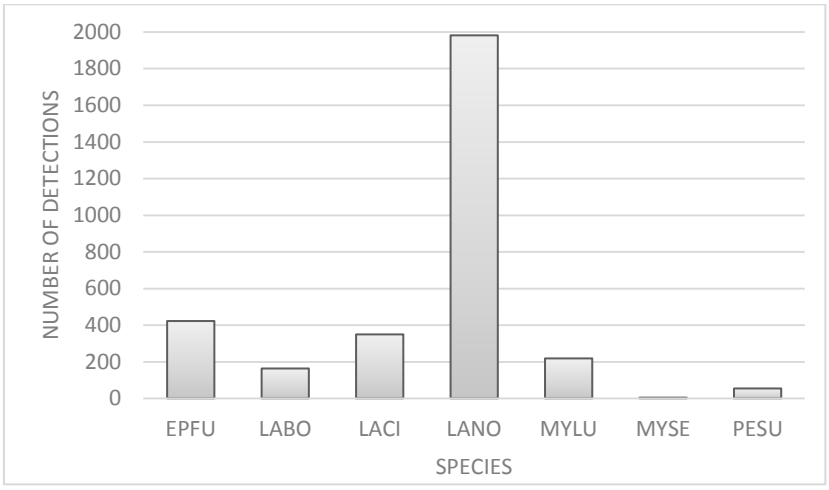

Figure 9.1: Total number of bat detections by species for monitor 1

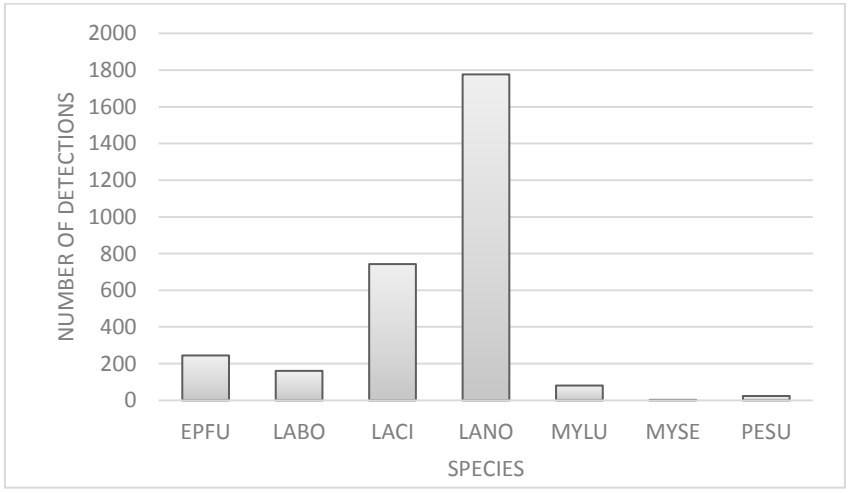

Figure 9.2: Total number of bat detections by species for monitor 2

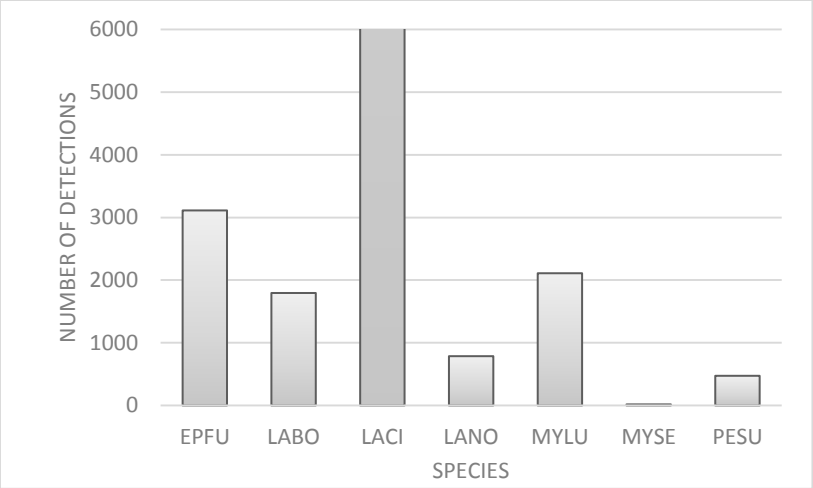

Figure 9.3: Total number of bat detections by species for monitor 3

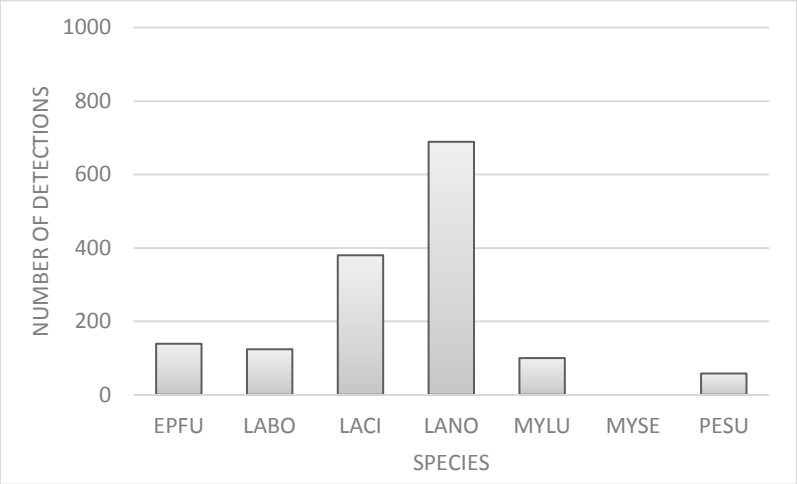

Figure 9.4: Total number of bat detections by species for monitor 4

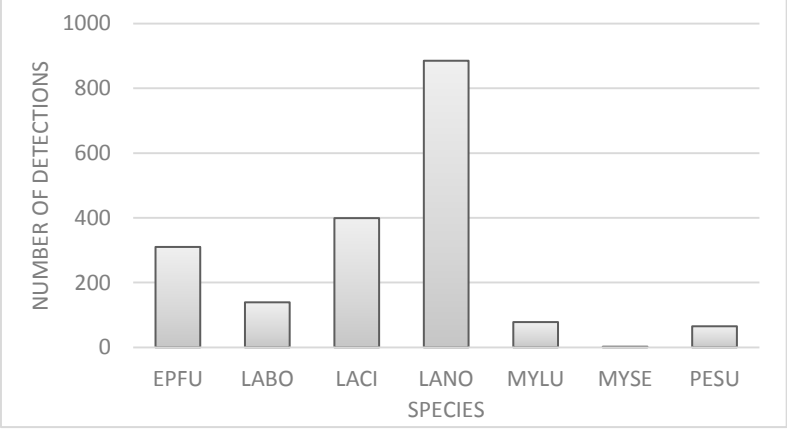

Figure 9.5: Total number of bat detections by species for monitor 5

Kaleidoscope Data

KALEIDOSCOPE 3.1.8

Bats of North America 3.1.0 S/A:+1

Monitor 1			
	Species	Detections	Presence p-value
Fall 2015	EPFU	123	0.95
	LABO	41	0
	LACI	144	0
	LANO	725	0
	MYLU	45	0
	MYSE	0	1
	PESU	10	0
5/28/2016	EPFU	118	0.77
	LABO	34	0
	LACI	104	0
	LANO	670	0
	MYLU	39	0
	MYSE	0	1
	PESU	8	0
9/2/2016	EPFU	91	0
	LABO	46	0
	LACI	53	0
	LANO	194	0
	MYLU	96	0
	MYSE	2	1
	PESU	23	0
10/7/2016	EPFU	92	0
	LABO	34	0
	LACI	38	0
	LANO	377	0
	MYLU	39	0
	MYSE	0	1
	PESU	14	0
10/15/2016	EPFU	3	0.33
	LABO	3	0
	LACI	8	0
	LANO	5	0.46
	MYLU	0	1
	MYSE	0	1
	PESU	0	1

Monitor 2			
	Species	Detections	Presence p-value
Fall 2015	EPFU	33	0.22
	LABO	31	0
	LACI	38	0
	LANO	148	0
	MYLU	15	0
	MYSE	1	1
	PESU	0	1
5/28/2016	EPFU	9	1
	LABO	8	0
	LACI	29	0
	LANO	167	0
	MYLU	9	0
	MYSE	0	1
	PESU	2	0.08
9/2/2016	EPFU	108	1
	LABO	84	0
	LACI	631	0
	LANO	1085	0
	MYLU	20	0
	MYSE	1	1
	PESU	9	0.01
10/7/2016	EPFU	17	1
	LABO	41	0
	LACI	189	0
	LANO	313	0
	MYLU	8	0.14
	MYSE	0	1
	PESU	3	0.33
10/15/2016	EPFU	0	1
	LABO	1	0.10
	LACI	0	1
	LANO	4	0
	MYLU	0	1
	MYSE	0	1
	PESU	0	1

KALEIDOSCOPE 3.1.8
Bats of North America 3.1.0 S/A:+1

Monitor 3			
	Species	Detections	Presence p-value
9/2/2016	EPFU	2	1
	LABO	0	1
	LACI	208	0
	LANO	0	1
	MYLU	0	1
	MYSE	0	1
	PESU	0	0
10/7/2016	EPFU	260	0
	LABO	303	0
	LACI	3463	0
	LANO	399	1
	MYLU	163	0
	MYSE	1	1
	PESU	69	0
10/15/2016	EPFU	1	0.77
	LABO	3	0
	LACI	1	0.09
	LANO	2	0.34
	MYLU	0	1
	MYSE	0	1
	PESU	0	1

Monitor 4			
	Species	Detections	Presence p-value
9/2/2016	EPFU	96	0
	LABO	82	0
	LACI	309	0
	LANO	289	0
	MYLU	85	0
	MYSE	0	1
	PESU	34	0
10/7/2016	EPFU	46	1
	LABO	47	0
	LACI	84	0
	LANO	397	0
	MYLU	18	0
	MYSE	0	1
	PESU	25	0
10/15/2016	EPFU	1	0.69
	LABO	0	1
	LACI	0	1
	LANO	2	0.16
	MYLU	0	1
	MYSE	0	1
	PESU	0	1

KALEIDOSCOPE 3.1.8
Bats of North America 3.1.0 S/A:+1

Monitor 5			
	Species	Detections	Presence p-value
9/2/2016	EPFU	130	0
	LABO	79	0
	LACI	162	0
	LANO	427	0
	MYLU	58	0
	MYSE	2	1
	PESU	40	0
10/7/2016	EPFU	186	0
	LABO	58	0
	LACI	239	0
	LANO	444	0
	MYLU	17	0
	MYSE	0	1
	PESU	27	0
10/15/2016	EPFU	1	1
	LABO	0	0.61
	LACI	2	0
	LANO	0	1
	MYLU	0	1
	MYSE	0	1
	PESU	3	0

Species Descriptions

Silver Haired Bat

The silver-haired bat (*Lasionycteris noctivagans*) is a solitary migratory species and the only member of the genus *Lasionycteris*. They are found in Bermuda, Canada, Mexico and the United States. They often roost in tree cavities or in bark crevices on tree trunks, especially during migration. This medium-sized bat is mostly black (including the wings, ears, interfemoral membrane, and fur) with white-tipped hairs. The basal upper half of its tail membrane is densely furred. This gives the bat a frosted appearance for which it is named. This species has a flattened skull with a broad rostrum. This species weighs around 8–12 g, has a total length of ~100 mm, a tail length of 40 mm, and a forearm length of 37–44 mm. Silver-haired bats consume primarily soft-bodied insects, such as moths, but will also take spiders and harvestmen. This species will forage low, over both still and running water, and also in forest openings. Silver-haired bats are slow but maneuverable flyers that typically detect prey only a short distance away. In addition to the hoary bat (*Lasiurus cinereus*) and eastern red bat (*Lasiurus borealis*), the silver-haired bat is one of the three tree bat species most commonly killed at wind energy facilities (over 75% of the mortalities).

Big Brown Bat

The big brown bat (*Eptesicus fuscus*) is native to North America, Central America, the Caribbean, and extreme northern South America. This medium-sized bat ranges from 10–13 cm in body length, with a wingspan 28-33, and weighs between 14-16 g. The fur is moderately long and shiny brown. The wing membranes, ears, feet, and face are dark brown to blackish in color. Big brown bats roost during the day in hollow trees, beneath loose tree bark, in the crevices of rocks, or in man-made structures such as attics, barns, old buildings, eaves and window shutters. Big brown bats are insectivorous, eating many kinds of night-flying insects including moths, beetles, and wasps.

Hoary Bat

The hoary bat (*Lasiurus cinereus*) is a species of bat in the vesper bat family, Vespertilionidae. It occurs throughout most of North America and much of South America. The hoary bat averages 13-14.5 cm long with a 40 cm wingspan and a weight of 26 g. Its coat is dark brown and the hairs on the back are frosted with silver. The body is covered in fur except for the undersides of the wings. This species normally roosts alone on trees, hidden in the foliage, but on occasion has been seen in caves with other bats. It prefers woodland, mainly coniferous forests, but hunts over open areas or lakes. It hunts alone and its main food source is moths. The bat is migratory and may travel from Canada as far south as the southern United States or Bermuda.

Eastern Red Bat

The eastern red bat (*Lasiurus borealis*) is widespread across eastern North America, with additional records in Bermuda. This is a medium-sized bat, averaging weights of 9.5-14 g and measurements of 112.3 mm in total length. Adults are usually dimorphic: males have red hair while females are chestnut-colored with whitish frosting on the tips of the fur. Moths form the majority of the diet, but red bats also prey on beetles, flies, and other insects.

Eastern Pipistrelle

The Eastern Pipistrelle (*Perimyotis subflavus*) is found commonly in the eastern portion of the United States, but extends into southeastern Nebraska. This reddish, yellowish and brownish bat is one of the smallest bats in the eastern part of the US. The forearms are orange to red while the wing membrane is black. Adults weigh between 4-10g and reach a forearm length of 30-35mm. These bats feed on small insects on the edges of forested areas, rivers, streams or open water.

Little Brown Bat

The Little Brown Bat (Myotis lucifigus) is found throughout much of North America. It is most common in the northern half of the continental United States and Southern Canada. The bat's fur is dark brown and glossy on the back with slightly paler, greyish fur underneath. Wing membranes are dark brown on a typical wingspan of 22–27 cm. Ears are small and black with a short, rounded tragus. Adult bats are typically 6–10 cm long and weigh 5–14g. Since many of their preferred meals are insects with an aquatic life stage, such as mosquitoes, they prefer to roost and forage near water.

Wenck File #B2759-0005-05
April 2017

Palmer's Creek Wind Farm
Bird And Bat Conservation Strategy

Prepared for:

Palmer's Creek Wind Farm, LLC.

501 West Highway 212
Granite Falls, MN 56241

PALMER'S CREEK
Wind Farm

WENCK
ASSOCIATES

Responsive partner.
Exceptional outcomes.

Prepared by:

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301 1st Street NE, Suite 202
Mandan, ND 58554
(701) 751-3370

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Documents Appended by Reference and Available in Site Permit Application and Environmental Assessment

Acoustic Bat Summary Report, Final (Jan 2017) – New Century Environmental, LLC
Avian Point Count Results, *in-prep* – (2017) – Wenck Associates, Inc.
Palmer's Creek Project Best Management Practices and Conservation Measures

1.0 Palmer's Creek Information

Palmer's Creek Wind Farm, LLC (Palmer's Creek) proposes to construct the Palmer's Creek Wind Energy Facility (Project or PCWF), a Large Wind Energy Conversion System (LWECS), with a 44.6- megawatt (MW) nameplate capacity wind energy facility in Chippewa County, Minnesota (**Figures 1 and 2, Site Location Map and Site Detail Map, respectively**). The project area consists of 18 wind turbines located on approximately 6,150 acres of privately owned land. The Project will also include associated access roads, a new collector substation, an operations and maintenance (O&M) facility, and associated transmission interconnection facilities. Palmer's Creek further proposes to interconnect the Project to an existing Western Area Power Administration (WAPA) substation, the Granite Falls Substation, which is within the project area boundary.

Palmer's Creek Proposed Action is to execute an interconnection agreement with the Southwest Power Pool (SPP) to connect the Palmer's Creek Project to WAPA's Granite Falls Substation. As part of the Proposed Action, WAPA will install necessary equipment in their existing substation to accept the generated power.

The Palmer's Creek Wind Farm will consist of two (2) 2.3-MW and sixteen (16) 2.5-MW wind turbines with an aggregate nameplate capacity of 44.6 MW. The Project will also include:

- Underground electric collector lines,
- New central collector substation (Palmer's Creek Substation),
- Approximately 1000-foot long T-line interconnecting the Granite Falls Substation,
- O&M facility,
- Access roads connecting to each turbine,
- One permanent meteorological tower,
- Supervisory control and data acquisition (SCADA) system, and
- Temporary laydown yard.

Figures 1 and 2 (Site Location Map and Site Detail Map, respectively) show the proposed layout of the Project facilities. The expected life of the Project is approximately 20 to 40 years (leases for the Project are for the life of the power purchase agreement (PPA), with an option to upgrade turbines and extend leases for an additional 20 years).

The interconnection of the Project to Western's transmission system is a federal action under the National Environmental Policy Act of 1969 (NEPA), and therefore requires the completion of Federal environmental review. A Programmatic Environmental Assessment (EA), of which this bird and bat conservation strategy is part, will be prepared for the Project.

Palmer's Creek is committed to its responsibility to be a good steward of the environment and to adhere to federal, state, and local laws and ordinances. Palmer's Creek wind project policy calls for wind projects to be designed, constructed, and operated in an environmentally sensitive manner and, either avoid or minimize potential avian and bat impacts. Palmer's Creek understands that even with diligent design, construction and operation activities, avian and bat fatalities may occur, including species that are protected under federal and state laws. As part of this commitment, Palmer's Creek has

developed a Bird & Bat Conservation Strategy (BBCS) for the Project. The development and application of this ABPP will ensure that:

- All Project-related actions comply with federal and state regulations;
- All Project-related actions comply with permit conditions;
- Project-specific species concerns are included in the BBCS, including avoidance and minimization measures;
- Public and private organizations are included in programs and research that minimize detrimental effects of bird and bat interactions with wind projects.
- The procedures described in this BBCS are followed;
- The Palmer's Creek' staff and all relevant subcontractors will receive the appropriate training pursuant to wildlife monitoring and reporting protocols; and,
- The documentation of bird and bat injuries and fatalities may provide the basis for future modifications to the BBCS.

This BBCS continues Palmer's Creek regulatory compliance concerning bird and bat interactions with its wind projects through a proactive approach to reducing risk to birds and bats and their habitats.

2.0 Project Description and Overview

Palmer's Creek proposes to construct a Large Wind Energy Conversion System (LWECS), with a 44.6 megawatt (MW) nameplate capacity wind energy facility in Chippewa County, Minnesota, approximately 1.5 miles north of the City of Granite Falls (**Figures 1 and 2, Site Location Map and Site Detail Map, respectively**). The Project includes approximately 18 wind turbines, associated access roads, a new collector substation, an O&M facility, and associated transmission interconnection facilities. Palmer's Creek further proposes to interconnect the Project to the existing Granite Falls Substation within the project area boundary. The anticipated timeline for construction is July 2017 to February 2018 with commercial operation date (COD) of March 2018.

The Project will place 18 turbines across the project area, connecting these turbines by access roads and transmission facilities. Project construction is anticipated to include land disturbance for the 18 turbines, approximately 14 miles of collection lines, an approximately 1,000-foot transmission line at 115 kV, approximately 5.5 miles of new or upgraded roads; approximately 5.5. miles of temporary, construction access roads; a new substation using approximately one acre; approximately three acres of laydown area; a 2,800-square foot O&M Facility; and one meteorological tower.

2.1 PROJECT LOCATION

The southern boundary of the project area is located approximately one mile north of the City of Granite Falls in Chippewa County, Minnesota in Granite Falls Township, east of the Minnesota River (**Figure 1, Site Location Map**).

Table 2-1: Project Location.

County	Township Name	Township	Range	Sections
Chippewa	Granite Falls	116 North	39 West	3-10, 15-22, 27, 28, 29
Chippewa	Granite Falls	116 North	40 West	1, 12, 13

2.2 SIZE OF THE PROJECT AREA

The project area boundary is approximately 6,150 acres. Project construction is anticipated to include temporary land disturbance of approximately 172 acres for Project construction. Permanent land disturbance will be approximately 12 acres for turbines and associated facilities. Refer to **Table 2-2, Temporary and Permanent Land Disturbance**.

Table 2-2: Temporary and Permanent Land Disturbance.

Cover Types	Temporary Disturbance	Permanent Disturbance
Barren Land (Rock/Sand/Clay)	0	0
Cultivated Crops	161	10
Deciduous Forest	1	0
Developed	7	0.6
Emergent Herbaceous Wetlands	1.1	0
Grassland/Herbaceous	0.5	0.1
Open Water	0	0
Pasture/Hay	1.2	0.6
Shrub/Scrub	0.1	0.1
Total	**171.9**	**11.4**

Source: NLCD, 2011.

3.0 Project Design

The Project was designed to optimize wind resources, while minimizing potential impacts to ecological and cultural resources. Primary Project features include: wind turbines, collection lines, access roads, new substation, O&M facility, temporary and permanent meteorological towers, and SODAR unit. Temporary features include laydown areas and crane walks (**Figure 2, Site Detail Map**).

3.1 DESCRIPTION OF LAYOUT AND SETBACK

The Project will construct the turbines primarily on agricultural land. The applicable setbacks for the Project are summarized in **Table 3-1, PUC Setback Requirements**.

Table 3-1: Public Utilities Commission Setback Requirements.

Object	Setback
Wind Access Buffer – Prevailing Wind Directions	5 rotor diameters
Wind Access Buffer – Non-Prevailing Wind Directions	3 rotor diameters
Internal Turbine Spacing: Crosswind	3 rotor diameters
Internal Turbine Spacing: Downwind	5 rotor diameters
Meteorological Towers	250 feet
Residences	1,000 feet (or further to meet noise standards)
Public Roads (from right-of-way)	250 feet[(1)]
Noise Requirements	Minnesota Noise Standards (Minnesota Rules Chapter 7030) at all residential receivers (homes). Residential noise standard NAC 1, L50 50 dBA during overnight hours.
Protected Waters and Wetlands	Avoidance, crossing subject to agency approval

[(1)]PUC has adopted as case-by-case approach where necessary and in the public interest which applies to public roads and trails.

The current Project layout (**Figure 2, Site Detail Map**) may differ from the final construction layout, but Palmer's Creek anticipates the final layout will remain substantially similar to what is presented in the Site Permit Application. The changes that may occur to the current Project layout will be the result of ongoing information gathering and monitoring data, permitting, and micro-siting activities. Any changes in the proposed turbine layout will be evaluated throughout the Site Permit process, and any layout changes that would work following Site Permit issuance will be evaluated to ensure that the revised turbine locations have similar human and environmental impacts when compared with the original proposed and/or permit turbine locations. Any turbine location changes will be identified, evaluated, and discussed with the DOC-Energy, Environmental Review and Analysis (EERA) staff prior to beginning construction.

3.2 DESCRIPTION OF TURBINES AND TOWERS

Basic wind turbine components include a nacelle, hub, blades, tower and foundation. A wind turbine operates three propeller-like blades mounted to a hub, which forms the rotor.

3.2.1 Wind Turbine Design

Palmer's Creek plans to install two (2) 2.3-MW and sixteen (16) 2.5-MW horizontal axis wind turbines for the Project. Each will have an anticipated hub height between 262 and 295 feet (80 and 90 meters) and a rotor diameter of approximately 380 feet (116 meters). The total height of each turbine will be approximately 485 feet (146 meters) when a blade is in vertical position. The rotor consists of three blades mounted to a rotor hub. Turbine towers will be cylindrical monopoles, approximately 262 to 295 feet (80 to 90 meters) in height. The tower color will be non-reflective light grey, and all surfaces will be multi-layer coated for protection against corrosion. Marking and lighting of the wind farm will be done in compliance with Federal Aviation Administration (FAA) regulations. **Table 3-2** provides a summary of the turbine characteristics.

Table 3-2: Turbine Characteristics.

	GE 2.3	GE 2.5
Nameplate Capacity	2.3 MW	2.5 MW
Hub Height	262 feet (80 meters)	295 feet (90 meters)
Rotor Diameter	380 feet (116 meters)	380 feet (116 meters)
Total Height	452 feet (150 meters)	485 feet (146 meters)
Swept Area	113,411 feet (10,568 meters)	113,411 feet (10,568 meters)
Cut-in Wind Speed	6.7 mph (3 m/s)	6.7 mph (3 m/s)
Cut-out Wind Speed	56 mph (25 m/s)	56 mph (25 m/s)
Rated Wind Speed	85 mph (38 m/s)	85 mph (38 m/s)
Rotor Speed	8 to 15.7 rpm	8 to 15.7 rpm

3.2.2 Foundations

The wind turbine foundations will typically be reinforced concreate spread foundations. A spread foundation requires a shallow excavation, generally 10 to 12 feet deep. The actual foundation for each turbine will be specifically designed based on geotechnical analysis of a 50-foot (15 meter) core sample at each turbine location combined with structural loading requirements for the turbine. The pedestal diameter for an approximate 262 feet (80 meter) tower is approximately 18 feet (five meters) anchored by high strength bolts into a concrete foundation of approximately 60 feet in diameter. The excavated area for the turbine foundations will typically be approximately 75 feet by 75 feet (23 meters by 23 meters). During construction, a larger area, approximately 300-foot diameter (92 meters), will be used to lay down the rotors and maneuver cranes during turbine assembly.

3.2.3 Temporary Laydown and Crane Walks

An approximate 3-acre laydown area is located near the proposed substation and O&M building (**Figure 2, Site Detail Map**). The temporary area will serve as locations for job trailers, temporary offices, parking, and storage for items necessary for the Project. The location of the laydown area will be selected during final design; however, a preferred location will be an undeveloped or previously disturbed area that is flat (**Figure 4, Topographic Map**) and does not contain streams, wetlands (**Figure 8, Waterbodies and Wetlands**) or other environmentally sensitive resources.

In addition to the approximately 3-acre laydown area, temporary crane walk (**Figure 2, Site Detail Map**) disturbances will also be necessary for the Project. Crane walks are estimated to be 40 feet in width and will be located throughout the Project based on the shortest route to the next turbine in the construction sequence. However, cranes will utilize access roads if feasible. Where feasible, Palmer's Creek will make every effort to avoid streams, wetlands, and other environmentally sensitive resources. If avoidance is not possible, Palmer's Creek will acquire the necessary permits/approvals for Project construction and operation and will minimize impacts to the greatest extent possible.

3.2.4 Operation

Palmer's Creek Wind Farm, LLC will oversee all operations, maintenance, and management of the Project facilities through a service agreement with a qualified operations and maintenance (O&M) service. WTG and substation maintenance schedules and required outage durations are based on equipment manufacturer's recommendations and Palmer's Creek operating experience. O&M Service Provider will address both scheduled and unscheduled maintenance on the wind project, including repairs, replacement of parts and removal of failed parts. WTG maintenance will be performed as an on-going function during the life of the Project. Transformer and other substation maintenance will be completed on an annual basis and will be scheduled during times with minimal impact to production.

General maintenance includes maintaining Project structures, access roads, drainage systems and other facilities. General maintenance will be ongoing for the life of the project and scheduled as needed. Palmer's Creek will operate a SCADA system located at the base section of each WTG, substation control building, and O&M building.

3.3 DESCRIPTION OF ELECTRICAL SYSTEM

Each turbine will have a step-up transformer to raise the voltage to the 34.5 kilovolt (kV) collection line system. The electricity generated by each turbine will run through underground collection lines to the proposed Palmer's Creek Substation. The electricity will be converted to 115 kV at the new Palmer's Creek Substation and distributed via new proposed 115 kV transmission line to the existing Granite Falls (WAPA) Substation.

3.3.1 Transformers

A generator step-up transformer will be installed at the base of each wind turbine to increase the output voltage of the wind turbine to the voltage of the power collection system (34.5-kV). The transformers will be mounted on concrete pads and will be placed next to each wind turbine.

3.3.2 Electrical Collection Systems

Each wind turbine within the project area will be interconnected by underground communication and electrical power collection circuit facilities and routed to the Palmer's Creek Substation (collector substation) where the electrical voltage will be stepped up from 34.5-kV to 115-kV. The underground collector system will be placed in one trench, approximately 18-24 inches wide, and will connect each of the turbines to the Palmer's Creek Substation. The estimate trench length, is approximately 73,920 feet (approximately 14 miles).

The underground electrical collector and communication systems generally will be installed by plowing or trenching the cables. Using this method, the disturbed soils and topsoil are typically replaced over the buried cable within one day, and the drainage patterns and surface topography are restored to pre-existing conditions. In grassland/rangeland areas, disturbed soils will be re-vegetated with a weed-free native plant seed mix.

3.3.3 Substation and Switching Station

A new collector substation, Palmer's Creek Substation (**Figure 2, Site Detail Map**), will be constructed at the south end of the project area, on private land, where the 34.5-kV electric collection grid and fiber optic communication network will terminate. Palmer's Creek Substation will include a transformer to step up the voltage of the collection grid from 34.5-kV to 115-kV, above-ground bus structures or T-lines to interconnect the substation components for delivery of electric power to the adjacent 115-kV Granite Falls Substation.

The design of Palmer's Creek Substation is not finalized, but Palmer's Creek Wind Farm expects it will be enclosed by a chain link fence with dimensions roughly 110 feet by 170 feet (33.5 meters by 52 meters). The substation components will be placed on concrete and steel foundations. Palmer's Creek Substation will be designed in compliance with Federal, State and local regulations, NESC standards, Independent Systems Operator needs (Southwest Power Pool), transmission owner, and other applicable industry standards.

3.3.4 Interconnection

The Project will also include 34.5 kV underground collection lines, a central collector substation (Palmer's Creek Substation) which will convert the electricity from 34.5 kV to 115 kV via the Main Transformer, an approximately 1,000-foot long (304 meter) 115 kV 3-Phase transmission line interconnecting the Project to the Granite Falls (WAPA) Substation. There are several options for the power to be directed out of the Granite Falls (WAPA) Substation as there are seven different transmission lines exiting the facility.

3.4 ASSOCIATED FACILITIES

There are several facilities associated with the Project that will be required for operation. These include project substation, collector lines, an approximate 1,000-foot 115 kV 3-phase transmission line, which have all been previously described. Other associated facilities include a permanent meteorological tower, SCADA building, O&M facility, and access roads.

3.4.1 Meteorological Tower

One permanent meteorological tower will be installed at the Project site to monitor the wind during the operation of the wind farm (**Figure 2, Site Detail Map**). This tower will be approximately 90 meters in height (295 ft. tall). The tower will have a grounding system similar to that of the WTGs with a buried copper ring and grounding rod or rod installed at the top of the tower to provide an umbrella of protection for the upper sensors. The tower

will be connected to the wind farms central SCADA system. In addition, some of the previously permitted temporary meteorological test towers may be kept in place for approximately one year after construction.

3.4.2 SCADA Building

Palmer's Creek will operate a Site Control and Data Acquisition (SCADA) System located at the base section of each WTG, substation control building, and O&M building. Each WTG in the Project will communicate directly with the SCADA system for the purposes of performance monitoring, energy reporting, and trouble-shooting. The SCADA system provides the O&M team with access to WTG and production data, availability, meteorological, and communications data, as well as alarms and communication error information.

3.4.3 O&M Facility

An O&M facility will be located near the approach and access road to a proposed turbine location (**Figure 2, Site Detail Map**). The property will be graded and a 4,000-square foot utility building will be erected for offices, storage and maintenance work. The proposed O&M facility will house the equipment to operate and maintain the wind farm. A gravel parking pad will provide the building with a parking area. The O&M Facility will have a new septic system and well for domestic purposes.

3.4.4 Access Roads

Approximately 5.5 miles of new or upgraded roads will be constructed to facilitate both construction and maintenance of the wind turbines (**Figure 2, Site Detail Map**). These roads have been designed to minimize length and construction impact. Initially, turbine access roads will be approximately 40 feet in width to accommodate the safe operation of construction equipment. Upon completion of construction, the turbine access roads will be reclaimed and narrowed to an extent allowing for the routine maintenance of the facility, or approximately 16 feet in width. The wind turbines will be accessible from public roads. Access roads will follow fence lines, field lines, and existing field access roads to the extent possible. Siting roads in areas with unstable soil will be avoided wherever possible. Roads will include appropriate drainage controls, including culverts and will be constructed in a manner to allow farm and/or land owner equipment to cross. The access road cross-sections will consist of graded soil, with soil stabilization, and surfaced with compacted base of course aggregate. Gates will be installed where access roads cross landowner fences.

4.0 Environmental Conditions

The environmental conditions within the project area and other information used to complete the environmental analysis are described in greater detail in the Site Permit Application of which this Bird and Bat Conservation Strategy is a part. The analysis was conducted following PUC procedures on siting LWECS and applicable portions of the Power Plant Siting Act, which was used to determine various exclusion and avoidance criteria considered in the selection of the project area.

Preliminary information used for evaluating environmental conditions and selecting the project area included agency queries to the Minnesota Department of Natural Resources (MNDNR), Minnesota State Historic Preservation Office (SHPO), Minnesota Department of Commerce (DOC), and Chippewa County.

The southern boundary of the project area is located approximately one mile north of the City of Granite Falls in Chippewa County, Minnesota in Granite Falls Township, east of the Minnesota River (**Figure 1, Site Location Map**). The project area is at approximately 1040 feet above mean sea level (amsl) above the Minnesota River valley at approximately 925 feet amsl (**Figure 4, Topographic Map**). The project area is comprised primarily of agricultural fields with dispersed rural homesteads (**Figure 2, Site Detail Map**).

The Minnesota River Valley provides habitat for many birds, waterfowl, and wildlife. It also supports a large fish population. The area also provides potential habitat for several federal and state-listed species.

4.1 VEGETATION

Cover types within the project area are summarized in **Table 4-1** and displayed on **Figure 3, Land Cover**. Cultivated crops comprise the vast majority of cover types in this area. Other cover types include pasture, grassland, and developed open space with some deciduous forest. The cover types other than cultivated crops are typically associated with rural residences including windbreaks, lawn, and pasture and grassland.

Table 4-1: Existing Cover Types of Palmer's Creek Wind Farm.

Cover Types	Total Acreage
Barren Land (Rock/Sand/Clay)	1
Cultivated Crops	5,157
Deciduous Forest	134
Developed	213
Emergent Herbaceous Wetlands	160
Grassland/Herbaceous	192
Open Water	5
Pasture/Hay	284
Shrub/Scrub	4
Total	**6,150**

Source: NLCD, 2011

4.2 WILDLIFE

Good habitat is found along the Minnesota River floodplain, nearby WMAs, and along some of the drainages in the project area. Agricultural production areas, such as cultivated crops, may be used on a temporary basis by birds and wildlife for foraging or short-term shelter.

The project area is primarily agricultural lands and does not contain significant wetland habitats (**Table 4-1, Existing Cover Types of Palmer's Creek Wind Farm and Figure 3, Land Cover**). The project area is adjacent to the Minnesota River, which provides large riverine and wetland habitats. The agricultural landscape and developments of the region have determined the type of wildlife present.

4.2.1 Birds

Migratory birds and waterfowl travel through Minnesota during the spring and fall of each year, as they alternate between summer breeding grounds in the northern portion of the continent and winter feeding ground in the southern half of the continent. The project area is located within the Mississippi River Flyway, which results in large spring and fall migrations of various bird species. During spring and fall migrations, flocks of migratory birds can number in the tens of thousands at traditional migratory staging areas and refuges. Migratory birds and waterfowl typically stage and rest in areas with significant amounts of wetland and open water habitats that provide sufficient food sources for the migration. The Minnesota River corridor is highly used by nesting, over-wintering, and migratory bald eagles.

The project area is adjacent to the Minnesota River and its floodplain. The Minnesota River valley provides a corridor of habitat for many birds and waterfowl. The project area is predominantly cropland, and the most common birds observed during the completed surveys are passerines (61%, thru February 24, 2017). Unidentified blackbirds (0.22 birds/20 min) and red-winged blackbirds (0.14 birds/20 min) are most likely to be exposed to collisions from wind turbines at PCWF. Other passerine and waterfowl species that flew through the RSA during the surveys include; unknown duck (0.250 birds/20 min) and American crow (0.13 birds/20 min). Red-winged blackbirds (*Agelaius phoeniceus*) (270 individuals), American crows (*Corvus brachyrhynchos*) (323 individuals), brown-headed

cowbirds (*Molothrus ater*) (239 individuals), and barn swallows (*Hirundo rustica*) (180 individuals) are the most abundant (45.6 percent of all individual birds observed). As of February 24, 2017, 60 species were observed (refer to **Appendix A, Avian Point Count Results Thru Feb 24 2017**).

One Minnesota Listed Special Concern Species, the American white pelican (*Pelecanus erythrorhynchos*), and one MNDNR rare species, Bald Eagle (*Haliaeetus leucocephalus*), were observed during the field surveys in the project area. One observation of the American white pelican was made that had four individuals in flight. Eight observations of the Bald Eagle were made totaling ten individuals. Additional eagles were observed during the eagle point count surveys. Refer to **Appendix A, Avian Point Count Results Thru Feb 24 2017** for further details.

Project siting will occur primarily on agricultural land that have been previously disturbed for cultivated crops and other agricultural practices. Minnesota Biological Survey (MBS) sites, native prairie, and wetland areas will be avoided if possible.

The Project could affect birds due to collision mortality, displacement due to disturbance, habitat fragmentation, and habitat loss. Collision mortality rates are anticipated to be low. The Project will not directly impact habitat in the project area. The Applicant is currently conducting wildlife surveys of the project area to evaluate the potential presence of threatened and endangered species. The Applicant has been coordinating with the MNDNR and USFWS. The results of the surveys will be used by permitting authorities to determine permit conditions based on the potential for impacts to wildlife.

Migratory birds and waterfowl will be most susceptible to impacts from the Project when taking off and landing at staging and resting areas, because these are the times they will be flying at heights that could cause collisions with WTGs. At other times during their migration, migratory birds and waterfowl will be flying at heights well above the maximum height of the WTGs.

WTGs closest to the Minnesota River are WTGs 1, 5, 9 and 12 (**Figure 2, Site Detail Map**). Avian collisions and subsequent mortality may be more likely with these WTGs than other WTGs in the project area. Lac qui Parle Dam is located about 16 miles north, and therefore, impacts to migration routes and patterns, resting and staging areas at the State Park or WMA are not anticipated.

4.2.2 Bats

There are seven bat species known to occur in Minnesota – big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*) and tri-colored bat (eastern pipistrelle, *Perimyotis subflavus*) (MNDNR 2016). The northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are all state-listed species of special concern.

There was a total of six bat species documented throughout the course of the surveys (Fall 2015 and Fall 2016). Three species of concern in the state of Minnesota were observed during the acoustic bat monitoring (tricolored bat, big brown bat, and little brown bat). The northern long-eared bat is a federally threatened species with a species range that includes the majority of the eastern United States, extending west through Minnesota to the western

borders of the Dakotas. No confirmed documentation of the northern long-eared bat in the project area was recorded during the Fall 2015 to Fall 2016 acoustic bat monitoring (see *Acoustic Bat Summary Report, NCE 2017*, appended by reference).

Bats typically utilize farm buildings and dead and dying trees with cavities and loose bark as roosting and maternity habitat. Bats typically use forests, riparian corridors and wetlands as feeding habitats due to higher nocturnal insect densities in these areas. There is minimal native vegetation that serves as wildlife habitat within the project area near direct areas of Project impact. For bats, the mean mortality rate at seventeen wind energy facilities in the Midwest is 9.6 bats per turbine per year (s.d. 24.1) (Stantec 2012). There are bats in the project area and some wind turbine collision bat mortality is likely to occur because of the Project. Compared to birds less is known about bat populations and habitat preferences on a local, regional or national level. Bat mortality is likely to be greatest for migratory tree bat species, including hoary, eastern red and silver-haired bats during the fall migration period (Johnson 2005, Arnett et al. 2008).

4.2.3 Important Bird Areas

Part of the western side of the project area, near the Minnesota River, overlaps with the Upper Minnesota River Valley Important Bird Area (IBA). Refer to **Figure 5, Ecologically Significant Areas**. IBAs, identified by Audubon Minnesota in partnership with the MNDNR, are part of an international conservation effort aimed at conserving critical bird habitats. The Upper Minnesota River Valley IBA incorporates the riparian corridor and adjacent river valley and upland communities along the Minnesota River and provides excellent habitat for a wide variety of bird species. This IBA contains significant bird habitat in an intensely agricultural area and is a natural corridor for migrating birds. Over 200 species, including state-listed species and Species in Greatest Conservation Need (SGCN) are known to use the IBA.

4.2.4 Rare and Unique Wildlife

4.2.4.1 Minnesota NHIS Data

A query of the MNDNR Natural Heritage Information System (NHIS) was completed (MNDNR 2016) to determine if there are rare species or other significant features in the project area. Ecologically Significant Areas (ESAs) were identified within the project area (**Figure 5**). The ESA results are detailed in the Site Permit Application.

The NHIS query also identified state-listed bird and wildlife species in the project vicinity. Although there are no NHIS records for bats near the Project, the MNDNR indicated that all seven of Minnesota's bats can be found throughout Minnesota. The northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are all state-listed species of special concern. There was a total of six bat species documented throughout the course of the surveys (Fall 2015 and Fall 2016) (NCE 2017). Three species of concern in the State of Minnesota were observed during the acoustic bat monitoring. These species included the tricolored bat, big brown bat, and the little brown bat. The northern long-eared bat is a federally threatened species with a species range that includes the majority of the eastern United States, extending west through Minnesota to the western borders of the Dakotas. No confirmed documentation of the northern long-eared bat in the project area was recorded during the Fall 2015 to Fall 2016 acoustic bat monitoring (see *Acoustic Bat Summary Report, NCE 2017*, appended by reference).

The NHIS query indicates a documented bald eagle (*Haliaeetus leucocephalus*) nest located just outside the project area (Section 11, T116N R40W) along the Minnesota River. This nest was active when checked in 2000, 2001, and 2005. The current status of this nest is unknown. An additional nest was in Section 20, T116N R39W which was not in the historical database, and is located outside of the project area. Palmer's Creek is completing point count surveys of bald eagles and plans to conduct aerial eagle nest surveys with 10 miles of the project area in Spring 2017. This information will be used to further evaluate eagle activity in the area.

The NHIS indicated breeding season observations of two rare grassland birds: the lark sparrow (*Chondestes grammacus*), a state-listed species of concern, and the upland sandpiper (*Bartramia longicauda*), a SGCN. A minimum of 20 SGCN are known to use grassland habitat within the Minnesota River Prairie Ecological Subsection (where the Project is located). Potential impacts to grassland birds are a concern because many of these species are declining in number nationwide. There are small areas of grassland located within the project area, which may provide habitat for these species. The primary land disturbance for the Project will occur on cultivated, agricultural land, and as feasible, avoid grassland areas. As of February 24, 2017, the lark sparrow and upland sandpiper have not been identified during the avian point count surveys. Refer to **Appendix A, Avian Point Count Results Thru Feb 24 2017**.

4.2.4.2 Federal/Bat Species Known From County/Project Area Records

A list of federally threatened, endangered, candidate and proposed species was obtained for Chippewa County, Minnesota (MNDNR 2016) from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) website (USFWS 2017). The Project Action and impact to Federal species are addressed by adherence to the Programmatic Biological Assessment Species Consistency Evaluation Form (*in-progress*). The only Federally-listed bird and bat species with potential to occur is the northern long-eared bat. Refer to **Table 4-2, Federal/State Listed Bat Species**.

Table 4-2: Federal/State Listed Bat Species.

Scientific Names	Common Names	Status[1]	Documented in Project Area[2]
Eptesicus fuscus	Big Brown Bat	ST: Special Concern	Yes
Myotis lucifugus	Little Brown Myotis	ST: Special Concern	Yes
Myotis septentrionalis	Northern Myotis/ Northern long-eared bat	ST: Special Concern F: Threatened	No
Perimyotis subflavus	Tri-colored Bat/Eastern Pipistrelle	ST: Special Concern	Yes

[1]Status = Federal Status (F), State Status (ST): E = endangered; T = threatened; P=proposed; C = candidate.
[2]Natural Heritage Information System (NHIS), or Eagle/Avian Point Count Surveys (**Appendix A**).

4.2.4.3 State Endangered, Threatened or Special Concern Species

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 (MNDNR 2013).

Minnesota state-listed species and Species in Greatest Conservation Need are identified in Minnesota's State Wildlife Action Plan (MNDNR 2013).

The northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are all state-listed species of special concern (MNDNR 2016, refer to **Table 4-2**).

The Natural Heritage Information System (MNDNR 2016) identified breeding season observations of two rare grassland birds: the lark sparrow (*Chondestes grammacus*), a state-listed species of concern (**Table 4-3, Federal/State Listed Bird Species**), and the upland sandpiper (*Bartramia longicauda*), a Species in Greatest Conservation Need.

Table 4-3: Federal/State Listed Bird Species.

Scientific Names	Common Names	Status[1]	Documented in Project Area[2]
Accipiter gentilis	Northern Goshawk	ST: Special Concern	No
Aegolius funereus	Boreal Owl	ST: Special Concern	No
Ammodramus bairdii	Baird's Sparrow	ST: Endangered	No
Ammodramus henslowii	Henslow's Sparrow	ST: Endangered	No
Ammodramus nelsoni	Nelson's Sparrow	ST: Special Concern	No
Anthus spragueii	Sprague's Pipit	ST: Endangered	No
Asio flammeus	Short-eared Owl	ST: Special Concern	No
Athene cunicularia	Burrowing Owl	ST: Endangered	No
Buteo lineatus	Red-shouldered Hawk	ST: Special Concern	No
Calcarius ornatus	Chestnut-collared Longspur	ST: Endangered	No
Charadrius melodus	Piping Plover	ST: Endangered	No
Chondestes grammacus	Lark Sparrow	ST: Special Concern	Yes

Scientific Names	Common Names	Status[1]	Documented in Project Area[2]
Coturnicops noveboracensis	Yellow Rail	ST: Special Concern	No
Cygnus buccinator	Trumpeter Swan	ST: Special Concern	No
Empidonax virescens	Acadian Flycatcher	ST: Special Concern	No
Falco peregrinus	Peregrine Falcon	ST: Special Concern	No
Gallinula galeata	Common Gallinule	ST: Special Concern	No
Haliaeetus leucocephalus	Bald Eagle		Yes
Lanius ludovicianus	Loggerhead Shrike	ST: Endangered	No
Leucophaeus pipixcan	Franklin's Gull	ST: Special Concern	No
Limosa fedoa	Marbled Godwit	ST: Special Concern	No
Parkesia motacilla	Louisiana Waterthrush	ST: Special Concern	No
Pelecanus erythrorhynchos	American White Pelican	ST: Special Concern	Yes
Phalaropus tricolor	Wilson's Phalarope	ST: Threatened	No
Podiceps auritus	Horned Grebe	ST: Endangered	No
Progne subis	Purple Martin	ST: Special Concern	No
Rallus elegans	King Rail	ST: Endangered	No
Setophaga cerulea	Cerulean Warbler	ST: Special Concern	No
Setophaga citrina	Hooded Warbler	ST: Special Concern	No
Sterna forsteri	Forster's Tern	ST: Special Concern	No
Sterna hirundo	Common Tern	ST: Threatened	No
Tympanuchus cupido	Greater Prairie Chicken	ST: Special Concern	No
Vireo bellii	Bell's Vireo	ST: Special Concern	No

[1] Status = Federal Status (F), State Status (ST): E = endangered; T = threatened; P=proposed; C = candidate.
[2] Natural Heritage Information System (NHIS), or Eagle/Avian Point Count Surveys (**Appendix A**).

As of February 27, 2017, two state special concern species (bald eagle (*Haliaeetus leucocephalus*) and American white pelican (*Pelecanus erythrorhynchos*)) were observed during the avian surveys. None of these species are protected by the federal Endangered Species Act.

Bald Eagle
In 2007, the bald eagle (State Special Concern) 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 also delisted in Minnesota in 2013.

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 near 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.

Existing data on bald eagle nest locations was received from the MNDNR on July 5, 2016. Based on historical records, one nest is in Section 11, T116N R40W, estimated to be greater than one mile west of the nearest WTG. During field surveys, another eagle nest was located in the Minnesota River Valley, approximately one mile southeast of the nearest WTG (WTG 12). This nest was not recorded in the NHIS database. Both nests are located outside of the project area.

As of February 24, 2017, eight eagle observations consisting of ten individuals were identified during the Avian Point Count Surveys (**Appendix A**). Additional eagles were observed during the Eagle Point Count Surveys. At this time, Palmer's Creek has met with the USFWS and MNDNR and has provided preliminary avian point count data. Based on agency discussions, eagle nesting areas will be avoided, as feasible, and Palmer's Creek will continue to conduct point count surveys of bald eagles, and conduct aerial eagle nest surveys within 10 miles of the project area in Spring 2017. This information will be used to further evaluate eagle activity in the area. Additionally, due to the Minnesota River Valley being a significant migration corridor, MNDNR has recommended post-construction avian fatality monitoring, which Palmer's Creek will implement as part of this Site Permit.

American White Pelican
The MNDNR currently lists this species as special concern, and several studies have shown this species increasing in abundance across its range over the past 20-25 years (Wires et al. 2005; Evans and Knopf 1993). This species is a colonial nesting species that selects large, shallow bodies of water with flat bare islands isolated from human disturbance (Coffin and Pfannmueller 1988).

As of February 24, 2017, American white pelicans (State Special Concern) were observed on one occasion during the Avian Point Count Surveys. One flock was observed consisting of four individuals. Overall 0.1 individuals per hour were observed during the avian point count surveys. The observation was made within the RSA (see **Appendix A, Avian Point Count Results Though Feb 24 2017**).

5.0 Regulatory Framework and Agency Consultation

Avian and bat surveys voluntarily began at the beginning of the permitting process. This Bird and Bat Conservation Strategy document is to be a "living" document, due to the timing of the requirement to be included in the Site Permit Application with the understanding the wildlife surveys are not-complete and will not be completed until Fall 2017. All pre-construction avian and bat survey results will be submitted to the United States Department of Energy, Western Area Power Administration (WAPA), United States Fish and Wildlife Service (USFWS), Minnesota Department of Natural Resources (MNDNR), and Minnesota Department of Commerce (DOC). Due to Palmer's Creek adherence to best management practices and conservation measures outlined by WAPA in the Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement (EIS), a formal Biological Assessment is not required and the project will be appropriate for the Programmatic Biological Assessment for Upper Great Plains Region Wind Energy Development Program Impact Information and Consistency Determination. The Consistency Evaluation Forms will be submitted as a separate document from this Bird and Bat Conservation Strategy.

This Bird and Bat Conservation Strategy is required by the DOC as part of the permitting process for the Project.

5.1 REGULATORY FRAMEWORK

5.1.1 Federal Laws

5.1.1.1 Federal Endangered Species Act

The federal Endangered Species Act (ESA 1973) defines and lists species as "endangered" and "threatened" and provides regulatory protection for the listed species. The federal ESA provides a program for conservation and recovery of threatened and endangered species; it also ensures the conservation of designated critical habitat that the USFWS has determined is required for the survival and recovery of these listed species. Section 9 of the federal ESA prohibits the take of species listed by USFWS as threatened or endangered. Take is defined as follows: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct." In recognition that take cannot always be avoided, Section 10(a) of the federal ESA includes provisions for take that is incidental to, but not the purpose of, otherwise lawful activities. Section 10(a)(1)(B) permits (Incidental Take Permits) may be issued if take is incidental and does not jeopardize the survival and recovery of the species.

Section 7(a)(2) of the federal ESA requires that all federal agencies, including the USFWS, evaluate projects with respect to any species proposed for listing or already listed as endangered or threatened and any proposed or designated critical habitat for the species. Federal agencies are prohibited from authorizing, funding, or carrying out any action that will jeopardize the continued existence of a listed species or destroy or modify its critical habitat. As defined in the federal ESA, individuals, organizations, states, local governments, and other non- federal entities are affected by the designation of critical habitat only if their actions occur on federal lands; require a federal permit, license, or other authorization, or involve federal funding (ESA 1973).

5.1.1.2 Bald and Golden Eagle Protection Act

The federal Bald and Golden Eagle Protection Act of 1940 (BGEPA; 16 USC 668–668c, as amended) is administered by the USFWS and was enacted to protect bald and golden eagles, their nests, eggs, and parts (e.g., feathers or talons). The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, purchase or barter, transport, export, or import any bald or golden eagle alive or dead, or any part, nest or egg without a valid permit to do so (USFWS, n.d.). The BGEPA also prohibits the take of bald and golden eagles unless pursuant to regulations. Take is defined by the BGEPA as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb is defined in the BGEPA 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: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS, n.d.). In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles were not present. Permits are issued to Native Americans to possess eagle feathers for religious purposes, and salvaged eagle carcasses can be sent to the National Eagle Repository in Colorado where they are redistributed to Native Americans. This effort is coordinated by a local USFWS office. Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA and Migratory Bird Treaty Act as described in the following section. In addition, the *National Bald Eagle Management Guidelines* were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts.

Under the BGEPA, a final rule was published in May 2008, in the Federal Register (FR) that proposed authorization for take of bald eagles for those with existing authorization under the federal ESA where the bald eagle is covered in a Habitat Conservation Plan (HCP) or the golden eagle is covered as a non-listed species. The final rule also established a new permit category to provide expedited permits to entities authorized to take bald eagles through Section 7 incidental take permits. A proposed rule will later address authorization of take of (1) disturbance-type take of bald and golden eagles due to otherwise lawful activities and (2) eagle nests in rare cases where their location poses a risk to human safety or the eagles themselves.

In 2009, the USFWS issued a final rule on new permit regulations that would allow some disturbance of eagles "in the course of conducting lawful activities" (74 FR 46836–46879). Physical take of an eagle will only be authorized if every avoidance measure has been exhausted. Removal of nests will generally be permitted only in cases where the nest poses a threat to human health, or where the removal would protect eagles. Take permits may be issued when "necessary for the protection of…other interests in any particular locality" (USFWS 2009). Due to concerns about population declines, permits for take of golden eagles are likely to be restricted throughout the eagle's range (USFWS 2009). Considerations for issuing take permits include the health of the local and regional eagle populations, availability of suitable nesting and foraging habitat for any displaced eagles, and whether the take and associated mitigation provides a net benefit to eagles (74 FR 46836–46879, USFWS 2009). In April 2013, USFWS issued *Eagle Conservation Plan Guidance Module 1: Land-based Wind Energy (Version 2)* to address these new regulatory matters (USFWS 2013).

5.1.1.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA, 16 U.S.C. 703-712)) makes it 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 United States, Great Britain, Mexico, Japan, and Russia (and other countries of the former Soviet Union). Most birds (outside of introduced species and non-migratory game birds) within the US and the Project area are protected under the MBTA. The birds, occupied nests and the contents of the nest (eggs or chicks) within the Project property are afforded protection pursuant to the MBTA. Unlike ESA and BGEPA, no permits are available to authorize incidental take of birds under the MBTA. Due to the potential for resident and migratory birds within the Project, development of this Bird and Bat Conservation Strategy was prepared to assist in complying with the MBTA.

5.1.2 State Laws

5.1.2.1 Wind Energy Site Permitting

The Wind Siting Act of Minnesota (Minnesota Statute Chapter 216F) requires that a site permit be issued from the PUC to build and operate a large wind energy conversion system (LWECS). According to the Statute, the siting of an LWECS must be compatible with environmental preservation, sustainable development, and the efficient use of resources (Minnesota Statute Section 216F.03). Further, the criteria considered by the PUC in designating LWECS sites must include the impact of the LWECS on humans and the environment (Minnesota Statute Section 216F.05). Palmer's Creek is designing the Project to comply with the PUC's wind turbine setback and siting guidelines, and other requirements set forth in Minnesota Rules Chapter 7854.

5.1.2.2 State Threatened and Endangered Species Laws

Per Minnesota Statute Section 84.0895, the MNDNR has adopted 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 regulating the 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.

5.2 AGENCY GUIDANCE AND CONSULTATION

As part of the planning and design of the Project, Palmer's Creek consulted public and private available guidance materials including:

- Avian and Bat Protection Plan white paper (USFWS 2010)
- Avian Protection Plan Guidelines (APLIC and USFWS 2005)
- Suggested Practices for Avian Protection on Power Lines (APLIC 2006)
- Reducing Avian Collisions with Power Lines (APLIC 2012)
- Odell Wind Farm: Wildlife Assessment and Field Studies Tier 3 Report (Dunlap et al. 2013)
- Wildlife Baseline Studies for the Highmore Wind Resource Area, Hughes, Hyde and Hand Counties, South Dakota (Derby et al. 2010)
- Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to other Sources of Avian Collision Mortality in the United States (Erickson et al. 2001)
- Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments (Erickson et al. 2002)
- An Assessment of Direct Mortality to Avifauna from Wind Energy Facilities in North Dakota and South Dakota (Graff 2015)
- A Review of Bat Mortality at Wind Energy Developments in the United States (Johnson 2005)
- U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS 2012)
- Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions (NWCC)
- Acoustic Bat Summary Report: Palmer's Creek Wind Farm (*interim report*) (NCE 2017)
- Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Sollano County Resource Areas (Orloff and Flannery 1992)
- Towards Reliable Bird Surveys: Accounting for Individuals Present but not Detected (Thompson 2002)
- Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement (Western 2015)
- Bald Eagle Management Guidelines and Conservation Measures (USFWS, n.d.)
- National Bald Eagle Management Guidelines (USFWS 2007a)
- Eagle Permits; Take Necessary to Protect Interests in Particular Localities (USFWS 2009)
- Draft Eagle Conservation Plan Guidance (USFWS 2011)
- Eagle Conservation Plan Guidance: Land-based Wind Energy (Vers. 2) (USFWS 2013)
- Information for Planning and Conservation (IPaC) (USFWS 2017)
- Palmer's Creek Wind Farm, LLC.: Avian Point Count Survey Preliminary Results (Wenck 2017)
- Wild Birds and Avian Influenza: An Introduction to Applied Field Research and Disease Sampling Techniques (Whitworth et al. 2007)
- Willow Creek Wind Project: Bird and Bat Conservation Strategy

A public scoping meeting was held on December 1, 2016, in Granite Falls, Minnesota. The public and Federal, State, and local agencies were invited to the meeting and to provide comments regarding the Project. The public was invited through newspaper and radio

announcements, and residents near the Project were invited to comment. The public scoping meeting documentation is included in Appendix I of the EA. Comments received regarding the proposed Project from agencies and the public are included in Appendix J of the EA.

The local, state and federal agencies were contacted during the evaluation of the Project to determine potential impacts, identify avoid, minimization, and mitigation measures, and for guidance on permitting and approvals needed for the Project. These agencies included:

- Federal Aviation Administration
- U.S. Fish and Wildlife Service
- Minnesota Department of Transportation
- Minnesota Department of Natural Resources
- Minnesota Public Utilities Commission
- Minnesota State Historic Preservation Office
- Upper Minnesota Regional Development Commission
- Chippewa County
- City of Granite Falls

Palmer's Creek has met with and exchanged correspondence a number of times throughout the course of designing and reviewing the Project. This included conference calls and meeting with the MNDNR, USFWS, DOC, and WAPA to discuss concerns regarding turbine placement and other Project design features. Survey protocols, monitoring requirements, specific species, and biological assessment requirements were also discussed at several meetings and through correspondence.

Following these agency discussions, turbines were shifted to minimize potential impacts to the Sparta Wildlife Management Area, and survey protocols for bald eagles and other avian species were updated. The bat surveys were also discussed and modified to suit agency requests. The January 18, 2017 meeting with WAPA, DOC, and USFWS resulted in agreement to use the Consistency Evaluation Forms in place of a biological assessment since a programmatic BA had already been completed as part of the Upper Great Plains Wind Energy Final Programmatic EIS.

6.0 Pre-Construction Site Specific Wildlife Surveys & Risk Assessments

6.1 AVIAN USE SURVEYS

Wenck Associates, Inc. was contracted by Fagen, Inc. to conduct several studies. The data from these studies were used to identify species, species groups or species of concern that are present in the project area and that may be at a higher risk of mortality and/or displacement. Passerine species have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001 and Erickson et al. 2002), often comprising more than 80% of the bird fatalities. Both migrant and resident passerine fatalities have been observed (Erickson et al. 2001 and Erickson et al. 2002). Data are presented in several categories, and highlight federally listed species, state listed species, and species of concern (See Wenck 2017 *in-prep*, and **Appendix A, Avian Point Count Results As Of Feb 24 2017**, available at Fagen, Inc.).

6.1.1 Diurnal Fixed-Point and Incidental Avian Use

Avian surveys focus on inventory and monitoring with specific objectives that include: 1) an inventory of bird species in a specific project area; 2) determining the relative abundance of species; and 3) monitoring seasonal changes in species composition and relative abundance (Whitworth et al. 2007). Diurnal fixed-point surveys are one of the most common methods used to determine avian composition and abundance. Point counts not only focus on visual cues but also on auditory cues to give the observer an advantage in rough terrain. For some species, vocal cues may be the only reliable means of detection (Whitworth et al. 2007).

A total of 36 surveys will be conducted over four seasons with seasons defined as summer (June 27, 2016–August 31, 2016 and May 14, 2017-June 17, 2017 [8 point count surveys]), fall (September 1, 2016–November 30, 2016 [12 point count surveys]), winter (December 1, 2016–February 25, 2017 [6 point count surveys]), and spring (February 26, 2017–May 15, 2017 [10 point count surveys]).

Survey data was used to evaluate avian use, behavior, and species composition during Spring and Fall migration and to determine Summer resident species at the project area.

Point counts were selected to capture a diverse range of habitats and at locations with the best possible viewshed. Eight point count locations were selected for the avian point count surveys (Refer to **Figure 6, Point Count Locations**).

All observations within an 800-meter radius at each point count were recorded; any observations outside the 800-meter radius were considered incidental. Each point count survey lasted for 20 minutes; all audio and visual observations were recorded. Surveys were conducted by an experienced ornithologist. Surveys were rotated to cover all daylight hours to ensure each point count was surveyed at various times of the day. Data recorded for each observation included species, number of individuals, time, height above ground, behavior, and flight direction. A range finder and topographic maps were used as references to determine bird distances to the observer and flight heights. Birds not easily identifiable due to low light conditions and distance were identified to the lowest taxonomic level possible.

Twenty-minute survey periods provide adequate time to detect both raptors and non-raptors. Double counting may occur during the 20-minute survey because individuals may appear and disappear from view. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-minute survey, not number of distinct individual birds.

The ability to detect all species within the 800-meter survey radius varies among species and potentially not all individuals within the survey area are counted. This variation in detectability results in an overestimate of mean use in conspicuous species and an underestimate of mean use in reclusive species (Thompson 2002).

Incidental avian surveys are used to obtain bird distribution and composition information between point count locations. Larger birds, such as game birds, raptors, and waterfowl, large flocks of smaller birds, and birds that are a rarity in the area are typically recorded during incidental surveys.

Incidental observations included observations that occurred while traveling between point count locations, pre-and post-point count survey time period, and outside the 800-meter radius circular plot. These observations were recorded but not used in the formal analysis.

Flight behavior was evaluated by calculating the proportion of flying birds that were observed flying below, within, or above the turbine rotor sweep area (RSA). The Project is comprised of two (2) 2.3-MW and sixteen (16) 2.5-MW horizontal axis wind turbines. Each will have an anticipated hub height between 80 and 90 meters and a rotor diameter of approximately 116 meters. Therefore, an RSA between 22 and 148 meters above the ground was used.

The encounter rate is the rate in which a species was observed flying through the RSA during the avian point count surveys at the project area and suggests potential mortality risk from flight behavior.

To estimate the rate at which a species flies through the RSA, the following equation was applied to every species observed in the PCWF:

Encounter Rate = A*P*f*P*t*

- A is the mean use of birds/20 minutes for a given species
- P*f* is the proportion of all activity observations for a given species that were flying
- P*t* is the proportion of flying observations that were within the turbine RSA

The encounter rate index is relative to the observations of species during the surveys and within the study area and cannot be extrapolated to the species that may use the project area in the future. The encounter rate index from this study does not take into consideration behavior (e.g. foraging, courtship), habitat use, and turbine avoidance differences between species.

Please refer to **Appendix A, Avian Point Count Results (as of Feb. 24, 2017)**. Also, refer to **Section 4.2.1** of this BBCS.

6.1.1.1 Eagle/Raptor Use and Encounter Rate – As of February 24, 2017

Surveys were completed through February 24, 2017. Based on these surveys, the raptor annual mean use rate in the project area of 0.33 raptors/20 min was compared with 37 other wind energy facilities that implemented similar protocols. The raptor annual mean use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/20 min survey. Based on the results from these wind energy facilities, as summarized by Derby et al. 2010, a ranking of seasonal raptor mean use was developed: low (0-0.5 raptors/20 min. survey); low to moderate (0.5-1.0 raptors/20 min); moderate (1.0-2.0 raptors/20 min); high (2.0-3.0 raptors/20 min); and very high (> 3.0 raptors/20 min). Under this ranking, mean raptor use in the project area is low. The annual raptor use in the project area would rank 11th out of the 37 other wind energy facilities (Derby et al. 2010).

Based on surveys completed through February 24, 2017, raptor encounter rates were 0.09 individuals flying within the RSA/20 min. Approximately twenty-eight (28) percent of all raptor observations were within the RSA. The highest raptor encounter rate was red-tailed hawk and turkey vulture with 0.03 individuals flying within the RSA/20 min. The raptor encounter rate calculated is relatively low, however the percentage of raptor observations within the RSA during the surveys and the low annual mean use rate (raptors/20 minutes) does not eliminate the potential for mortality in the project area.

Bald eagles are frequent in the area as reported during the avian point count surveys completed thru February 24, 2017. Ten (10) bald eagles have been observed during the avian point count surveys with thirty-three (33) percent of the them observed flying through the RSA. Most of these eagles have been observed within one mile of the Minnesota River.

High numbers of raptor fatalities have been documented at wind energy facilities (e.g. Altamont Pass), however other studies at wind energy facilities in the United States suggest that 3.2% of the total casualties were raptors (Erickson et al. 2001). Results from Altamont Pass in California suggest that species mortality is not all related to abundance (Orloff and Flannery 1992). Golden eagles, red-tailed hawks and American kestrels were casualties more often than predicted based on abundance. Based on species occurrence/abundance within PCWF, red-tailed hawk and turkey vultures may constitute the highest proportion of raptor fatalities in the project area.

6.1.1.2 Non-raptor Use and Encounter Rate – As of February 24, 2017

Passerines make up a large proportion (61%), of the birds observed during the avian surveys in the project area and would be expected to make up the largest proportion of fatalities at the PCWF. Encounter rates indicate that unidentified blackbirds (0.22 birds/20 min) and red-winged blackbirds (0.14 birds/20 min) are most likely to be exposed to collisions from wind turbines in the project area. Other passerine and waterfowl species that flew through the RSA during the surveys include; unknown duck (0.250 birds/20 min) and American crow (0.13 birds/20 min). Refer to **Appendix A, Avian Point Count Results Through Feb 24 2017**.

6.1.1.3 Sensitive Species - As of February 24, 2017

A total of nine (9) endangered, two (2) threatened and twenty-one (21) special concern species are found in Minnesota (MNDNR 2013). One (1) special concern species (American white pelican, *Pelecanus erythrorhynchos*) has been observed during the field surveys. One observation consisted of four individuals. Refer to **Section 4.2.4 Rare and Unique**

Wildlife of this BBCS, and **Appendix A, Avian Point Count Results Through Feb 24 2017**.

6.1.2 Eagle Use Surveys

Following Stage 2 of the Eagle Conservation Plan Guidance (USFWS 2013), eagle point count surveys have been and will continue to be conducted to collect quantitative data on eagle presence that would allow estimation of eagle exposure rate, which forms the basis of a risk assessment model. Eagle use surveys focus exclusively on eagles and occur at the eight (8) point count locations (**Figure 6, Point Count Locations**) used for point count surveys in 2016-2017. The objective of the eagle use survey is to document eagle movements and behavior within and adjacent to the study area in all four seasons to assess risk to eagles (primarily bald eagles). Eagle surveys are conducted by a qualified biologist and will continue for one calendar year to capture temporal variation in eagle use of the study area.

Eagle use data is collected in 1-minute intervals so that the data can the translated into eagle exposure minutes. The data recorded for each survey includes the count start and stop times, eagle species observed, numbers and age classes of eagles seen, minutes of eagle flight in two height categories based on the USFWS Eagle Conservation Plan Guidance (< 200 and > 200 meters [m] above ground), notes on flight and other behaviors, and an individual identifier for each flight observation allowing it to be linked to a flight map. Each eagle flight observed will be drawn on a topographic map or aerial image of the Study Area and digitized using a GIS so that eagle locations and behaviors can be overlaid with Project features. Each sampling point will consist of an 800-meter (0.5-mile) radius circle (0.77 square mile) that provides distant, unobstructed views and allows visual observations of eagles and other large birds at a 2 to 3-mile distance. Numerical data is collected within 800-m-radius plots, but flight lines will be documented across line-of-sight and are not limited to the 800-m-redius survey plot. A detailed protocol study-specific data sheets and data management plan is being adhered to and is utilized in the field.

Surveys are being conducted once a month during the non-migration months (April-August), surveys are conducted at a minimum of twice a month during the migration months (September-March) starting July 2016 and concluding in June 2017. There will be 20 survey weeks in total. Individual surveys consist of a 1-hour observation period at each of the eight point-count locations during each week of the surveys, for a total of 160 hours of observations. Surveys occur in all weather conditions except when visibility is poor. These surveys are conducted outside of the twenty-minute avian point count surveys.

Through February 24, 2017, eagle use surveys documented 11 bald eagles with 37 flight minutes, and 91 percent of the individuals were flying within the RSA. Most of these eagles have been observed within one mile of the Minnesota River (Wenck 2017).

6.1.3 Eagle / Raptor Nest Surveys

Raptors spend much of their time hunting and soaring within elevation ranges that correspond to the wind turbine rotor-sweep-area (RSA), making them susceptible to turbine blades (Erickson et al. 2002). Because raptors are long-lived species with low reproduction rates, potential population impacts from collision-related mortality are of concern (Erickson et al. 2002). Although specific studies are lacking, adults and recently fledged young could be at particular risk of collision with turbines because of their higher use of areas near nest sites. Adult raptors often fly near nest sites during the breeding season to attend to young and deliver prey. After young raptors fledge, fledglings often spend significant amounts of

time flying and roosting near nest locations until they become capable flyers and hunters. Additionally, construction activities near active nests during the breeding season may potentially result in disturbance or abandonment of nest sites.

Few raptor species that have been identified as nesting at wind energy facilities have been observed as fatalities at wind-energy facilities (Derby et al. 2010), therefore, the relationship is very low between the number of collision fatalities and raptor nests within or near project facilities. However, it is assumed that raptors nesting close to turbines would likely have a greater chance of being impacted from collision with turbines (Derby et al. 2010), but the data is not available at this time to determine the impact (Wenck 2017, *in-prep*).

A raptor nest survey will be conducted to locate raptor nests and determine nest activity status and the species using those nests during the spring of 2017. The initial surveys will be conducted before trees leaf out, to locate nests and to identify early breeding species. The project area and a 1-mile buffer area will be surveyed from a vehicle using binoculars and spotting scopes. All raptor nest locations will be documented with Global Positioning System (GPS) coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data will be recorded for each nest. An additional visit will be conducted if nests are found to document the activity status of nests located during the initial survey and to identify nesting attempts by late nesting raptors such as Swainson's hawks. Raptors may use nests intermittently among years as well as re-nest after a nest failure; therefore, early- and late-season nest surveys allow for a more accurate summary of breeding raptors.

A review of historical eagle nest data (MNDNR 2016) within one mile of the Project was completed at the request of Fagen. A bald eagle (*Haliaeetus leucocephalus*) nest has been documented in T116N R40W Section 11 just outside of the project boundary. This nest was active when checked in 2000, 2001, and 2005. It is unknown whether the nest is still active or whether there are additional nests in the area. A nest location map cannot be produced, as requested by the MNDNR.

An additional nest was located the spring of 2016 by Fagen, this nest was active in 2016 and is in T116N R39W Section 20, immediately outside of the project boundary. Fagen staff have been monitoring nest use data in 2016 and will continue monitoring from April thru August 15, 2017 or until all eaglets have fledged (Michael Rutledge, Fagen, Inc., Personal Communication, March 7, 2017).

An aerial (fixed-wing) raptor/eagle nest survey will be conducted in April 2017 that will encompass a 10-mile buffer of the proposed wind farm. For any nests observed, the following will be recorded: GPS location, approximate nest height, nest substrate, nest size, actively used or non-use, and species using nest.

6.1.4 Acoustic Bat Surveys

New Century Environmental, LLC (NCE) initiated acoustic monitoring surveys to capture the diversity/abundance of bat species within the proposed Palmer's Creek Wind Farm, to meet due diligence with regulatory agencies (NCE 2017). Staff of Fagen, Inc. deployed five separate Anabat systems (Anabat® SD-2 ultrasonic detectors) to record bat activity throughout the study area, the first deployment was done with two of the Anabat recorders during the fall of 2015 and continued through 15 October 2016. Three additional Anabat recorders were launched on 03 August 2016. **Refer to Figure 7, Bat Monitor Locations.**

The data collected from Fagen was sent to NCE. NCE then took the data and processed in zero-crossing through Kaleidoscope (Ver. 3.1.8) to confirm presence diversity and abundance of bat species. The software uses a presence/absent indicator by giving each species of bat a p-value. The lower the p-value, the more likely the species of bat is present. Bat presence, in the form of vocalization, was detected, identified by species, and catalogued, thereby allowing estimates of species occurrences, distribution and relative abundance.

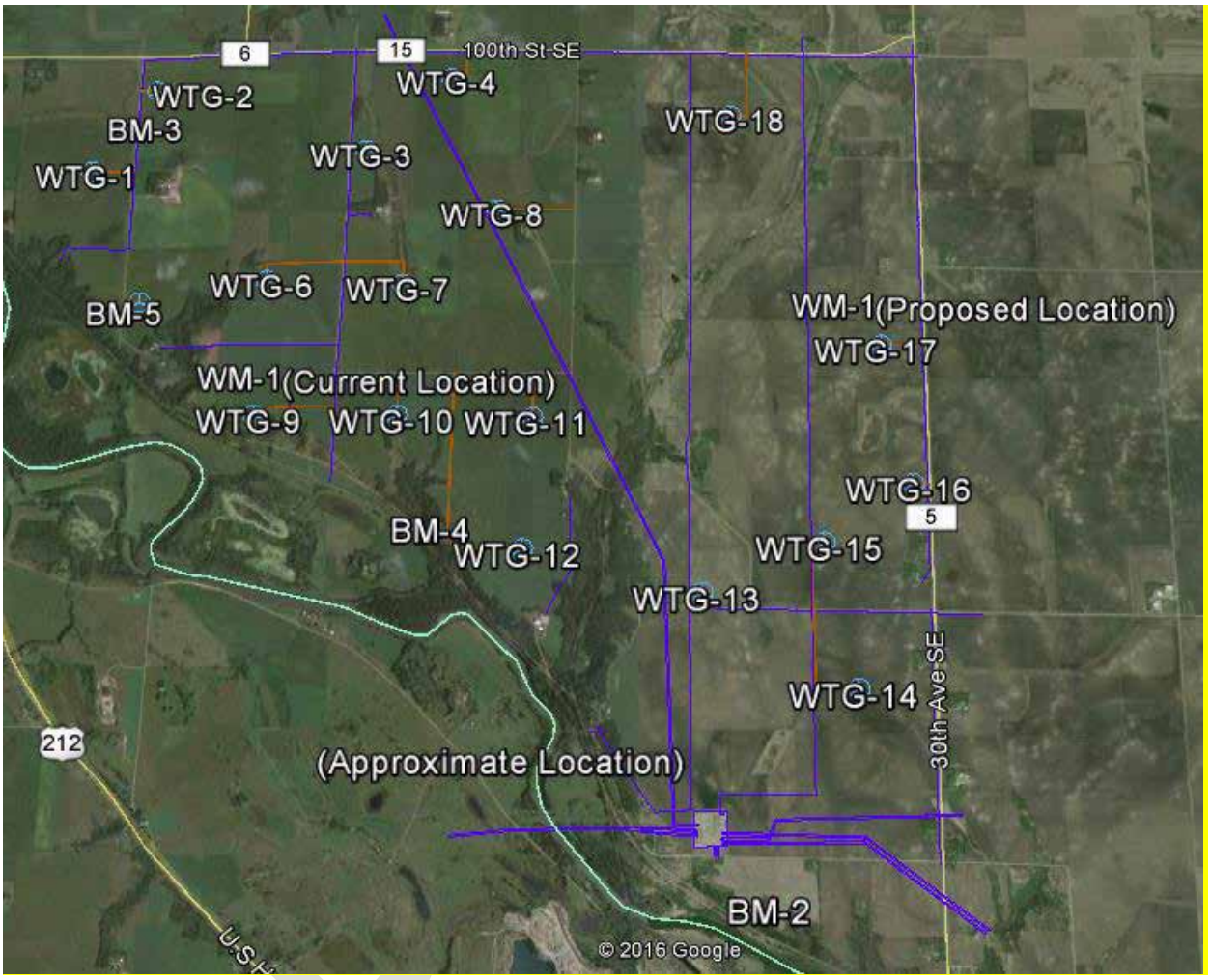

Figure 7. Bat Monitor (BM) Locations. BM-1 is not shown on the map but lies next to BM-2.

Bat Monitors (BM) 1 & 2 gathered data throughout the fall of 2015 and were deployed again in May of 2016. Monitors 3-5 were added in September of 2016.

Monitors 1 & 2 were deployed on September 13, 2015 and removed on October 11, 2015. They were deployed again on April 12, 2016, then removed on October 15. Monitor 3, Monitor 4 and Monitor 5 were deployed on August 3rd, 2016 then removed on October 15, 2016. The monitors were deployed for 287 trap nights.

From the five (5) Anabat recording systems, 232,116 sound files were recorded. Visual examination and filtering of files to eliminate extraneous noise (e.g., wind, insects, etc.) resulted in a total of 14,442 bat detections.

There was a total of six bat species documented throughout the course of the study (September-October 2015 and 2016). The tricolored bat, also known as the eastern pipistrelle (*Pipistrellus sublavus*) was documented at this site and is listed as a species of concern in the state of Minnesota. It was detected in small numbers but was found at every monitor except for monitor 1. The northern long-eared myotis (*Myotis septentrionalis*) is a federally threatened species whose home range lies within the study site. However no confirmed documentation was recorded here. Even though a total of five clicks of which Kaleidoscope classified as MYSE (northern long-eared myotis) the P-value was given a 1 for every monitor indicating the likelihood of presence is near non-existent. All other species documented are of least concern. Of the six species documented, the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and big brown bat (*Eptesicus fuscus*) were among the most common followed by the little brown bat (*Myotis lucifugus*) and eastern red bat (*Lasiurus borealis*).

Bat acoustic surveys will continue through the 2017 season.

Assuming that the general relationship between bat activity and bat mortality observed at other sites is broadly applicable to other locations, we expect that levels of turbine-related bat mortality at the Palmer's Creek Wind Farm will be on the lower end of the spectrum, and on par with others from the region.

7.0 Best Management Practices

7.1 WILDLIFE CONSERVATION MEASURES

Palmer's Creek has committed to implement several Best Management Practices (BMPs) and conservation measures for wildlife, derived from the Upper Great Plains Wind Energy Final Programmatic EIS (WAPA 2015). To implement these BMPs, several project plans and guidance documents will be developed for the Project prior to construction and operation. These plans will provide detailed information and implementation steps for BMPs that will benefit birds, bats, and their habitat. These plans are summarized in **Table 7-1, Summary of Project Plans and BMPs for Bird/Bat Protection**. Specific best management practices and conservation measures for birds and bat as they relate to the Project are identified in **Appendix B**. For the Project and Palmer's Creek to comply with the Site Permit Application and environmental assessment (EA), a detailed and complete list of BMPs were consulted on with DOC, MNDNR, USFWS and WAPA. This complete list is *appended by reference* and provided as an appendix in both the Site Permit Application and the EA for the Project.

Table 7-1: Summary of Project Plans and BMPs for Bird/Bat Protection.

Plan	Project BMPs Identified by Plan	Avian and Bat Protection Accomplished
Site Design Plans · Layout · Controlled Inspection/Cleaning Area · Excess Cut/Fill Placement · Profile · Erosion Control · Meteorological Towers · Re-fueling Areas · Engineered controls (e.g., fencing) · Drainage · Avoidance of important areas for wildlife · Utilize existing clearings in forests/shrublands · Consolidate facilities · Slope Stability Analysis · Co-location of t-lines, roads with existing/shared ROWs · Avoid aquifer conduits · Utilize dikes, swales, and lined ditches · Lighting guidelines	· Dust control · Erosion control · Site drainage · Ground disturbance · Use existing natural features (rocks, vegetation, drainage features) · Guy wires · Contamination · Safety · Fragmentation · Sediment transport · Lighting	· Dust control to minimize impacts to insects for forage. · Minimize impacts to habitat loss. · Guy wire marking to minimize avian/bat collision. · Engineered barriers prevent injury/death to unauthorized wildlife. · Avoidance of important wildlife areas minimizes direct/indirect impacts to birds/bats. · Fragmentation removes natural wildlife corridors/patterns. · Timed shut-off minimize light drawing insects, thus minimizes likelihood of birds/bats. · Downward-facing lights minimized horizontal and skyward illumination making unnatural light. Could confuse birds/bats.

Construction Plan · Explosives · Maintenance Activities	· Litter control · Ground disturbance	· Minimize impacts to habitat loss.
Decommission Plan · Contour · Hazardous Materials and Waste · Well removal · Subsoil decompaction	· Ground disturbance · Structure removal · Contamination · Vegetation establishment	· Contouring creates natural landscape to minimize fragmentation. · Minimize impacts to habitat. · Soil decompaction allows easy vegetation establishment!
Noxious Weed & Invasive Plant Control Plan · Facility Monitoring · Certified weed-free mulch · Surface Disturbance · Fill Materials · Clean vehicles · Blading avoidance of native vegetation	· Invasive species · Spread of invasive species · Revegetation	· Minimize impacts to habitat. · Invasive species out-compete natural species, can change ecological function.
Hazardous Materials Plan · Vehicle Maintenance · Excess excavation materials · Waste storage facilities · Storage, Use & Transportation · Drip pans	· Contamination · Erosion control	· Minimize impacts to terrestrial and aquatic habitat of birds/bats.
Integrated Pest & Vegetation Management Plan · Pesticides/herbicides	· Contamination	· Minimize impacts to terrestrial and aquatic habitat of birds/bats.
Site Restoration Plan · Restoration Timing · Temporary Use Areas · Contours · Weed-free native grasses, forbs, and shrubs · Road-cuts · Preserve specimen trees · Preserve nonhazardous rock outcroppings · Topsoil segregation and spread · Planting pockets	· Erosion control · Invasive weed control · Contours · Revegetation	· Minimize impacts to terrestrial and aquatic habitat of birds/bats. · Invasive species out-compete natural species, can change ecological function. · Contouring creates natural landscape to minimize fragmentation. ·

8.0 Monitoring Studies

Two years of avian and bat fatality monitoring, one year of acoustic bat monitoring and one year of eagle nest monitoring will be conducted after Palmer's Creek Wind Farm is operational. The fatality monitoring protocol is outlined in **Appendix C, Protocol: Post-Construction Avian and Bat Studies.** The eagle nest monitoring protocol is currently *in preparation* (Palmer's Creek Wind Farm, LLC). These protocols will adhere to the Land-based Wind Energy Guidelines (USFWS 2012).

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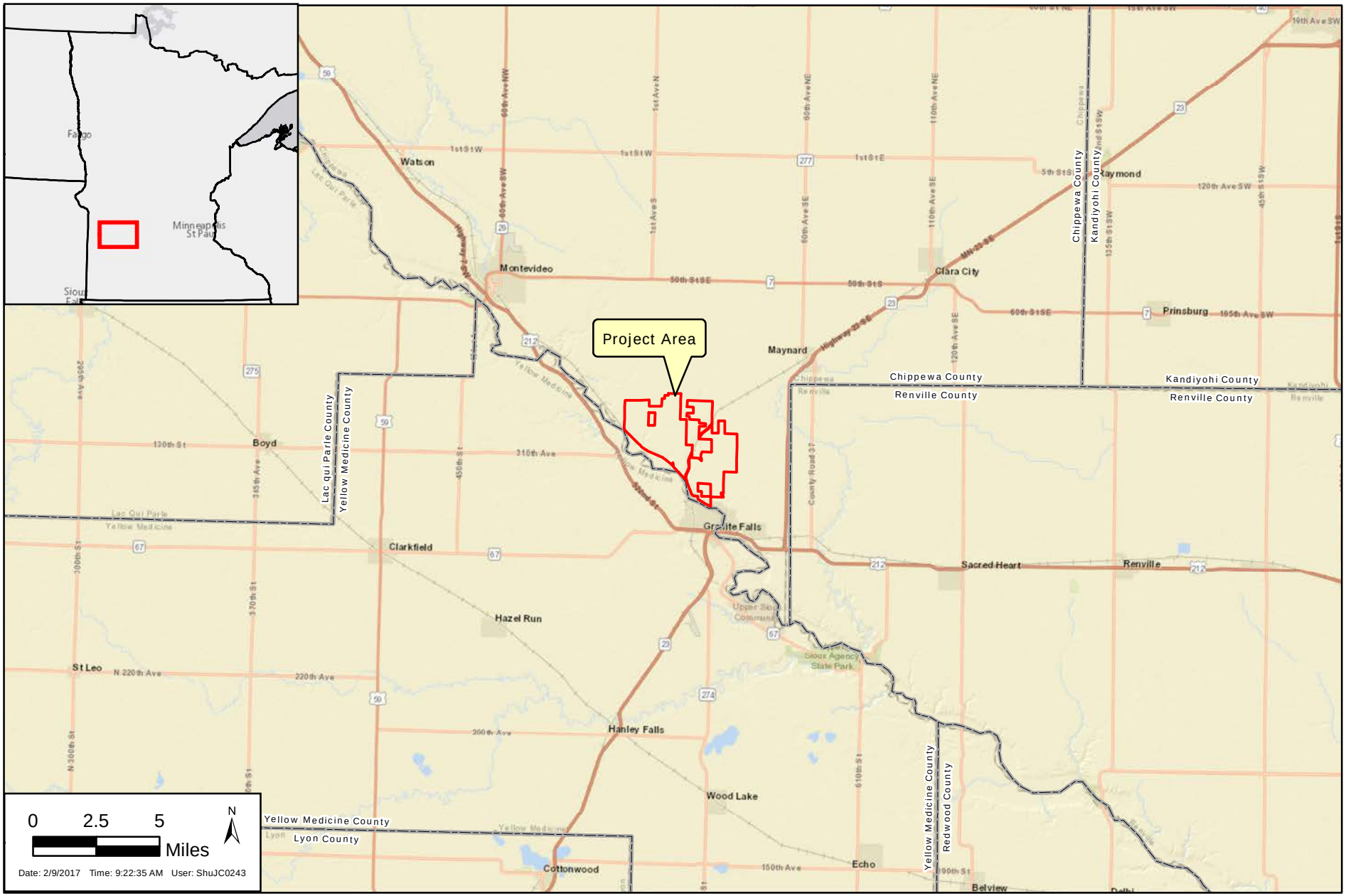
Figures



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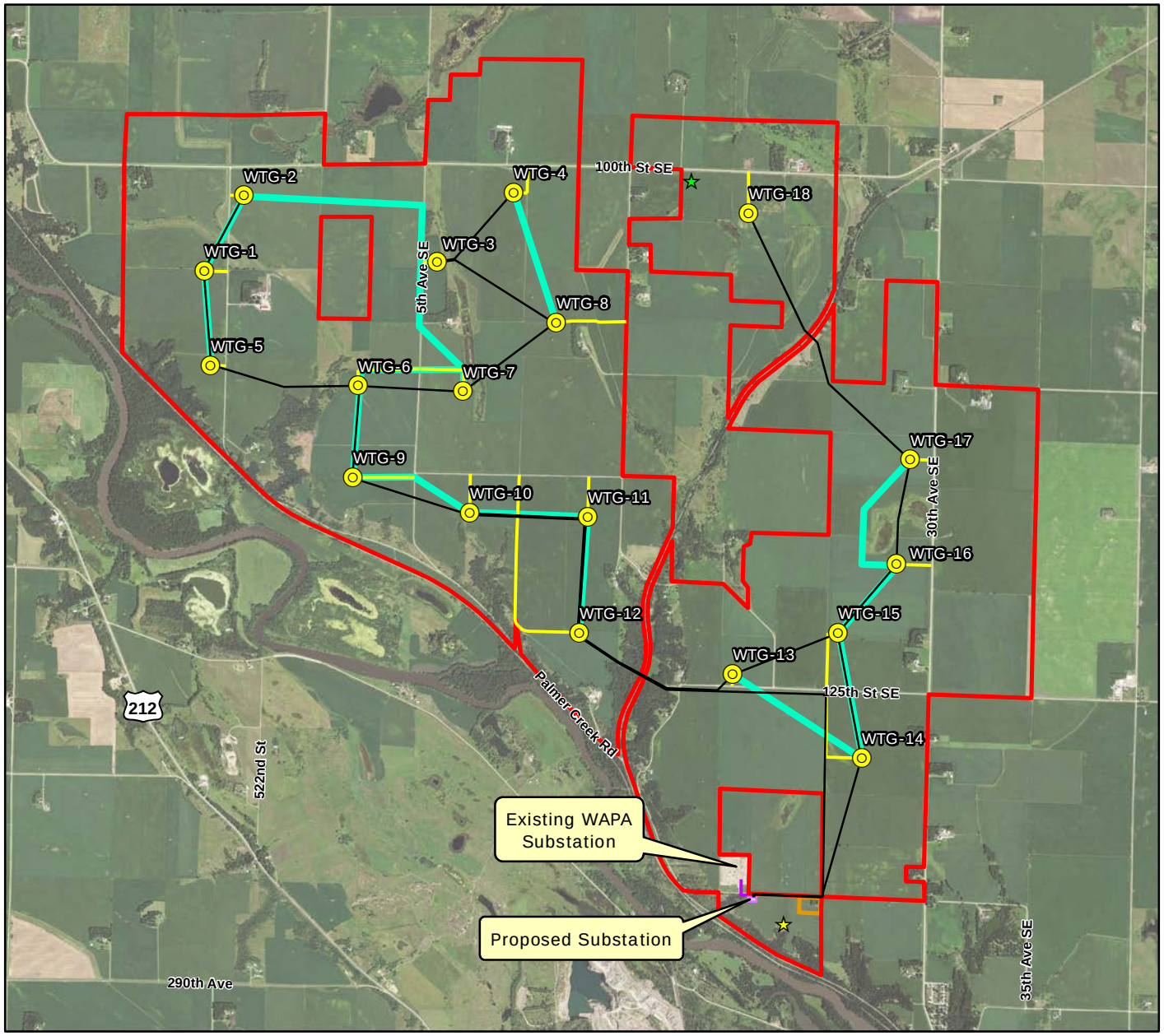
PALMER'S CREEK WIND FARM, LLC	FEB 2017
Site Location Map	Figure 1

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.



Legend

- Project Boundary
- Turbine Locations
- Collector Lines
- Access Roads
- Temporary Crane Path
- Permanent MET Station
- Temporary MET Station
- Proposed Substation
- Transmision Lines
- O&M Building and Laydown Area

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Site Detail Map

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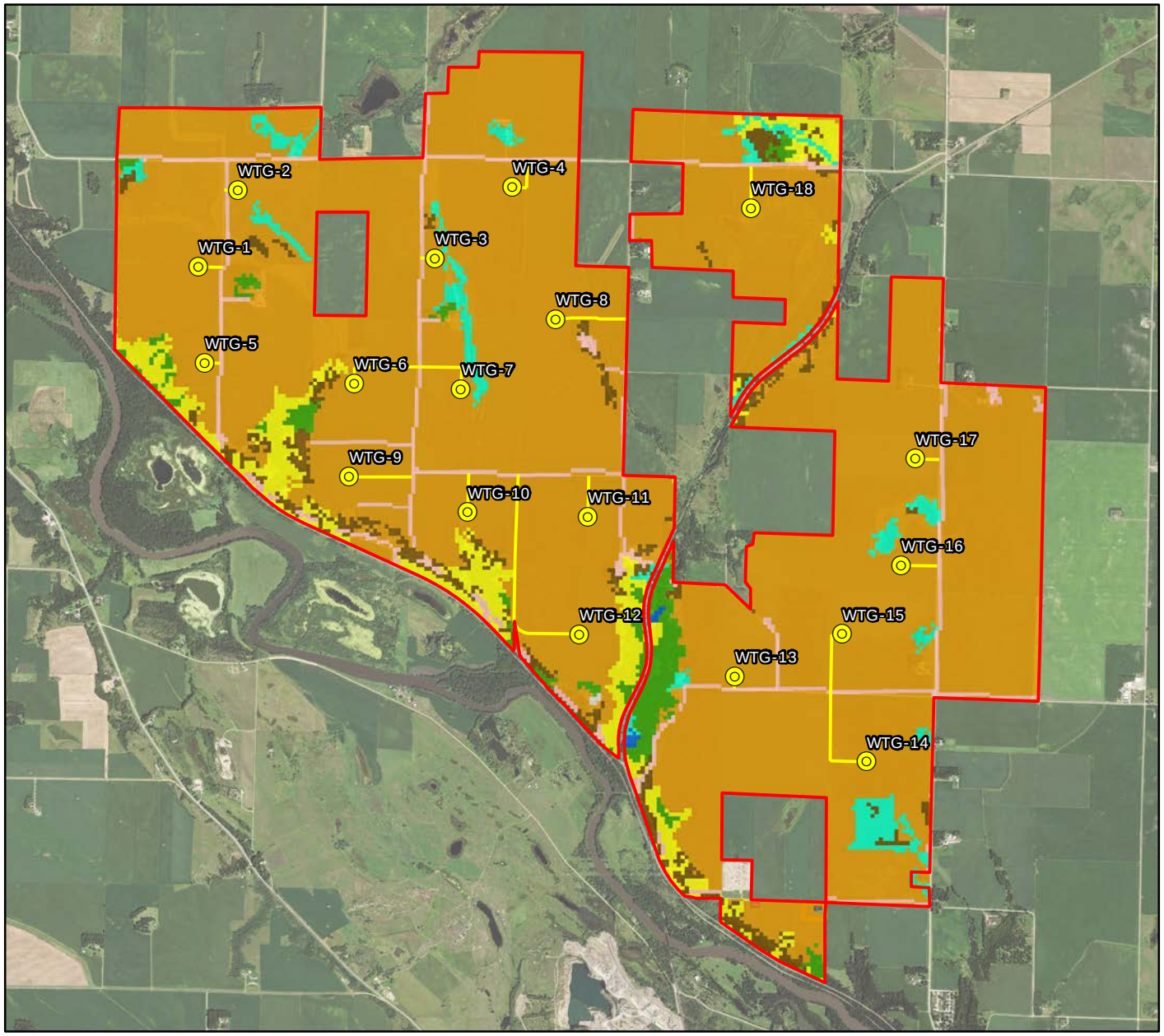
FEB 2017

Figure 2



Project
Turbine Locations
Access Roads

NLCD

Barren Land
Cultivated Crops
Wooded
Developed
Wetland
Hay/Pasture
Grasslass
Open
O&M Building and Laydown Area
Proposed Substation

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Land Cover

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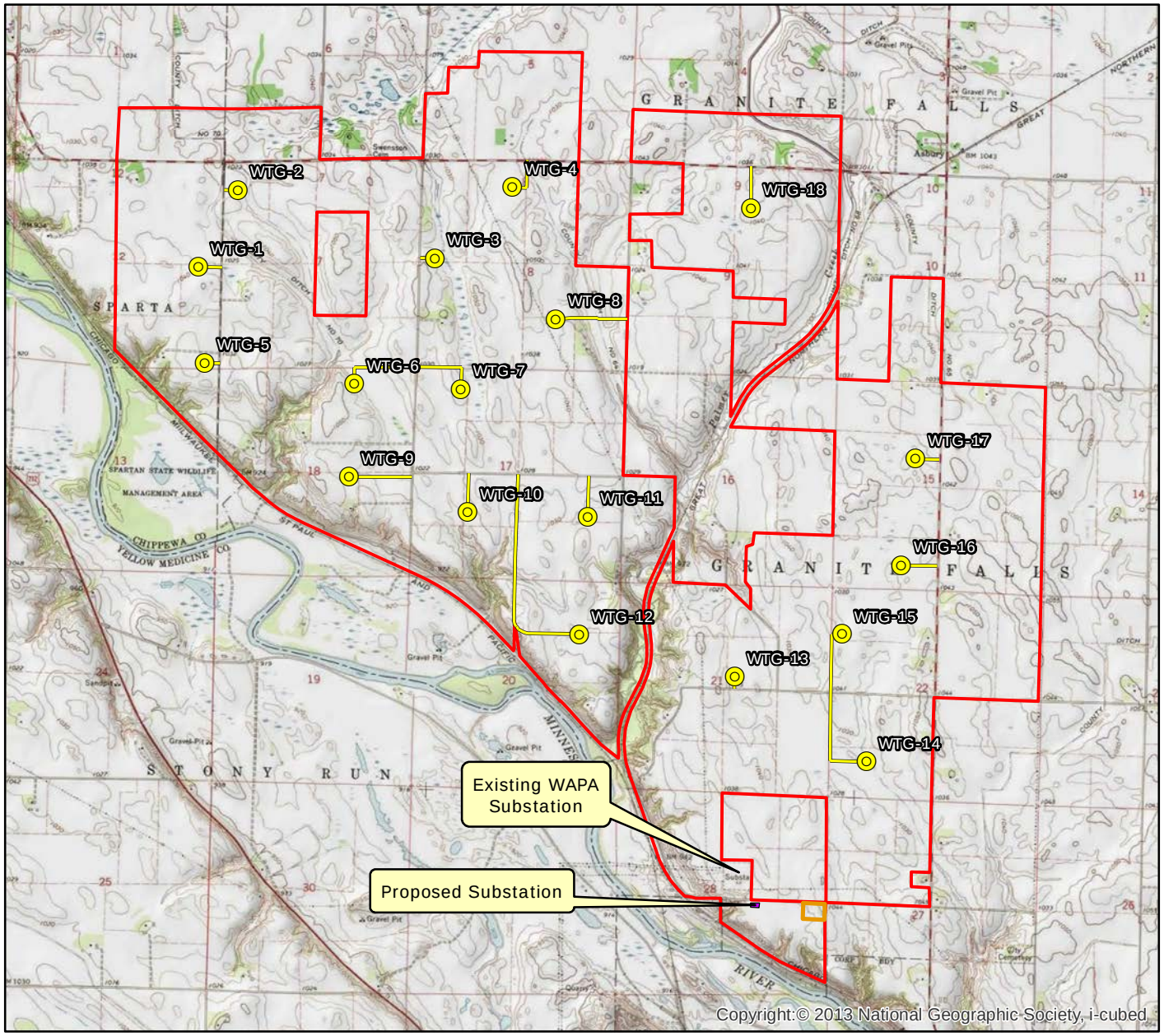
Figure 3



Legend

- Project Location
- Turbine Locations
- Access Roads
- Proposed Substation
- O&M Building and Laydown Area

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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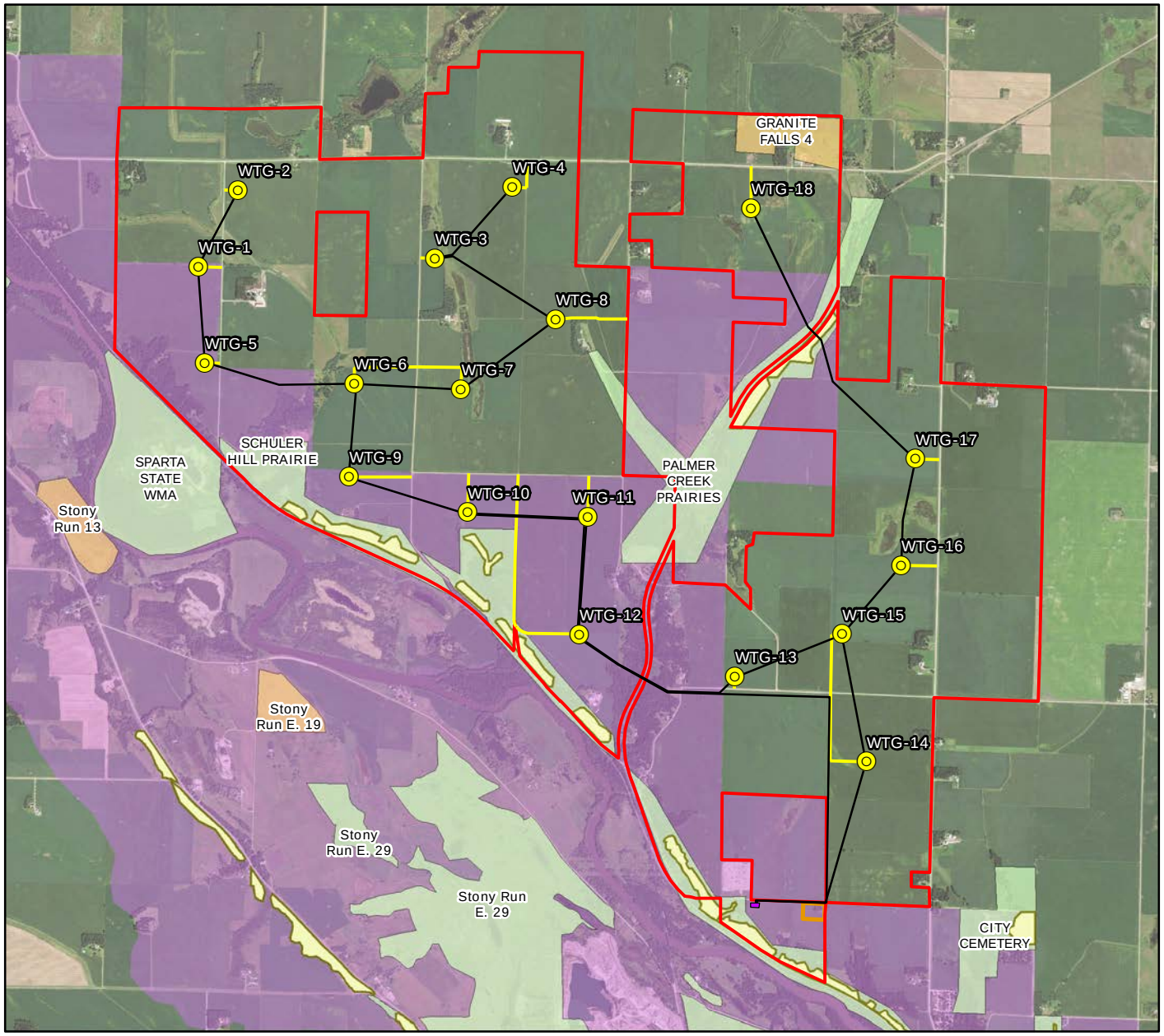
PALMER'S CREEK WIND FARM, LLC

Topographic Map

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.

FEB 2017

Figure 4



Project
Turbine Locations
Access Roads
Collector Lines
Proposed Substation
O&M Building and Laydown Area
Upper Minn. R. Valley Prairie Corridor Restoration Plan

DNR Prairie Native Plant Communities

Upland Prairie
Wetland Prairie
Complex community

MBS Sites of Biodiversity Significance

Outstanding
Moderate

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Ecologically Significant Areas

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FEB 2017

Figure 5

Palmer's Creek Wind Farm

Point Count Locations

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JUL 2016

Figure 6

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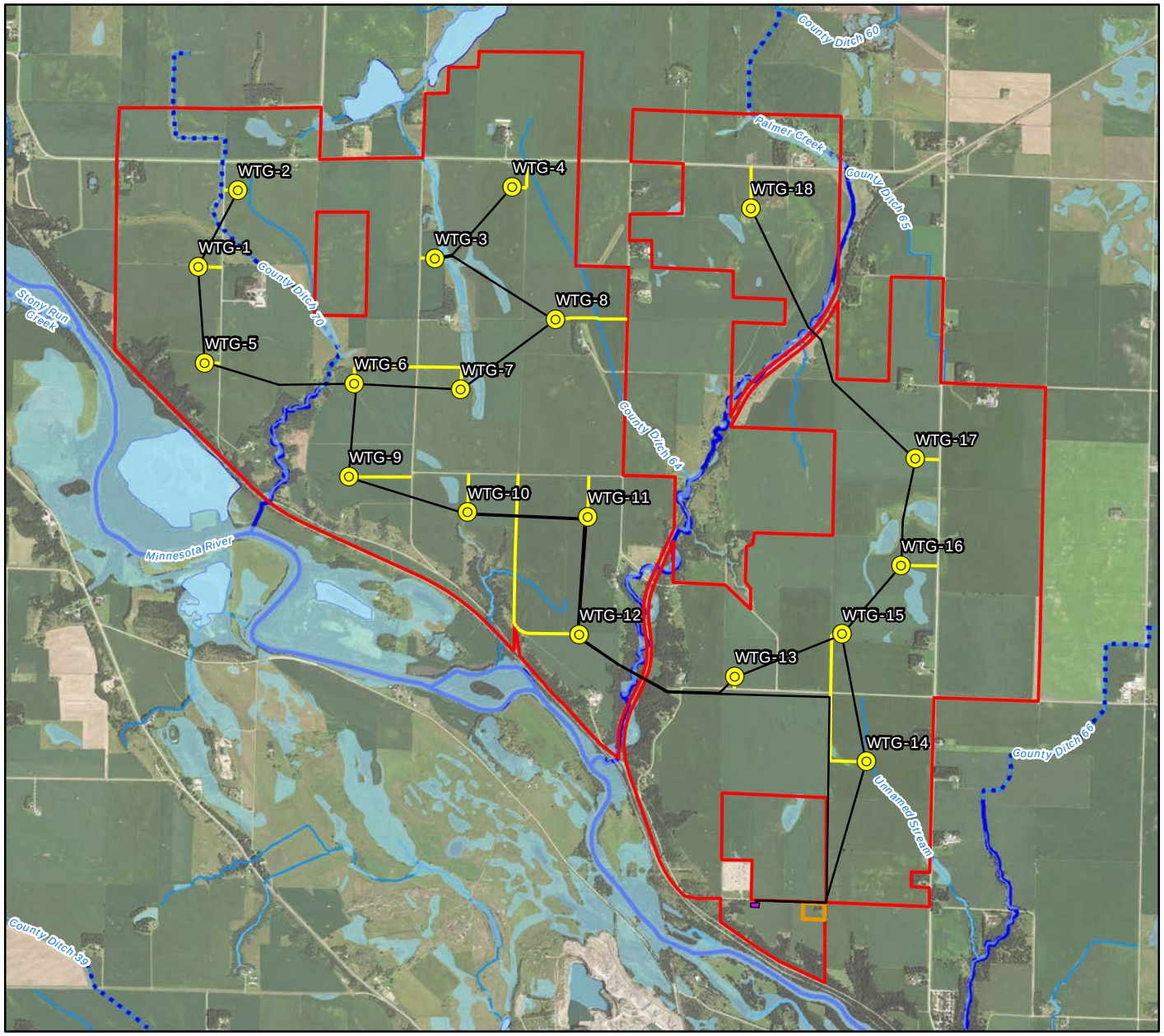

Project
Turbine Locations
Access Roads
Collector Lines
National Wetlands
Public Stream
Public Ditch/Altered Stream
Public Waters Basins
Rivers and Streams
O&M Building and Laydown Area
Proposed Substation

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Waterbodies and Wetlands

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FEB 2017

Figure 8

Appendix A – Avian Point Count Results Thru Feb. 24, 2017

PALMER'S CREEK WIND RESOURCE AREA - Summer 2016- Winter 2017

Survey #1 (6/29/16) - Survey #23 (2/24/17)

Species	Group	Obs	Ind	Fly	Mean Use per 20 min	Percent Composition	No. Surveys Species Observed	Frequency (% Surveys)	Proportion Ind. Flying	Proportion Ind. Flying Below RSA	Proportion Ind. Flying Within RSA	Proportion Ind. Flying Above RSA	Encounter Rate	N	NE	E	SE	S	SW	W	NW	Var
European Starling	SB	15	438	384	2.38	15.02%	5	2.72%	87.7%	100.0%	0.0%	0.0%	0.00	8.1%	0.0%	0.0%	0.0%	11.5%	0.0%	0.0%	0.0%	80.5%
American Crow	C	44	323	127	1.76	11.08%	25	13.59%	39.3%	81.9%	18.1%	0.0%	0.13	22.8%	2.4%	0.0%	15.7%	11.8%	7.9%	0.8%	13.4%	25.2%
Red-winged Blackbird	SB	27	270	258	1.47	9.26%	27	14.67%	95.6%	89.9%	10.1%	0.0%	0.14	0.4%	1.6%	0.0%	20.9%	19.0%	14.7%	0.4%	0.0%	43.0%
Brown-headed Cowbird	SB	20	239	203	1.30	8.20%	19	10.33%	84.9%	100.0%	0.0%	0.0%	0.00	5.9%	0.0%	0.5%	7.4%	9.4%	26.1%	23.6%	6.9%	20.2%
Barn Swallow	SB	22	180	180	0.98	6.17%	22	11.96%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	98.9%
American Goldfinch	SB	34	132	132	0.72	4.53%	32	17.39%	100.0%	98.5%	1.5%	0.0%	0.01	9.8%	1.5%	34.8%	11.4%	18.9%	6.1%	2.3%	0.8%	14.4%
Blue Jay	SB	41	114	66	0.62	3.91%	32	17.39%	57.9%	100.0%	0.0%	0.0%	0.00	9.1%	15.2%	16.7%	6.1%	12.1%	10.6%	15.2%	6.1%	9.1%
Snow Bunting	SB	6	109	109	0.59	3.74%	0	0.00%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	15.6%	0.0%	0.0%	15.6%	0.0%	18.3%	0.0%	50.5%
Rock Pigeon	PD	28	105	105	0.57	3.60%	18	9.78%	100.0%	98.1%	1.9%	0.0%	0.01	22.9%	0.0%	11.4%	0.0%	1.9%	0.0%	11.4%	13.3%	39.0%
Wild Turkey	GB	5	93	0	0.51	3.19%	1	0.54%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Field Sparrow	SB	33	84	51	0.46	2.88%	33	17.93%	60.7%	100.0%	0.0%	0.0%	0.00	7.8%	0.0%	3.9%	0.0%	3.9%	3.9%	2.0%	0.0%	78.4%
Canada Goose	WF	8	71	65	0.39	2.43%	7	3.80%	91.5%	46.2%	0.0%	53.8%	0.00	1.5%	0.0%	0.0%	13.8%	56.9%	27.7%	0.0%	0.0%	0.0%
Dark-eyed Junco	SB	9	70	70	0.38	2.40%	5	2.72%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.7%	7.1%	87.1%
Unknown Duck	WF	5	60	46	0.33	2.06%	3	1.63%	76.7%	0.0%	100.0%	0.0%	0.25	30.4%	0.0%	0.0%	69.6%	0.0%	0.0%	0.0%	0.0%	0.0%
Black-capped Chickadee	SB	12	58	54	0.32	1.99%	7	3.80%	93.1%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	3.7%	0.0%	0.0%	14.8%	0.0%	0.0%	81.5%
Horned Lark	SB	11	57	50	0.31	1.95%	10	5.43%	87.7%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	30.0%	0.0%	50.0%	0.0%	20.0%
Unknown Blackbird	SB	1	40	40	0.22	1.37%	1	0.54%	100.0%	0.0%	100.0%	0.0%	0.22	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified Sparrow	SB	4	35	34	0.19	1.20%	0	0.00%	97.1%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	0.0%	97.1%
Common Grackle	SB	7	32	32	0.17	1.10%	7	3.80%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	12.5%	3.1%	6.3%	59.4%	15.6%	0.0%	3.1%	0.0%
American Robin	SB	16	29	17	0.16	0.99%	16	8.70%	58.6%	100.0%	0.0%	0.0%	0.00	11.8%	0.0%	5.9%	23.5%	11.8%	11.8%	0.0%	17.6%	17.6%
Red-tailed Hawk	RVO	24	27	25	0.15	0.93%	17	9.24%	92.6%	56.0%	24.0%	20.0%	0.03	16.0%	0.0%	4.0%	24.0%	24.0%	12.0%	8.0%	4.0%	8.0%
Mourning Dove	PD	15	25	19	0.14	0.86%	15	8.15%	76.0%	100.0%	0.0%	0.0%	0.00	42.1%	0.0%	15.8%	0.0%	5.3%	5.3%	31.6%	0.0%	0.0%
Ring-billed Gull	GT	6	25	25	0.14	0.86%	6	3.26%	100.0%	32.0%	68.0%	0.0%	0.09	0.0%	0.0%	0.0%	4.0%	8.0%	0.0%	8.0%	12.0%	68.0%
Common Yellowthroat	SB	12	22	0	0.12	0.75%	12	6.52%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cedar Waxwing	SB	6	21	19	0.11	0.72%	6	3.26%	90.5%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	42.1%	36.8%	21.1%	0.0%	0.0%	0.0%	0.0%
Yellow Warbler	SB	4	20	13	0.11	0.69%	3	1.63%	65.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Ring-necked Pheasant	GB	10	19	6	0.10	0.65%	6	3.26%	31.6%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
American Tree Sparrow	SB	2	19	18	0.10	0.65%	2	1.09%	94.7%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Clay-colored Sparrow	SB	12	16	0	0.09	0.55%	12	6.52%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Northern Flicker	WP	6	15	15	0.08	0.51%	6	3.26%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	26.7%	0.0%	20.0%	33.3%	20.0%	0.0%	0.0%	0.0%
Western Meadowlark	SB	3	14	14	0.08	0.48%	3	1.63%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	50.0%	35.7%	0.0%	14.3%	0.0%	0.0%
Turkey Vulture	RVO	9	12	12	0.07	0.41%	9	4.89%	100.0%	33.3%	50.0%	16.7%	0.03	0.0%	0.0%	25.0%	33.3%	8.3%	0.0%	16.7%	0.0%	16.7%
Tree Swallow	SB	5	12	12	0.07	0.41%	5	2.72%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Bank Swallow	SB	1	12	12	0.07	0.41%	1	0.54%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Downy Woodpecker	WP	11	11	8	0.06	0.38%	9	4.89%	72.7%	100.0%	0.0%	0.0%	0.00	12.5%	0.0%	12.5%	25.0%	12.5%	12.5%	25.0%	0.0%	0.0%
Killdeer	SH	7	10	5	0.05	0.34%	7	3.80%	50.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Vesper Sparrow	SB	6	10	0	0.05	0.34%	6	3.26%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bald Eagle	RVO	8	10	9	0.05	0.34%	6	3.26%	90.0%	11.1%	33.3%	55.6%	0.02	0.0%	33.3%	0.0%	44.4%	11.1%	0.0%	0.0%	0.0%	11.1%
Savannah Sparrow	SB	1	8	0	0.04	0.27%	0	0.00%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chipping Sparrow	SB	7	8	4	0.04	0.27%	7	3.80%	50.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Song Sparrow	SB	5	7	0	0.04	0.24%	5	2.72%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Eastern Bluebird	SB	2	6	6	0.03	0.21%	2	1.09%	100.0%	100.0%	0.0%	0.0%	0.00	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	83.3%	0.0%
Swainson's Hawk	RVO	4	5	3	0.03	0.17%	3	1.63%	60.0%	66.7%	33.3%	0.0%	0.01	0.0%	0.0%	0.0%	33.3%	33.3%	33.3%	0.0%	0.0%	0.0%
Mallard	WF	2	5	0	0.03	0.17%	2	1.09%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Least Flycatcher	SB	4	5	1	0.03	0.17%	4	2.17%	20.0%	100.0%	0.0%	0.0%	0.00	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sedge Wren	SB	5	5	0	0.03	0.17%	5	2.72%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
American White Pelican	WB	1	4	4	0.02	0.14%	1	0.54%	100.0%	0.0%	100.0%	0.0%	0.02	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
Rough-legged Hawk	RVO	3	4	4	0.02	0.14%	2	1.09%	100.0%	25.0%	25.0%	50.0%	0.01	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Eastern Wood-Pewee	SB	3	3	0	0.02	0.10%	3	1.63%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Eastern Kingbird	SB	2	3	1	0.02	0.10%	2	1.09%	33.3%	100.0%	0.0%	0.0%	0.00	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Belted Kingfisher	SB	2	2	1	0.01	0.07%	2	1.09%	50.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Snow Goose	WF	1	2	2	0.01	0.07%	1	0.54%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Grasshopper Sparrow	SB	2	2	0	0.01	0.07%	2	1.09%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Yellow-headed Blackbird	SB	2	2	1	0.01	0.07%	2	1.09%	50.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Northern Harrier	RVO	1	1	1	0.01	0.03%	0	0.00%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
American Kestrel	RVO	1	1	1	0.01	0.03%	1	0.54%	100.0%	100.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
Wilson's Snipe	SH	1	1	0	0.01	0.03%	1	0.54%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bobolink	SB	1	1	0	0.01	0.03%	1	0.54%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Willow Flycatcher	SB	1	1	0	0.01	0.03%	1	0.54%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Marsh Wren	SB	1	1	0	0.01	0.03%	1	0.54%	0.0%	0.0%	0.0%	0.0%	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		547	**2,916**	**2,264**	**15.85**	**100.0%**			**77.6%**				**0.96**	**8.48%**	**2.12%**	**4.20%**	**8.83%**	**13.12%**	**7.07%**	**6.27%**	**3.22%**	**46.69%**

Appendix B: Applicable Bird/Bat Best Management Practices and Conservation Measures

Best Management Practices (BMPs)	References	Project Application
Construction: Communication and other local utility cables shall be buried, where feasible.	VR-26, VRP 5-194	See Design Plans-Layout Plans.
Construction: Construction debris shall be removed from the site.	LU-3,LUP 5-14	X
Construction: Excess cut/fill materials shall be hauled in or out to minimize ground disturbance and impacts from fill piles.	VR-22, VRP 5-193	X
Construction: If needed during construction, only use explosives within specified times and at specified distances from sensitive wildlife or surface waters as established by the appropriate Federal and State agencies.	ER-7, ERP 5-130	X
Construction: Litter must be controlled and removed regularly during construction.	VR-30, VRP 5-194	X
Construction: Minimize the area disturbed during the installation of meteorological towers (i.e., the footprint needed for meteorological towers and associated laydown areas).	ER-2, ERP 5-129	See Design Plans-Layout Plans.
Construction: Schedule the installation of meteorological towers and other characterization activities to avoid disruption of wildlife reproductive activities or other important behaviors (e.g., do not install towers during periods of sage-grouse nesting).	ER-3, ERP 5-129	See Design Plans-Layout Plans.
Decommissioning: All aboveground and near-ground structures, including turbines and ancillary structures, shall be removed from the site during decommissioning.	ER-23, ERP 5-132, VR-39, VRP 5-195	See Decommission Plan.
Decommissioning: Facilities constructed on Federal lands should follow the decommissioning recommendations provided in the USFWS's Land-Based Wind Energy Guidelines (USFWS 2012b).	ERP 5-132	See Decommission Plan.
Decommissioning: Salvage and reapply topsoil excavated during decommissioning activities to disturbed areas during final restoration activities.	ER-24, ERP 5-132	See Decommission Plan.
Decommissioning: When decommissioning sites, ensure that any wells are properly filled and capped.	WR-10, WRP 5-33	See Decommission Plan.
Design: Existing rocks, vegetation, and drainage patterns shall be preserved to the maximum extent possible.	VR-12, VRP 5-193	See Design Plans.
Design: Minimize the use of guy wires on permanent meteorological towers or use designs for towers that do not require guy wires. If guy wires are necessary, they shall be equipped with line marking devices.	ER-8, ERP 5-130	See Design and Layout Plans.
Design: Power collection cables or lines on the site should be buried in a manner that minimizes additional surface disturbance (e.g., collocating them with access roads).	VR-26, VRP 5-194, ERP 5-129	See Design, Layout and Construction Plans.
General: Conduct construction and maintenance activities when the ground is frozen or when soils are dry and native vegetation is dormant.	SR-5, SRP 5-25	See Construction Plan.
General: Facilities and off-site surrounding areas shall be kept clean of debris, "fugitive" trash or waste, and graffiti. Scrap heaps and materials dumps shall be prohibited and prevented. Materials storage yards, even if thought to be orderly, shall be kept to an absolute minimum. Surplus, broken, disused materials and equipment of any size shall not be allowed to accumulate.	VR-35, VRP 5-194	X
Haz. Materials: Dispose of excess excavation materials in approved areas to control erosion and minimize leaching of hazardous materials.	SR-8, SRP 5-26	See Hazardous Material Plan and Erosion Control Plan.
Haz. Materials: Hazardous materials and waste storage areas or facilities shall be formally designated and access to them restricted to authorized personnel. Construction debris, especially treated wood, shall not be disposed of or stored in areas where it could come in contact with aquatic habitats.	HM-16, HM 5-249	See Hazardous Material Plan and Design Plans.
Wildlife/Vegetation: If pesticides/herbicides are to be used on the site, develop an integrated pest and vegetation management plan to ensure that applications will be conducted within the framework of managing agencies and will entail the use of only EPA-registered pesticides/herbicides that are (1) nonpersistent and immobile and (2) applied by licensed applicators in accordance with label and application permit directions, following stipulations regarding suitability for terrestrial and aquatic applications.	HM-3, HMP 5-247	See Integrated Pest & Vegetation Management Plan.
Haz. Materials: Limit herbicide and pesticide use to nonpersistent, immobile compounds and apply them using a properly licensed applicator in accordance with label requirements.	WR-6, WRP 5-33	See Integrated Pest & Vegetation Management Plan.

Refernces: Palmer's Creek Project Best Management Practices and Conservation Measures adopted from Western (2015).

Best Management Practices (BMPs)	References	Project Application
Haz. Materials: Prepare a hazardous materials and waste management plan that addresses the selection, transport, storage, and use of all hazardous materials needed for construction, operation, and decommissioning of the facility for local emergency response and public safety authorities and for the regulating agency, and that addresses the characterization, on-site storage, recycling, and disposal of all resulting wastes. The plan shall include a comprehensive hazardous materials inventory; Material Safety Data Sheets (MSDSs) for each type of hazardous material; emergency contacts and mutual aid agreements, if any; site map showing all hazardous materials and waste storage and use locations; copies of spill and emergency response plans (see below), and hazardous materials-related elements of a decommissioning/ closure plan. The waste management plan shall identify the waste streams that are expected to be generated at the site during construction and operation and address hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements (e.g., selecting appropriate waste storage containers, appropriate off-site treatment, storage, and disposal facilities), inspection procedures, and waste minimization procedures. The plan shall address solid and liquid wastes that may be generated at the site in compliance with CWA requirements if a NPDES permit is needed.	HM-1, HMP 5-247	See Hazardous Materials Plan.
Maintenance: Promptly dispose of all garbage or human waste generated on site in order to avoid attracting nuisance wildlife.	ER-15, ERP 5-131	X
Maintenance: Clean and maintain catch basins, drainage ditches, and culverts regularly.	WR-5, WRP 5-33	X
Maintenance: Refueling areas shall be located away from surface water locations and drainages and on paved surfaces; features shall be added to direct spilled materials to sumps or safe storage areas where they can be subsequently recovered.	HM-12, HMP 5-248	See Design Plan-Refueling Areas.
Maintenance: Wind facilities and sites shall be actively and carefully maintained during operation. Wind energy projects shall evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power.	VR-32, VRP 5-194	X
Minimize ground-disturbing activities, especially during the rainy season.	SR-1, SRP 5-25	X
Restoration: A site restoration plan shall be in place prior to construction. Restoration of the construction areas shall begin immediately after construction to reduce the likelihood of visual contrasts associated with erosion and invasive weed infestation and to reduce the visibility of affected areas as quickly as possible.	VR-9, VRP 5-192	See Site Restoration Plan.
Safety: Drip pans shall be used under the fuel pump and valve mechanisms of any bulk fueling vehicles and during on-site refueling to contain accidental releases.	HM-13, HMP 5-248	X
Safety: Use proper signage and/or engineered barriers (e.g., fencing) to limit access to electrically energized equipment and conductors in order to prevent access to electrical hazards by unauthorized individuals or wildlife.	HS-9, HSP 5-257	X
Siting: Avoid locating wind energy developments in areas of unique or important recreation, wildlife, or visual resources. When feasible, a wind energy development should be sited on already altered landscapes.	LUP 5-14	See Design-Layout Plan.
Siting: Consolidate infrastructure wherever possible to maximize efficient use of the land and minimize impacts. Existing transmission and market access should be evaluated and use of existing facilities should be maximized.	LUP 5-14	See Design-Layout Plan.
Siting: Consult with Federal, State, and county agencies; tribes; property owners; and other stakeholders as early as possible in the planning process to identify potentially significant land use conflicts and issues and State and local rules that govern wind energy development.	LUP 5-14	This Bird & Bat Conservation Strategy is part of the Site Permit Application (requirement for MN Dept. of Commerce and associated agencies).
Siting: Minimize the extent of land disturbance to the extent possible.	WRP 5-33	See Design-Layout Plan. Total Land Disturbance is x.xx acres.
Siting: Through site design, the number of structures required should be minimized. Activities should be combined and carried out in one structure, or structures should be collocated to share pads, fences, access roads, lighting, etc.	VRP 5-190	See Design-Layout Plan.
Vegetation: Reduce habitat disturbance by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.	ER-4, ERP 5-130	X
Wetlands/Vegetation: For wetland and grassland easements, coordinate closely with the USFWS or USDA during initial project planning to ensure that wetland and grassland easements are avoided to the extent practicable.	LUP 5-15	Coordinated as part of the Site Permit Application.
Wildlife/Vegetation: Contact appropriate Federal and State agencies (including State entities responsible for permitting energy development projects) early in the planning process to identify potentially sensitive ecological resources known to be present or likely to be present in the vicinity of the wind energy development.	WRP 5-128	Coordinated as part of the Site Permit Application.

References: Palmer's Creek Project Best Management Practices and Conservation Measures adopted from Western (2015).

Best Management Practices (BMPs)	References	Project Application
Wildlife/Vegetation: Do not locate individual meteorological towers in or adjacent to sensitive habitats or in areas where ecological resources known to be sensitive to human activities are present.	WRP 5-129	See Design-Layout Plan.
Wildlife/Vegetation: Review existing information on species and habitats in the project area. Identify important, sensitive, or unique habitat (including large contiguous tracts of grassland habitat) and biota in the project site and vicinity, and design the project to avoid, minimize, or mitigate potential impacts on these resources. Avoidance is the typically the most effective, and therefore preferred, choice for minimizing impacts. The design and siting of the facility should follow appropriate guidance and requirements from Western and the USFWS (as specified for each species in the selected alternative in the Final PEIS) as well as those required by State permitting agencies, and other resource agencies, as available and applicable. For birds specifically, attention should be given to project placement that may be within or near Important Bird Areas (http://netapp.audubon.org/iba) or Hemispheric or Regional Western Hemisphere Shorebird Reserve Network sites (http://www.whsrn.org/whsrn-sites), or where bird species or habitats of conservation concern are known to occur. The IBA Program has identified the most essential areas for birds, and conservation of these areas will provide for long-term protection of biodiversity. Sources of information on these important habitats can be found at http://ecos.fws.gov/ipac, http://www.avianknowledge.net, and http://web4.audubon.org/bird/iba.	WRP 5-127	This Bird & Bat Conservation Strategy is part of the Site Permit Application (requirement for MN Dept. of Commerce and associated agencies).
Wildlife: Avoid constructing turbines in areas of concentrated prey base for raptors (e.g., prairie dog towns).	ERP 5-130	Aerial raptor nest surveys will be conducted in Spring 2017. Avian point count surveys are continuing until mid-summer 2017. Avian use data will be updated in this document after surveys are completed.
Wildlife: Consult with the appropriate natural resource agencies to avoid scheduling construction activities during important periods for wildlife courtship, breeding, nesting, lambing, or calving that are applicable to sensitive species within the project area.	ERP 5-130	This Bird & Bat Conservation Strategy is part of the Site Permit Application (requirement for MN Dept. of Commerce and associated agencies).
Wildlife: Establish buffer zones around known raptor nests, bat roosts, and biota and habitats of concern if site evaluations show that proposed construction activities would pose a significant risk to avian or bat species of concern.	ER-6, ERP 5-130	This Bird & Bat Conservation Strategy is part of the Site Permit Application (requirement for MN Dept. of Commerce and associated agencies).
Wildlife: Evaluate potential avian and bat use (including the locations of active nest sites, colonies, roosts, and migration corridors) of the project and use data to plan turbine (and other structure/infrastructure) locations to minimize impacts.	ERP 5-128	Aerial raptor nest surveys will be conducted in Spring 2017. Avian point count surveys are continuing until mid-summer 2017. Avian use data will be updated in this document after surveys are completed. Acoustic bat surveys will continue through October 2017. Bat data will be updated in this document after surveys are completed.
Wildlife: Evaluate the potential for the wind energy project to adversely affect bald and golden eagles in a manner consistent with the Eagle Conservation Plan Guidance (USFWS 2013a). Early in the planning of transmission interconnection and wind farm location, coordination with USFWS Field Offices regarding the guidance is highly recommended. Documented occurrence of eagles can be acquired from the local USFWS Ecological Services office, State wildlife agencies, or State natural heritage databases in some cases, although on-site surveys may be needed. In accordance with the USFWS's Land-Based Wind Energy Guidelines (USFWS 2012b), surveys during early project development should identify all important eagle use areas (nesting, foraging, and winter roost areas) within the project's footprint. If recent data are available on the spacing of occupied eagle nests for the project-area nesting population, these data can be used to delineate an appropriate boundary for the project area. If appropriate survey data are unavailable, the USFWS suggests that the project area, for the purpose of evaluating potential effects on eagles, be defined as the project footprint together with areas within 10 mi (16 km) of the footprint boundary. As described in the USFWS's Land-Based Wind Energy Guidelines (USFWS 2012b), project developers should evaluate the need to develop an ECP.	ERP 5-128	Eagle Use Surveys, Eagle Nest Use Monitoring, Aerial Raptor Nest Surveys are continuing through 2017. Data will be updated in this document once surveys are completed.
Wildlife: Follow the recommendations provided in the USFWS's Land-Based Wind Energy Guideline (USFWS 2012b) and, as appropriate, the Eagle Conservation Plan Guidance (USFWS 2013a). In addition, follow guidelines or recommendations developed by individual States (e.g., IDNR 2011; Kempema 2009; Nebraska Wind and Wildlife Working Group 2011) to address potential effects of wind energy development on ecological resources.	WRP 5-126	Eagle Use Surveys, Eagle Nest Use Monitoring, Aerial Raptor Nest Surveys are continuing through 2017. Data will be updated in this document once surveys are completed.
Wildlife: If appropriate, conduct surveys for presence of Federal- and State-protected species and other species of concern and the habitats for such species that have a reasonable potential to occur within the project area based on habitat characteristics. Consult with the USFWS and/or appropriate State agency to identify species likely to be present and appropriate survey techniques, determine permit needs, and identify/apply species-specific avoidance and minimization measures.	WRP 5-128	Coordination with Federal and State agencies is occuring as this document is included in the Site Permit Application process.
Wildlife: If significant impacts on Important Bird Areas (IBAs) or similar ecologically important avian areas are not avoided, minimized, or mitigated, then this Final PEIS would not apply and a separate project specific NEPA evaluation must be developed and approved by the appropriate responsible federal agency prior to project construction.	WRP 5-128	This Project adheres to the Final PEIS.

References: Palmer's Creek Project Best Management Practices and Conservation Measures adopted from Western (2015).

Best Management Practices (BMPs)	References	Project Application
Wildlife: In the absence of long-term mortality studies, monitor regularly for potential wildlife problems including wildlife mortality. Report observations of potential wildlife problems, including wildlife mortality, to the appropriate State or Federal agency in a timely manner, and work with the agencies to utilize this information to avoid/minimize/offset impacts. The Ecological Services Division of the USFWS shall be contacted. Development of additional mitigation measures may be necessary.	ER-22, ERP 5-131	See this document, Bird & Bat Conservation Strategy.
Wildlife: Increasing turbine cut-in speeds (i.e., prevent turbine rotation at lower wind velocity) in areas of bat conservation concern during times when active bats may be at particular risk from turbines.	ER-20, ERP 5-131	Cut-in speeds = 6.7 mph (3 m/s) for both GE 2.3 and GE 2.5 turbines.
Wildlife: Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. Pets shall not be allowed on the project area.	ER-21, ERP 5-131	X
Wildlife: Place marking devices on any newly constructed or upgraded transmission lines, where appropriate, within suitable habitats for sensitive bird species.	ER-14, ERP 5-131	X
Wildlife: Prepare a Bird and Bat Conservation Strategy (BBCS). The overall goal of such a plan is to reduce or eliminate avian and bat mortality; implementation of a BBCS builds support for a FONSI when projects tier from the PEIS. The wind energy facility developer should work closely with the USFWS and the appropriate State wildlife agencies to identify protective measures to include in the plan. These would include project design measures, construction phase measures, operational phase measures, and decommissioning phase measures. A minimum of 1 yr of post-construction monitoring is needed to validate the preconstruction risk assessment and allow the facility owner to adjust operations based on identified problems. Based on project location in proximity to occupancy, habitat, and other ttributes that may increase the risk to birds and bats, multiyear post-construction monitoring may be necessary at some project sites. It is of paramount importance that post-construction surveys are accurate estimates of fatality at wind power facilities. Simple carcass counts at wind energy facilities are inaccurate and underestimate the total number of fatalities because not all carcasses are found due to factors such as unsearchable terrain, carcass removal by scavengers, and less than perfect searcher efficiency. Post-construction surveys for mortality must be robust and standardized to provide reliable results upon which to base adaptive management decisions. For these reasons, using a fatality estimator model is critical. The USFWS recommends a model like the Evidence of Absence model developed by Huso et al. (2014). The user's guide and software developed to estimate bird and bat fatalities at wind-power facilities (Dalthorp et al. 2014) can be found at http://pubs.usgs.gov/ds/0881. The Evidence of Absence software provides for comparison of various combinations of search coverage, search interval, and searcher efficiency that all produce the same overall level of carcass detection probability. Results of monitoring activities shall be reported to the appropriate State or Federal agencies in a timely manner. If bat monitoring is appropriate for the site, installation of bat acoustic monitors should be considered at the time meteorological towers are installed to reduce costs and minimize delays by collecting data early during the site review process.	WRP 5-126	See this document, Bird & Bat Conservation Strategy.
Wildlife: The transmission lines shall be designed and constructed with regard to the recommendations in Avian Protection Plan Guidelines (APLIC and USFWS 2005), in conjunction with Suggested Practices for Avian Protection on Power Lines (APLIC 2006) and Reducing Avian Collisions with Power Lines (APLIC 2012), to reduce the operational and avian risks that result from avian interactions with electric utility facilities.	ER-1, ERP 5-128	See this document, Bird & Bat Conservation Strategy.
Wildlife: Tier to the Final Programmatic EIS. The responsible federal agency will use a tiered NEPA evaluation to document avoidance, minimization, or mitigation of impacts to important bird habitat (e.g., established private, State, or federal special management areas for birds, IBAs, Regional Western Hemisphere Shorebird Reserve Network, [http://www.whsrn.org/whsrn-sites], etc.) to achieve no significant impact to avian resources. On a project-by-project basis, developers should contact local USFWS offices early in the planning process to identify areas of conflict with specific avian species or important bird habitat. Developers shall work with USFWS and Western to develop avoidance, minimization, or mitigation measures to adequately demonstrate their project will have no significant impact on avian resources. In these cases, individual projects determined to be consistent with the selected alternative in the Final PEIS will require a FONSI to document consistency.	ER 5-127	X
Wildlife: Turn off unnecessary lighting at night to limit attraction of migratory birds. Follow lighting guidelines, where applicable, from the Wind Energy Guidelines Handbook. This includes using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination, and avoidance of steady-burning, high-intensity lights.	ER-19, ERP 5-131	X

References: Palmer's Creek Project Best Management Practices and Conservation Measures adopted from Western (2015).

Appendix C – Protocol: Post-Construction Avian and Bat Studies

April 7, 2017

Protocol - Post Construction Avian and Bat Studies
Palmer's Creek Wind Farm

This document is prepared in conformance with the **U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines** and serves as the Post Construction Avian and Bat Study Protocol for the Palmer's Creek Wind Farm (PCWF), located north of Granite Falls, Chippewa County, Minnesota. The purpose of the proposed protocol is to satisfy the requirements of the PCWF Bird and Bat Conservation Strategy. The anticipated tasks include:

- Post-Construction Fatality Monitoring, including Searcher Efficiency Trials and Carcass Removal Trials

Post Construction Fatality Monitoring

Post Construction fatality monitoring will be conducted for the first two years of operation in accordance with Tier 4 of the U.S. Fish and Wildlife Service' Land-Based Wind Energy Guidelines and designed to answer the following questions:

- What are the fatality rates for the project?
- What are the fatality rates for species of concern?
- How do the estimated fatality rates compare to the predicted rates?
- Do fatalities vary within the project site in relation to site characteristics?
- How do the fatality rates compare to other projects in similar landscapes?
- What is the composition of fatalities in relation to migrating vs. resident birds/bats?
- Do the data suggest the need to employ measures to reduce impacts?
- All eighteen turbines will be monitored.

Carcass searches will be conducted for two full years, commencing within 60 days of COD, as allowed by weather conditions and safety considerations.

- Weekly from March through September
- Twice per month from October through February

The following information will be recorded at each turbine site:

- Weather conditions
- Ground cover conditions
- Start and finish times of survey
- Potential prey species, other than birds, observed within the survey area

Potential scavenge items, other than birds, will be either buried or removed.

All eighteen turbines will be included in the carcass searches. The survey area will be a 60-meter radius around each turbine.

Searches will take place at 10-meter transects out to 60 meters with a search area of 10 m centered on the transect centerline (5 m on each side). During periods of snow cover or other unsafe conditions, search patterns and methods may be modified to include different transect patterns and/or road and pad searches. Modified search methods will be documented in the permanent field notes.

All searches, with or without fatalities, shall be recorded on an Incident Report Form (Attached).

The USFWS, MNDOC, MNPUC and MNDNR (Interested Parties) shall be notified if:

- 5 or more dead or injured non-listed avian or bat species are discovered within a survey week, or;
- 1 or more dead or injured state threatened or endangered species or species of special concern, or;
- 1 or more dead or injured federally listed species, or;
- 1 or more dead or injured bald or gold eagle.

The specimen(s) shall be geo-located and the coordinates provided to Interested Parties.

Searcher Efficiency Trials

Searcher Efficiency Trials shall be conducted to estimate the proportion of carcasses found by searchers.

A minimum of 100 carcasses/year will be used for the trials.

Trials will be conducted during each season (spring, summer, fall, winter).

Carcasses representing small, medium and large birds will be used.

Carcasses will be discreetly marked before placement.

The location of all placed carcasses will be marked with GPS.

All field personnel involved in Fatality Monitoring will be involved in Searcher Efficiency Trials.

A carcass missed by the searcher but found by the trial conductor shall be considered “Available-Not Detected”.

A carcass missed by the searcher and not found by the trial conductor shall be considered “Unavailable”. It will be assumed that this carcass was scavenged or otherwise removed.

At the end of each trial, the searcher efficiency will be calculated.

Unless being used for Carcass Removal Trials, all carcasses placed will be removed after Searcher Efficiency Trials have concluded.

Carcass Removal Trials

Carcass Removal Trials will be conducted to estimate the average length of time a carcass remains in the area and is potentially detectable.

Removal can be by scavenging or by other means, such as being buried or concealed during cultivation.

Carcasses will be placed in various locations under turbines and their location recorded by GPS.

The carcasses will be checked every day for the first four days, and then on day 7, 10, and 14, after which all remains will be removed and disposed of.

Reporting

An Annual Report shall be submitted to the Interested Parties by March 30 of the following year. The Annual Report shall:

1. Identify fatalities, including location and date of discovery;
2. List Total number of fatalities for each Quarter;
3. Include adjusted fatality estimates for each season and for small, medium and large birds, as well as bats
4. Include an analysis of spatial, seasonal and habitat relationships to the fatalities
5. Present standardized results using accepted statistical analyses

Personnel

Post Construction Avian and Bat Studies performed at Palmer’s Creek Wind Farm will be supervised by Michael Rutledge, a qualified biologist. All team members participating in the surveys will receive a minimum of 6 hours of classroom and field training.

Palmer's Creek Wind Farm Fatality Monitoring Survey Data Form
Site Summary

Observer Name: _____ Survey Start Time: _____

Date: _____ Survey End Time: _____

Turbine ID: _____

Weather:

- ¨ Clear
- ¨ Partly Cloudy
- ¨ Overcast
- ¨ Fog
- ¨ Rain

Temperature (Beginning of survey): _____

Ground Cover/Visibility Class: ¨ **A** ¨ **B** ¨ **C** ¨ **D**

Prey Species On-Site: ¨ No ¨ Yes, Complete below

Species: _____

Distance from Turbine _____

Direction from Turbine _____

Fatalities Discovered: ¨ No ¨ Yes, Complete Incident Report Form for each fatality

Total Fatalities: _____

Injuries Discovered: ¨ No ¨ Yes, Complete Incident Report Form for each injury

Total Injuries: _____

Notes:

***Ground Cover Type/Visibility Class:**
A-More than 90% bare ground, sparse vegetation less than 6" tall
B-More than 25% bare ground, mostly sparse vegetation less than 6" tall
C-Less than 25% bare ground, less than 25% of vegetation is more than 12" tall or ground is rocky/scrubby
D-Less than 25% bare ground, more than 25% of vegetation is more than 12" tall

Incident Report Form

¨ Bird ¨ Bat Identification Number________________________________

Species (If known)____

Carcass : ¨ Complete ¨ Dismembered ¨ Partial

Carcass Condition: ¨ Fresh ¨ Decomposing ¨ Desiccated

Time Since Death: ¨ < 1 day ¨ < 1 week ¨ > 1 week ¨ Unknown

Notes:____

¨ Bird ¨ Bat Identification Number________________________________

Species (If known)____

Carcass : ¨ Complete ¨ Dismembered ¨ Partial

Carcass Condition: ¨ Fresh ¨ Decomposing ¨ Desiccated

Time Since Death: ¨ < 1 day ¨ < 1 week ¨ > 1 week ¨ Unknown

Notes:____

¨ Bird ¨ Bat Identification Number________________________________

Species (If known)____

Carcass : ¨ Complete ¨ Dismembered ¨ Partial

Carcass Condition: ¨ Fresh ¨ Decomposing ¨ Desiccated

Time Since Death: ¨ < 1 day ¨ < 1 week ¨ > 1 week ¨ Unknown

Notes:____

¨ Bird ¨ Bat Identification Number________________________________

Species (If known)____

Carcass : ¨ Complete ¨ Dismembered ¨ Partial

Carcass Condition: ¨ Fresh ¨ Decomposing ¨ Desiccated

Time Since Death: ¨ < 1 day ¨ < 1 week ¨ > 1 week ¨ Unknown

Notes:____

***Procedure for Carcass Marking**

Photograph carcass front and back with pen or other item in picture for size reference. Save Images.

From Main Screen, tap “Mark Waypoint”. Tap on “Edit” on the next screen. Tap on numeric field at top of screen. Enter Carcass Identifier using the following format: Two digit Turbine # (ex. OT01, CC01), dash, six digit date, dash, four digit sample number. Tap the checkmark at the bottom of the screen to save your entries. Tap on the three lines icon at the bottom of the screen and select “Change Photo”. Select the best photo of the carcass in question and then select “Use” from the bottom of the screen. Tap “Save” at the bottom of the screen and you are done.

A Phase I Reconnaissance Survey of the Palmer's Creek Wind Project in Chippewa County, Minnesota

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BCA Project No.: 2016-1321 and 2017-1301
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Abstract

Fagen Engineering (the Proponent) has contracted Beaver Creek Archaeology, Inc. (BCA) to complete a Phase I Reconnaissance Survey for the proposed Palmer's Creek Wind Project in Chippewa County, Minnesota. Western Area Power Administration (WAPA) is the lead agency on this project due to the interconnection between this project and WAPA's existing Granite Falls substation. This project is also subject to the jurisdiction of the Minnesota Department of Commerce and Minnesota Public Utilities Commission (MN PUC) because of the proponent's State Site Permit Application. The proposed project is located in the Minnesota State Historic Preservation Office (SHPO) Prairie Lakes Region (Archaeological region 2, sub-region 2N).

This report will discuss the two stages of the project. The original layout (Phase I) was surveyed and is described in the report and covers 352.3 acres of which 215.8 acres did not overlap with the final design. The final layout (Stage II) consists of 18 wind turbine locations, an O&M building, a substation, construction laydown areas, 15.28 miles of associated collector lines, 4.65 miles of access roads, and 8.82 miles of crane paths. A 5-acre block was typically centered on the turbine locations. Additional areas for assembling and dismantling cranes were included with seven turbines, resulting in blocks of up to 9 acres. The collector lines, access roads, and crane paths often ran parallel with one another. The lines were buffered 50' on either side of the proposed route, resulting in survey corridors ranging between 100' and 175' wide. The final project layout covers approximately 361.4 acres, with a total of 577.2 acres surveyed during both stages of the project.

The Area of Potential Effect (APE) is defined as the combined construction area of all project components, and the survey area encompassed the entire APE. At the time of inventory, vegetation within the APE consisted primarily of plowed agricultural fields with some rangeland as well as fallow grasslands. The proposed project location was identified using topographic and aerial maps, as well as Global Positioning System (GPS) hardware. Survey methods included intensive pedestrian survey and shovel tests. Wade Burns served as Principal Investigator for this project.

During the Stage I field inventory (November 14-17, 2016), BCA archaeologists identified two sites (21CP77 and 21CP78). In addition, three previously recorded mound sites (21CP9, 21CP10 and 21CP11) and one unidentifiable site lead 21CPa were located within the APE. Due to the presence of unevaluated mound sites in the APE, the project design was updated to avoid the sites, and BCA conducted further fieldwork. During the Stage II field inventory (February 15-16, 2017), one site (21CP79) was identified. One previously recorded site (21CP11) and one site lead (21CPa) were within the APE. The final design avoids all known eligible or unevaluated sites in the project area, but shovel tests need to be conducted in high probability areas, such as uplands overlooking stream crossings. The ground was frozen, so shovel tests were unable to be conducted. In addition, one turnout was submerged in water from melting snow and could not be surveyed.

Since shovel tests were not conducted and the inundated turnout was not surveyed, additional work is required to make a recommendation if the project will impact historic properties. As such, an addendum to this report including the turnout APE survey and shovel tests results will be submitted. In addition to the Phase I inventory, BCA will conduct an architectural inventory of historic properties near the project area and a viewshed analysis evaluating the potential visual impact to historic properties and tribally significant properties near the project area. The results of these studies will be included in separate reports.

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Introduction

Fagen Engineering (Proponent) contracted Beaver Creek Archaeology, Inc. (BCA) to complete a Phase I Reconnaissance Survey of the Palmer's Creek Wind Project in Chippewa County, Minnesota (see Figure 17 and Appendix B: Maps). The Phase I included a cultural resource investigation, including a file search, Phase I Reconnaissance survey and cultural resource survey report. Western Area Power Administration (WAPA) is the lead agency on this project due to the interconnection between this project and WAPA's existing Granite Falls substation. This project is also subject to the jurisdiction of the Minnesota Department of Commerce and Minnesota Public Utilities Commission (MN PUC) because of the proponent's State Site Permit Application.

The final layout of the proposed project consists of 18 wind turbine locations, a substation, an operations and maintenance (O&M) building, crane paths, construction laydown areas, road turnouts, 15.28 miles of collector lines, 4.65 miles of access roads, and 8.82 miles of crane paths. Each wind turbine location was centered in a five acre survey block. Some turbine locations comprised an area larger than 5 acres when an additional equipment staging area was needed for assembling and disassembling the cranes. The collector lines, access roads and crane paths overlapped and ran parallel with one another. As such, the proposed routes were buffered 50' on either side of the lines resulting in a survey corridor that measured between 100' and 175' wide. The final project layout covers approximately 361.4 acres, with a total of 577.2 acres surveyed during both stages of the project.

The locations of the proposed project are presented in Table 1, below in tabular format as depicted on the USGS 7.5' Asbury and Granite Falls quadrangle maps.

Table 1. Proposed Project Location.

Township	Range	Sections	USGS Quad. Map
Stage I			
116N	39W	7, 8, 9, 15, 16, 17, 18, 20, 21, 22, 27, 28	Asbury and Granite Falls (2003)
116N	40W	12, 13	
Stage II			
116N	39W	7, 8, 9, 15, 16, 17, 18, 20, 21, 22, 27, 28	Asbury and Granite Falls (2003)
116N	40W	12, 13	

This report consists of the Phase I Reconnaissance survey for the proposed Palmer's Creek Wind project. Since the project layout changed while BCA was conducting fieldwork, the cultural resource inventories for the proposed Palmers Creed Wind project are divided into two stages. Stage I is the original, preliminary layout for which the Phase I Reconnaissance survey was performed in November 2016. Stage II is the final layout for which the Phase I Reconnaissance survey was conducted in February 2017. The individual phases are discussed in depth in the *Results* section of this report. The *Summary/Recommendation* section of the report will only discuss the final layout (Stage II).

Project Description

The Area of Potential Effect (APE) is defined as the combined construction area of all project components. As such, the APE includes the location of the turbines, collector lines, access roads and turnouts, a substation, an operations and maintenance (O&M) building, and any additional work areas, such as construction staging areas and bore bell holes.

Stage I

The initial APE for Stage I consisted of 18 wind turbine locations, 13.97 miles of collector lines and 4.93 miles of access roads. The 18 wind turbines were inventoried with 5-acre survey blocks centered on each wind turbine location. Since the collector lines and access roads ran parallel with one another, the lines were buffered 50' on either side of the routes for a total survey corridor that measured 100' wide. The proposed substation encompassed an area of 9.1 acres adjacent to the existing WAPA substation. The O&M building and crane paths had not been determined. The total APE for the initial survey was approximately 352 acres and was inventoried for cultural resources. The breakdown of the APE acreage by project component is shown in Table 2.

Table 2. Phase I APE by project component.

	Acres
Turbines	90.0
Substation	9.1
Collection Lines and Access Roads	253.2
Total	**352.3**

Stage II

Due to the presence of mound sites within the APE, the wind project layout had to change in order to avoid these areas. There was also a change in substation location, as well as the O&M building, turnouts and crane paths which were added to the design layout. The final layout of the proposed project consists of the 18 wind turbines, an O&M building, a substation, 15.28 miles of collector lines, 4.65 miles of access roads, and 8.82 miles of crane paths. A 5-acre block was typically centered on the turbine locations. Additional area for assembling and dismantling cranes was required for seven turbines, resulting in blocks of up to 9 acres (WT-4, 5, 8, 12, 13, 17, and 18). The collector lines, access roads and crane paths overlapped and ran parallel with one another. As such, the proposed routes were buffered 50' on either side of the lines resulting in a survey corridor that measured between 100' and 175' wide. In addition, turnouts along existing roads were surveyed and included with the access road acreage calculation in the table below. The proposed project covers approximately 361.4 acres with a total of 224.9 acres surveyed during the current inventory. For the final layout, 136.5 acres were surveyed during Phase I. The breakdown of the APE acreage by project component is shown in Table 3.

Table 3. Phase II APE by project component.

	Acres
Turbines	107.4
Substation	0.6
O&M Building	5.0
Collection Lines, Crane Paths and Access Roads	248.4
Total	**361.4**

The Palmer's Creek Wind Project when completed will generate approximately 44.6 MW of electricity, and will consist of 18 turbines. Two will be 2.3MW GE generators while the turbines will have an 80 meter hub height (WT-14 and WT-15), and 16 will be 2.5MW GE generators with a 90 meter hub height for the rest of the turbines.

Objective

WAPA is the lead agency on this project due to the interconnection between this project and WAPA's existing Granite Falls Substation (Western) transmission line. Due to WAPA's participation in the project, the applicant must comply with Section 106 of the National Historic Preservation Act (NHPA). The NHPA requires the applicant to consider what effects the undertaking will have on historic properties within the APE. The three central objectives of this study are to assist the proponent with their Section 106 compliance obligations, identify and assess project impacts to cultural resources located within the APE, and to provide National Register of Historic Places (NRHP) recommendations for historic properties encountered within the APE. Cultural resources consist of any historic and prehistoric district, site, building, structure, or object (usually) over 50 years of age.

The proposed project area was inventoried to comply with state and federal regulations to locate any historic properties within or around the proposed project area, which may be affected by the proposed project. This allows the Proponent to plan construction to minimize impact to any NRHP eligible historic properties.

Project Environmental Setting

The Minnesota State Historic Preservation Office (SHPO) has divided the state into nine archaeological regions, which includes sub-sections of north (N), south (S), east (E) and west (W). The archaeological regions are defined by physical environmental characteristics, since the availability of natural resources affects the types and distribution of pre-contact sites (Arzigian 2008:4).

The survey area is located within archaeological region #2, known as the Prairie Lake Region. The region is split into two subsections: 2N and 2S. The Prairie Lake Region is located in southwestern and south central Minnesota, which lies between the Great Plains and the eastern Woodlands (Anfinson 1997:1). The region does extend into northeastern South Dakota and north-central Iowa. Ice sheets leaving thick mantles of drift covered the region. The landforms are the result of the most recent glaciation with numerous shallow lakes and tallgrass prairie vegetation. Trees are rare and located in river-bottoms along major river valleys, peninsulas, islands and isthmuses at major lakes (Gibbon 2002:3.4.2). There are small areas of marsh, wetland prairie and wet meadows.

The major topographic features are the Minnesota River trench and the scarp of the Prairie des Coteau highland in the west. Bedrock outcroppings are rare except for some deep cuts in the Minnesota River valley (Gibbon 2002:3.4.2). The climate has been relatively stable over the last 5,000 years in this region (Anfinson 1997:9). The climate is dry with low precipitation and dry westerly winds. These conditions made fires more frequent in pre-contact times. The northern portion (sub-section 2N) of the Prairie Lake region has deep-water sediment left by Glacial Lake Agassiz and more lakes than the southern region (sub-section 2S). The northern part is also heavily farmed. The southern part has few lakes but major rivers that include Lac Qui Parle, Yellow Medicine, and Redwood (Arzigian 2008). Due to the many shallow lakes in this region, there are extensive populations of muskrats, waterfowl, fish and edible plants such as water lilies and cattails. Wild rice was primarily limited to the Minnesota River valley and a few northern and eastern lakes (Gibbon 2002:3.4.2).

Culture History Overview

The proposed project area is in the Prairie Lake Region (Region 2), which is in southwestern and south central Minnesota. The counties in this region include Big Stone, Blue Earth, Brown,

Carver, Chippewa, Cottonwood, Faribault, Freeborn, Jackson, Lac Qui Parle, Le Sueur, Lyon, McLeod, Martin, Nicollet, Redwood, Renville, Scott, Sibley, Stevens, Swift, Watonwan, and Yellow Medicine, as well as portions of Douglas, Grant, Kandiyohi, Lincoln, Meeker, Nobles, Otter Tail, Pipestone, Pope, Rice, Steele, Traverse, and Waseca counties. From a regional perspective, material cultural from any cultural period (Paleo-Indian to modern) could be expected to be encountered in any archaeological region.

The cultural periods describe different prehistoric and historic sites that are known from various times in the past in different parts of the state. They provide the comparative background information needed for the management of historic properties. Although not necessarily applicable to this particular project, the descriptions cover trends within the Prairie Lake Region as a whole with notable sites specific to the region. The general prehistoric and historical periods encountered in Minnesota are as follows.

Native American Cultural Background:

Paleo-Indian Period (ca. 10,000 to 6,000 BCE)

As glaciers receded from the Upper Midwest, migratory groups of people settled throughout the area's open woodlands and grasslands, hunting native herding animals such as bison and mastodon, and likely exploiting available small-game, fish and plant resources as well. In addition to distinctive, lanceolate projectile points (Clovis, Folsom and Plano types), the tool kits included large, bifacially flaked knives, simple choppers and large scrapers. Settlement patterns are virtually unknown due to the low amount of sites. There are very few Paleo-Indian sites found in Minnesota, but some notable sites within the prairie lake region are the Browns Valley site (21TR5) and the Hildahl site (21YM35) (Minnesota Office of State Archaeologist [MNOSA] n.d. and Anfinson 1997:30-31).

Archaic Period (ca 6,000 to 800 BCE)

Groups during this era continued to rely on large game hunting, along with increasingly diversified technologies associated with hunting, trapping, fishing, foraging, woodworking and plant processing. This diversification of culture and associated technologies reflects more highly regionalized adaptation to local environmental conditions as climatic trends shifted to a cooler, wetter configuration. Chipped stone tools, such as side-notched projectile points and ground stone implements were used. The use of copper tools is rare in the southwest part of the state but not uncommon in the northwest. Evidence of the exploitation of diverse floral and faunal resources suggests a season-round type subsistence-settlement system, with habitation areas often located along the margins of lakes and major rivers. There is one well-dated archaic site in the region, the Granite Falls Bison Site (21YM47). Over the course of several summer excavations, five bison, three projectile points, a hammer-stone, two basaltic chipping tools, and a lithic reduction area were discovered at this site. There was evidence of butchering marks on the bison limbs (MNOSA n.d. and Anfinson 1997:36-37).

Woodland Period (ca. 800 BCE to 1650 A.D.)

The Woodland period in Minnesota is defined by the presence of ceramics, burial mounds and plant cultivation, but intensive gathering provided the bulk of subsistence needs. Settlement patterns resembled those appearing previously, with particularly intense occupation of stream/lake junctions late in the period. The Woodland period complexes are predominantly identified by ceramics. In this region, it is the Fox Lake Phase and Lake Benton Phase. With the introduction of the bow and arrow during the Late Woodland period, lithics became smaller (known as arrowheads). Burial mounds are present all over Minnesota except the far northeast. Burial treatments were simple and often featured secondary burials (MNOSA n.d. and Anfinson 1997:88). There are significantly more Woodland period sites in this region than in the other time

periods. Notable sites include the Fox Lake Site (21MR2) and the Pederson site 21(LN2), which are the type sites for Fox Lake ceramics and Lake Benton ceramics. The Pederson site is also a multicomponent site that includes artifacts from numerous time periods (Arzigian 2008:72).

Oneota/Plains Village Period (ca. 900 to 1650 A.D)

A new subsistence and settlement pattern emerged with this time period. People were less mobile and started building semi-permanent villages, with many constructed on river valley terraces. Many of the villages were fortified with large storage/trash pits inside. Ceramics became globular and new styles emerged. Arrowheads were small and triangular, with or without notching (Anfinson 1997:89). Horticulture became prevalent as people had a more sedentary lifestyle and seeds as a food source became more important. However, in the prairie lakes region and northern Minnesota, permanent settlements are fewer and not as extensive (Anfinson 1997:119). The complexes associated with the Plains Village are Great Oasis, Cambria, Big Stone and Blue Earth Phase. There are numerous sites within the area but some notable sites are Great Oasis site (21MU2), Cambria site (21BE2) and Shady Dell site (21TR6). These sites are ceramic type sites or multiple component sites (Anfinson 1997).

Historic Period (ca. 1650 to Present)

Early in the historic period, western portions of the state were occupied by Yankton Dakota, while Santee Dakota occupied the east. Ojibwe peoples had largely displaced Dakota in the northeast by the mid-1700s. During the post-contact period, tribal lifeways changed dramatically as groups became involved with Europeans, first through trade and later through warfare (MNOSA n.d).

The region where the project is located was first home to the Dakota Oyate Nation, which they called the area Pejuhutazizi Kapi (the place where they dig for yellow medicine). They occupied the area until the US Dakota Conflict of 1862 when the Dakota people were exterminated, forcibly removed to reservations or voluntarily fled. Many who survived left the assigned reservations to return to the Minnesota River Valley. In 1938, 746 acres of land south of Granite Falls were returned to the Dakota Oyate Nation and the Upper Sioux Indian Community was created. An additional 654 acres was later added for a total of 1,440 acres to the Upper Sioux Community Reservation. (Upper Sioux Community 2017)

Euro-American Cultural Background:

Historic Period (ca. 1650 to Present)

The earliest Euro-Americans to venture into the region were fur traders and explorers. French fur traders had moved into the region by the late 1600s, to be succeeded, in turn, by English and American traders. These early traders depended heavily on the Ojibwe and Dakota peoples, who were the primary trappers. In turn, the European goods had a profound effect on traditional lifeways of the Ojibwe and Dakota. Fort Snelling was established in 1800s at the confluence of the Minnesota and Mississippi Rivers to control the fur trade in the region (Minnesota Historical Society n.d.).

Urban commercial centers formed around the water-powered mills of St. Anthony Falls and the northernmost navigable areas of the Mississippi. Agricultural communities were predominant in the south and west parts of the state, with lumbering the earliest industry in the east and north during the mid- to late 1800s (MNOSA n.d.).

Before the Civil War and US Dakota Conflict of 1862, there were relatively few European settlers in the region. The Homestead Act of 1862 and the development of railroads in the 1870s and 1880s spurred more Europeans to move into the region. Early farming in Minnesota was focused on wheat, with Minnesota leading production in the country in the 1890s. Farms diversified and

prospered from the 1890s until the Great Depression of the 1930s. Recovery of the agricultural economy in the region grew steadily thanks to New Deal programs and increasing demand during World War II. Today, the region still primarily depends on an agriculturally-based economy (MSOSA n.d.).

Granite Falls (1889 to Present)

Granite Falls, Minnesota became a city in 1889 and was named after the granite and gneiss outcroppings along the Minnesota River. Granite Falls is located in Yellow Medicine County and it is the county seat. Henry Hill is known as the founder of Granite Falls but it was his brother Thomas P. Hill who first laid claims to land on the west side of the river. By 1868, Thomas Hill deeded the claim to his brother Henry Hill who now owned land on the west and east of the river bluffs. H. Hill's home was on the east side of the river while he began work on a mill and dam on the west side of the river (City of Granite Falls, MN EDA 2016). H. Hill built a dam, reservoir and flouring mill. Mill operations started in 1872. The mill processed wheat from local farmers while the saw mill cut timber into building lumber. This attracted settlers and soon businesses and homes were booming (The USGen Web Project 2011).

However, crossing the Minnesota River was a big disadvantage. A ferry boat had been established but it was limited in capacity and took time to pull the boat along the ropes. A wagon bridge was built at the north end of town in 1876 and was replaced by a steel one in 1911. The steel bridge was used until 1975 when it was replaced by the bridge used today.

The best-known resident of Granite Falls is Andrew Volstead. Not originally from the town, Volstead moved to Granite Falls in 1886. Volstead was a lawyer, who served as the county attorney and mayor before he was elected to Congress in 1903. Volstead co-wrote the Capper-Volstead Act which allowed the creation of farm cooperatives and the National Prohibition Act (also known as the Volstead Act) to enforce the Eighteenth Amendment. The National Prohibition Act was ratified in 1920 beginning prohibition and was repealed in 1933 ending prohibition (City of Granite Falls, MN EDA 2016).

Phase I Reconnaissance Survey

The report and fieldwork preparation included a review of previously identified cultural resources and intensive pedestrian survey of the APE. The layout of the windfarm changed during the course of fieldwork, and the results are split into the Stage I inventory (the original design), and the Stage II inventory (the updated design).

Literature Search

The file search was conducted at Minnesota SHPO from September 20-22, 2016. Records at the Minnesota SHPO were searched in order to identify all cultural resources and previous surveys within a one-mile radius of the survey area.

The literature search revealed 12 archaeological sites and 90 historical/architectural sites within a one-mile radius of the APE (see Appendix C for tables). Of these previously recorded sites, three archaeological sites, one site lead, and no historical/architectural sites were located within the Stage I APE. After the windfarm design was changed, one archaeological site, one site lead, and no historical/architectural sites were located within the Stage II APE.

The file search results did not reveal any previous archaeological inventories within a one-mile radius of the survey area. Architectural inventories are conducted independently from archaeological inventories, so the 90 historical/architectural sites would have been recorded during an inventory that was not found during the file search. The archaeological sites were recorded on the basis of published information, not from a previous field survey.

Inventory Methodology
The pedestrian survey was performed by lining crew members 10-15 meters apart walking in parallel transects across the APE. When an archaeological feature was identified, the location was marked with pin-flags and the surrounding area was intensely surveyed for additional historic properties to determine the size and nature of the resource. When the nature of the resource was determined, the appropriate site forms were filled out, and site boundaries and features were plotted with a GPS. These GPS points were later brought into GIS software where site maps and sketch maps were created.

Shovel tests were conducted in areas where ground surface visibility (GSV) dropped below 25% and in high probability areas where there was a good to moderate potential to contain archaeological sites. Shovel tests were not conducted in areas that are usually inundated or located on slopes greater than 20 degrees (Anfinson 2005:29). The shovel tests were situated at 15m intervals in areas with less than 25% visibility and/or in areas with a high probability for cultural resources. Since probes were placed at 15m intervals, radial probes around positive shovel probes were placed at 7.5m and 15m in the cardinal directions around a positive probe, with additional probes every 7.5m until two negatives were encountered. All dirt excavated was screened through ¼" mesh for cultural material.

Field Notes
Throughout the survey, field notes and overview pictures of the survey area were taken (see photos in Appendix A). Field observations were recorded as field notes in a bound notebook, portions of which were transcribed into sections of this report. Digital photographs were taken, are on file at Beaver Creek Archaeology, and are included in this report. Copies of maps, field notes, and photographs are located at the BCA main office in Bismarck, North Dakota. This report is printed on acid-free paper.

Site Evaluation Criteria
To be eligible for inclusion on the National Register of Historic Places (NRHP), a site must usually be more than fifty years old, retain its integrity of location, design, setting, materials, workmanship, feeling, and association and it must meet one of the following criteria:

(a) Associated with events that have made a significant contribution to the broad patterns of our history; or
(b) Associated with the lives of persons significant in our past; or
(c) Embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinctions; or
(d) Have yielded, or may be likely to yield, information important in prehistory or history.

Project Personnel
<u>*Stage I-*</u> BCA archaeologists and Tribal Cultural Specialists (TCS) conducted the Phase I Reconnaissance survey of the proposed project from November 14 to 17, 2016. Wade Burns is the Principal Investigator for the project. The BCA field crew consisted of Lindsey Reiners (Field Director), Catherine Bohner (Staff Archaeologist), and Tara Friend (Staff Archaeologist). Lindsey Reiners prepared the site forms while Gregory Erickson (GIS Coordinator) prepared the site form maps and project maps.

WAPA initiated tribal consultation with seven tribes; Prairie Island Indian Community, Upper Sioux Indian Community, Lower Sioux Indian Community, Spirit Lake Nation, Sisseton-Wahpeton Oyate Tribe, Flandreau Santee Sioux Tribe and Santee Sioux Tribe. In previous surveys, BCA has found that having tribal representatives participate in the archaeological survey

helps protect and avoid archaeologically and tribally important sites, so one Tribal Cultural Specialist (TCS) was invited from each consulting tribe to participate. Spirit Lake Nation was able to send one TCS, Ryan Longie. Since none of the other consulting tribes had an available TCS, BCA asked TCS from tribes with whom BCA had worked in the past who had a Sioux affiliation to participate in the survey. The TCS included Dylan Youpee and Colma 'Jason' Dupree from the Fort Peck Assiniboine and Sioux Tribes, and Russell Red Horn, an enrolled member of the Pine Ridge reservation who serves as a TCS for multiple Tribal Historic Preservation Offices in the area.

Tribal participation in the archaeological survey is not intended to substitute for the consultation process or for independent tribal survey. The consulting tribes will still have the right to pursue their own tribal inventories separately from the archaeological process.

Stage II- BCA archaeologists and a tribal monitor conducted the Phase I Reconnaissance survey of the proposed project from February 15 to 16, 2017. The field crew consisted of Lindsey Reiners (Field Director), Catherine Bohner (Staff Archaeologist), and Brittany Brooks (Staff Archaeologist). Lindsey Reiners and Brittany Brooks prepared the site forms while Gregory Erickson (GIS Coordinator) prepared the site form maps and project maps.

Dylan Youpee (Fort Peck) was the TCS for the Stage II survey. Owing to the short notice and narrow window of amenable conditions for the winter fieldwork, BCA invited one of the TCS who participated in the Stage I survey to return. Moreover, since the Stage II inventory was conducted in winter conditions, BCA did not anticipate completing shovel probes at the time due to the frozen conditions. BCA will invite the consulting tribes to participate in the addendum project, which will include the shovel probes needed to complete the Phase I inventory for the Stage II APE.

Survey Conditions

The project area is located in the rolling hills within the Prairie Lake Region of Minnesota. The elevation of the project area is approximately 1,040' AMSL. In November 2016 (Stage I), the weather conditions consisted of overcast and partly cloudy skies while the temperature was approximately 45°F. In February 2017 (Stage II), the weather conditions consisted of sunny and overcast skies while the temperature was approximately 37°F. The survey area is located in agricultural fields and rangeland. Vegetation in the area consists of corn, soybeans and native and non-native grasses, plants, forbs, trees and shrubs. The GSV ranged from 75-90% in the agricultural fields and 0-50% in rangeland. Shovel tests were dug in areas with 0-25% GSV or in an area with a high probability of cultural material.

Results

Stage I

The Stage I survey covered a total of 352.3 acres. The location of the APE can be seen on the map in Appendix B. The APE consisted of 18 wind turbines, 13.97 miles of collector lines, and 4.93 miles of access roads. The substation was located in 116N 39W Section 28 located next to the existing substation. The O&M building and crane paths had yet to be determined. The Phase I Reconnaissance survey was conducted from November 14 to November 17, 2016. During the pedestrian survey, three previously recorded sites (21CP9, 21CP10 and 21CP11) and one site lead (21CPa) were revisited, and one additional site was recorded (21CP77). During the shovel testing, one new site was recorded (21CP78). While the pedestrian survey was completed, shovel tests in all of the high probability areas identified could not be finished, because work had to be ceased after a snowstorm on November 18, 2016.

Due to low GSV and high potential for archaeological sites, forty-nine shovel tests were implemented in five different areas within the APE, including uplands near stream crossings and fallow land along the bluffs overlooking the Minnesota River. Shovel tests were profiled when the soils changed. Four shovel tests were profiled (Appendix D). The soils were very consistent at each location, with two locations on the west edge end of the same drainage exhibiting similar soils despite being on different collector lines. The shovel test data is displayed below in tabular format (Table 4).

Only one of the 49 shovel tests was positive for cultural material. A single flake and two pieces of raw material were found within the first 10 cm. Six radials were dug and all radials were negative. Since no other artifacts or features were found, the site has been recommended not eligible for the NRHP. A site form was submitted to MN SHPO, and the flake location was recorded as site 21CP78.

Table 4. Shovel test data.

ST #	Depth (cm)	Width (cm)	Cultural Materials	Location T-R-S	Profile	Archaeologist
1	80	40	negative	116N-39W-9	like profile #1	C. Bohner & R. Longie
2	80	40	negative	116N-39W-9	like profile #1	T. Friend & R. Red Horn
3	40	35	negative	116N-39W-9	like profile #1	T. Friend & R. Red Horn
4	42	35	negative	116N-39W-9	profile #1	C. Bohner & R. Longie
5	40	38	negative	116N-39W-9	like profile #1	C. Bohner & R. Longie
6	40	40	negative	116N-39W-9	like profile #1	T. Friend & R. Red Horn
7	40	40	negative	116N-39W-9	like profile #1	C. Bohner & R. Longie
8	35	40	negative	116N-39W-9	like profile #1	T. Friend & R. Red Horn
9	60	40	negative	116N-39W-28	profile #2	T. Friend & R. Longie
10	40	38	negative	116N-39W-28	like profile #2	C. Bohner & R. Red Horn
11	58	44	negative	116N-39W-28	like profile #2	L. Reiners, D. Youpee, & C. Dupree
12	40	30	negative	116N-39W-28	like profile #2	R. Red Horn
13	41	39	negative	116N-39W-28	like profile #2	L. Reiners, D. Youpee & C. Dupree
14	52	38	negative	116N-39W-28	like profile #2	L. Reiners, D. Youpee & C. Dupree
15	Not dug due to slope greater than 20 degrees					
16	38	35	negative	116N-39W-28	like profile #2	L. Reiners, D. Youpee & C. Dupree
17	50	37	negative	116N-39W-28	like profile #2	T. Friend & R. Longie
18	40	36	negative	116N-39W-28	like profile #2	T. Friend & R. Longie
19	30	30	negative	116N-39W-28	like profile #2	T. Friend & R. Longie
20	40	40	negative	116N-39W-28	like profile #2	T. Friend & R. Longie
21	Not dug due to slope greater than 20 degrees					
22	Not dug due to slope greater than 20 degrees					
23	30	30	negative	116N-39W-28	like profile #2	C. Bohner & R. Red Horn
24	38	40	negative	116N-39W-28	like profile #2	L. Reiners, D. Youpee & C. Dupree
25	32	35	negative	116N-39W-28	like profile #2	L. Reiners, D. Youpee & C. Dupree
26	37	38	negative	116N-39W-28	like profile #2	T. Friend & R. Longie
27	31	54	negative	116N-39W-28	like profile #2	C. Bohner & R. Red Horn
28	44	34	negative	116N-39W-28	like profile #2	C. Bohner & R. Red Horn
29	31	30	negative	116N-39W-28	like profile #2	C. Bohner & R. Red Horn
30	Not dug due to slope greater than 20 degrees					
31	Not dug due to slope greater than 20 degrees					
32	38	33	negative	116N-39W-21	like profile #2	C. Bohner & R. Red Horn
33	54	35	negative	116N-39W-20	like profile #2	L. Reiners, D. Youpee & C. Dupree
34	40	40	negative	116N-39W-20	like profile #2	T. Friend & R. Longie
35	55	40	negative	116N-39W-20	profile #3	T. Friend & R. Longie
36	35	30	negative	116N-39W-21	like profile #2	C. Bohner & R. Red Horn
37	41	37	negative	116N-39W-21	like profile #2	L. Reiners, D. Youpee & C. Dupree
38	53	40	negative	116N-39W-21	like profile #3	T. Friend & R. Longie
39	65	30	negative	116N-39W-21	like profile #2	L. Reiners, D. Youpee & C. Dupree
40	48	40	negative	116N-39W-20	like profile #4	T. Friend & R. Longie

ST #	Depth (cm)	Width (cm)	Cultural Materials	Location T-R-S	Profile	Archaeologist
41	50	38	1 flake	116N-39W-20	profile #4	C. Bohner & R. Red Horn
42	48	40	negative	116N-39W-20	like profile #4	L. Reiners, D. Youpee & C. Dupree
43	47	37	negative	116N-39W-20	like profile #4	T. Friend & R. Longie
44	38	40	negative	116N-39W-20	like profile #4	l. Reiners, D. Youpee, C. Dupree
45	50	40	negative	116N-39W-20	like profile #4	T. Friend, R. Red Horn & R. Longie
46	50	40	negative	116N-39W-20	like profile #4	T. Friend, R. Red Horn & R. Longie
47	38	38	negative	116N-39W-20	like profile #4	L. Reiners, D. Youpee, C. Dupree
48	34	36	negative	116N-39W-20	like profile #4	C. Bohner & R. Red Horn
49	43	38	negative	116N-39W-20	like profile #4	T. Frined & R. Longie

Five sites (21CP9, 21CP10, 21CP11, 21CP77 and 21CP78) and one site lead (21CPa) are located within the Stage I APE (Table 5). Previously recorded sites 21CP9 and 21CP10 are mound sites that are recommended unevaluated to the NRHP. Avoidance was recommended for both sites. Previously recorded site 21CP11 was a mound site that was destroyed by a substation. It is recommended not eligible to the NRHP, therefore no avoidance is necessary. Site lead 21CPa is a gravel pit that has been recommended unevaluated. Though the site lead is recommended unevaluated for the NRHP, no avoidance is necessary for the portion of the site lead located within the APE as no evidence of a gravel pit is located within the APE. Newly recorded site 21CP77 consists of six foundations and one barn, while newly recorded site 21CP78 consists of one flake. Although none of these newly recorded sites were formally evaluated for NRHP eligibility, BCA recommended sites 21CP77 and 21CP78 as not eligible to the NRHP, therefore no avoidance is recommended.

Table 5. Summary of sites and site lead within Stage I survey area.

Site Number	Affiliation	Description	NRHP Evaluation	Avoidance Measures
21CPa	Unknown	Site Lead: Gravel Pit NW of Granite Falls	Unevaluated	No avoidance necessary
21CP9	Unknown	Mounds	Unevaluated	Avoidance
21CP10	Unknown	Mounds	Unevaluated	Avoidance
21CP11	Unknown	Mounds	Ineligible	No avoidance
21CP77	Historic/ Architectural	Six foundations and one barn	Not eligible	No avoidance necessary
21CP78	Historic/ Architectural	One flake	Not eligible	No avoidance necessary

In addition, some modern trash and historic machinery was located near existing farmsteads. Porcelain bath tub pieces were located in a plowed field and a abandoned manure spreader was found in a tree row. The manure spreader has steel wheels, suggesting a manufacture date between the 1920s-1940s. Following the MN SHPO site form instructions, the equipment was not recorded as it was not an exceptional artifact and it was not associated with historical archaeological features.

Stage II

Due to the presence of three mound sites located within the Stage I APE, the wind project layout was moved to avoid these locations. In addition, the updated design removed the collector line that ran along the high probability bluff overlooking the Minnesota River, the substation was relocated, and the O&M building location was determined.

The location of the Stage II APE can be seen on the map in Appendix B. The APE consisted of 18 wind turbines, 15.28 miles of collector lines, 4.65 miles of access roads, 8.82 miles of crane paths, a substation, turnouts and an O&M building. The Phase I Reconnaissance survey was conducted on February 15 and 16, 2017.

The Stage II inventory consisted of pedestrian survey only. One turnout was submerged in water from melting snow, so it was unable to be surveyed. No shovel probes could be implemented, since the ground remained frozen, but shovel probes will need to be placed at high-probability stream crossings where shovel probes were not conducted during the Stage I inventory. An addendum to this report including the turnout APE and shovel tests results will be submitted.

One previously recorded site and one previously recorded site lead are located within the Stage II APE: site lead 21CPa and site 21CP11. Site lead 21CPa is recorded as the possible location of a gravel pit NW of Granite Falls. No evidence of a gravel pit was seen and no avoidance is required for the site lead. Site 21CP11 was a mound site that was destroyed by the existing substation and has been recommended not eligible to the NRHP. No avoidance is recommended for the site. One site recorded during the Stage I survey is located adjacent to the Stage II APE. Site 21CP78 a single flake that has been recommended not eligible to the NRHP and no avoidance is required for this site.

As a result of the Stage II pedestrian inventory, one new historical and architectural site (21CP79) was recorded. The site has been recommended ineligible to the NRHP and no avoidance is required. In addition, a light scatter of historic cultural material and a piece of workable lithic raw material were found but were not recorded as sites, following MN SHPO site form instructions.

Historic cultural material was encountered south of a farmstead in an agricultural field. Four pieces of brown and clear bottle glass, a metal belt buckle, a piece of metal scrap, as well as modern plastic refuse. Per the MN SHPO site form instructions, thin scatters of historic cultural material in plowed fields without potential to yield significant data about the past do not warrant recordation on a site form.

A small piece of quartz was found in a rodent burrow in horse pasture. Though a knappable material, it did not show any clear signs that it had been worked. A significant amount of gravel was present in the rodent mounds, and the material was determined to be natural. Shovel probes will need to be conducted in the pasture, but the ground was frozen at the time of inventory.

Summary/Recommendations

The Proponent has proposed the construction of a wind project in Chippewa County, Minnesota. In order to accomplish this, the Proponent hired BCA to conduct a file search, complete a Phase I reconnaissance cultural resource inventory, and write a cultural resource survey report for submittal to SHPO and WAPA.

The project design was changed while BCA was conducting the Phase I inventory. As such, the two layouts were designated Stage I and Stage II, with both APEs pictured on the map in Appendix B. Two unevaluated mound sites were located within the Stage I APE, and the Stage II layout was designed to avoid these cultural resources.

The literature search revealed 12 archaeological sites and 90 historical/architectural sites within a one-mile radius of the APE. Of these, one archaeological site (21CP11), one site lead (21CPa), and no historical/architectural sites were located within the final (Stage II) APE. A site consisting of a single flake (21CP78) that was recorded during the Stage I inventory was located within the Stage II APE. During the Stage II inventory, one additional historical/architectural site (21CP79)

was recorded. Sites 21CP11, 21CP78 and 21CP79 are recommended not eligible to the NRHP and avoidance is not required. As such, the Stage II APE avoids all known eligible or unevaluated cultural resources.

At the time of the Stage II inventory, the ground was frozen, so shovel tests were unable to be conducted. In addition, one turnout was submerged in water from melting snow and could not be surveyed. Consequently, additional work is required before BCA can make a recommendation if the project will impact historic properties. An addendum to this report including the turnout APE survey and shovel tests results will be submitted after the work is completed.

In addition to the Phase I inventory, BCA will conduct an architectural inventory of historic properties near the project area and a viewshed analysis evaluating the potential visual impact to historic properties and tribally significant properties near the project area. The results of these studies will be included in separate reports.

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Appendix A: APE Photographs

Figure 1. Stage I overview photo of the APE in 116N 39W Section 17. View is to the west.

Figure 2. Stage I overview photo of the APE 116N 39W Section 8. View is to the west.

Figure 3. Stage I overview photo of the APE 116N 39W Section 7. View is to the northeast.

Figure 4. Stage I overview photo of the APE 116N 39W Section 8. View is to the northeast.

Figure 5. Stage I overview photo of the APE 116N 39W Section 16. View is to the north.

Figure 6. Stage I overview photo of APE 116N 39W Section 21. View is to the northwest.

Figure 7. Stage I overview photo of marsh area in APE 116N 39W Section 8. View is to the southwest.

Figure 8. Stage I and II overview photo of field clearing piles. View is to the south.

Figure 9. Stage I modern trash (bath tub pieces) located in 116N 39W Section 20 close to existing farmstead.

Figure 10. Stage I photo of manure spreader located in 116N 39W Section 18. View is to the north.

Figure 11. Stage II overview photo of O & M building. View is to the north.

Figure 12. Stage II overview photo of Substation. View is to the south.

Figure 13. Stage II overview of APE 116N 39W Section 21. View is to the northwest.

Figure 14. Stage II overview of APE 116N 39W Section 9. View is to the northwest.

Figure 15. Stage II overview photo of historic cultural material 116N 39W Section 17. One buckle and one scrap of metal.

Figure 16. Stage II overview photo of historic cultural material 116N 39W Section 17 Two pieces of bottle glass.

Appendix B: Maps

Beaver Creek
ARCHAEOLOGY

Palmers Creek Wind Project
Fagen Engineering
Project Located in:
Chippewa County, Minnesota

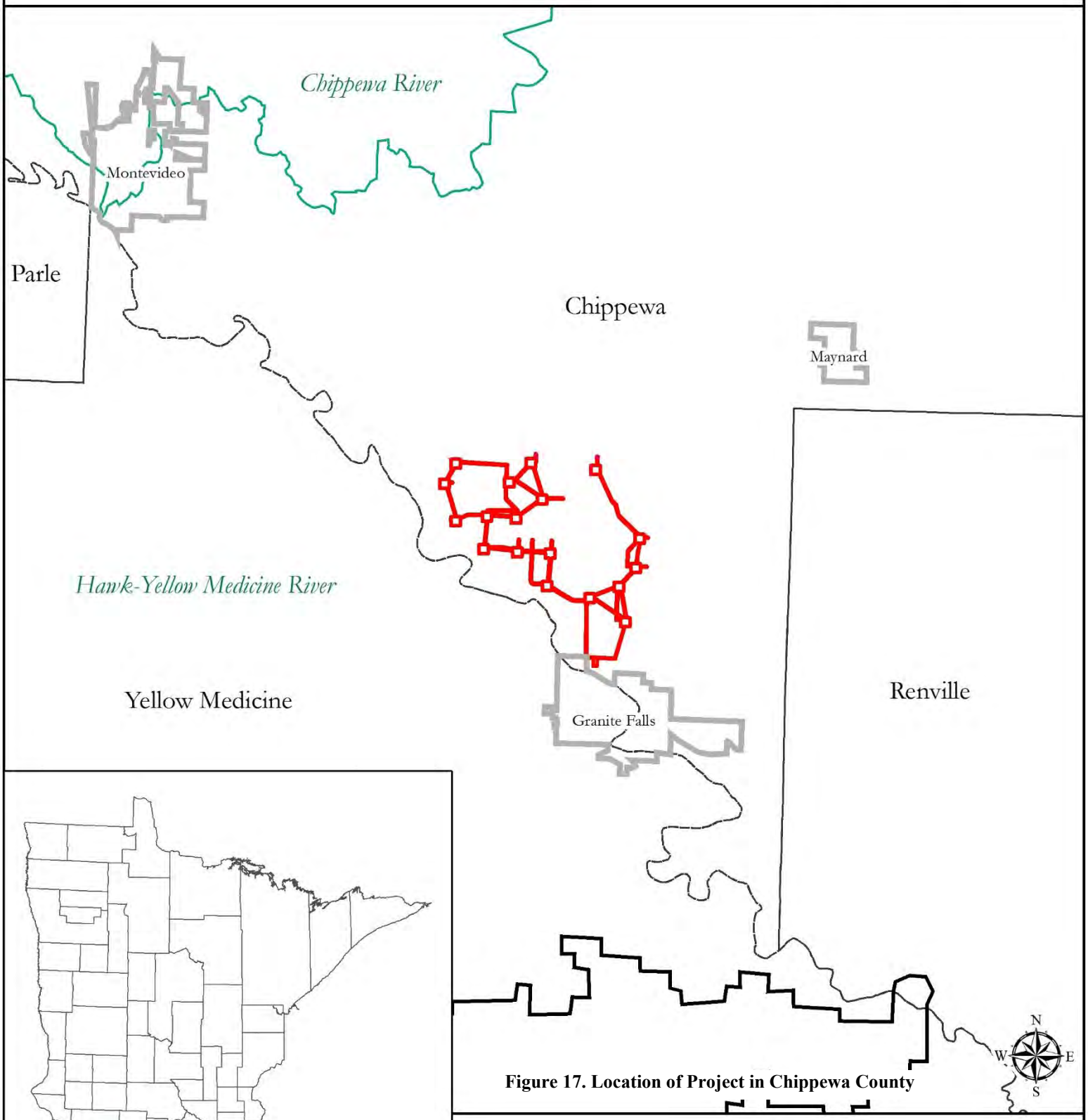


Figure 17. Location of Project in Chippewa County

0 1,200 2,400 4,800 7,200 9,600 Meters
0 0.75 1.5 3 4.5 6 Miles

Base Map: USGS 7.5'
Scale: 1:150,000
UTM NAD83 Zone 15

GE

Palmers Creek Wind Project Area

For: Fagen Engineering

T116N R40W; T116N R39W

Asbury/Granite Falls Quad. Map

Hawk-Yellow Medicine Drainage

Chippewa County, Minnesota

Legend

- Phase II Survey Area (361 acres)
- Not Surveyed-Under Water
- Turbines
- Substation/OM/Laydown
- 1 Mile Buffer
- Phase 1 Survey Area (352 acres)

Cultural Resources

- Eligible/Unevaluated Site
- Ineligible/Isolated Find
- Unevaluated Site Lead
- Historical/Architectural Sites

0 210 420 840 1,260 1,680 Meters

0 0.125 0.25 0.5 0.75 1 Miles

Figure 18. Project Map Showing Phase I and Phase II Survey Areas

Beaver Creek ARCHAEOLOGY

Base Map: USGS 7.5'
Scale: 1:24,000
UTM NAD83 Zone 15

Appendix C: Site Tables

Table 6. Summary information on Historic/Architectural sites recorded within a one-mile radius of the survey area.

SITS #	Location			Affiliation	Description	Recorder	NRHP Status
	Twp	R	S				
CP-GRT-2	116	39	4	Historical/Architectural	Christian Haakenson Farmstead	Unknown	Unevaluated
CP-GRT-3	116	39	6	Historical/Architectural	Olof Swennson Farmstead	Unknown	Unevaluated
CP-GRT-4	116	39	6	Historical/Architectural	Farmstead	Unknown	Unevaluated
CP-GRT-5	116	39	6	Historical/Architectural	Farmstead	Unknown	Unevaluated
CP-GRT-6	116	39	6	Historical/Architectural	Sparta First Norwegian Baptish Church	Unknown	Unevaluated
CP-GRT-7	116	39	27	Historical/Architectural	Bernt Frederickson House	Unknown	Unevaluated
CP-GRT-8	116	39	10	Historical/Architectural	Bridge	Unknown	Unevaluated
CP-GRT-9	116	39	16	Historical/Architectural	Bridge	Unknown	Unevaluated
CP-LEE-10	117	39	33	Historical/Architectural	Bridge	Unknown	Unevaluated
XX-BRI-8	116	39	28	Historical/Architectural	Bridge	Unknown	Unevaluated
XX-RVR-8	116	39	19	Historical/Architectural	Minnesota River Channerl Northwest of Granite Falls	Unknown	Unevaluated
	116	39	33	Historical/Architectural	20 History/Architecture Inventory		
	116	39	34	Historical/Architectural	59 History/Architecture Inventory		

Table 7. Summary information on Archaeological sites recorded within a one-mile radius of the survey area.

SITS #	Location			Affiliation	Description	Recorder	NRHP Status
	Twp	R	S				
21CPa	116	39	28	1965	Gravel Pit	Unknown	Unevaluated
21CPb	116	39	34	1965	Granite Falls Mill, Henry Hill's Mill	Unknown	Unevaluated
21CPi	116	40	11	Unknown	Earthworks	NA	Unevaluated
21CP9	116	39	18	Unknown	Earthwork, Mound (Harold Schuler)	NA	Unevaluated
21CP10	116	39	21	Unknown	Earthwork, Mound (Conard Tjosvold I)	NA	Unevaluated
21CP11	116	39	28	Unknown	Earthwork, 3 Mounds 2 Linear (Stanley Minsaas I), Destroyed	NA	Ineligible
21CP12	116	39	28	Unknown	Earthwork, Mounds and Habitation, Lithics (Stanley Minsaas II)	SAS/MHS	Unevaluated
21CP13	116	39	21	Unknown	Earthwork, Mound (Conard Tjosvold II)	NA	Unevaluated
21CP60	116	39	16	Pre-Contact (9500-1650 BC)	Isolated: Debitage	P. Trocki	Ineligible
21CP61	116	39	16	Pre-Contact (9500-1650 BC)	Isolated: Debitage	P. Trocki	Ineligible
21CP62	116	39	16	Pre-Contact (9500-1650 BC)	Isolated: Debitage	P. Trocki	Ineligible
21YM104	116	39	29	Pre-Contact (9500-1650 BC)/Post Contact	Lithic Scatter: Projectile Points' Folsom point-Paralledl Pointed (Site Destroyed)	K. Wolf & B. Koenen	Ineligible

Appendix D: Soil Profiles

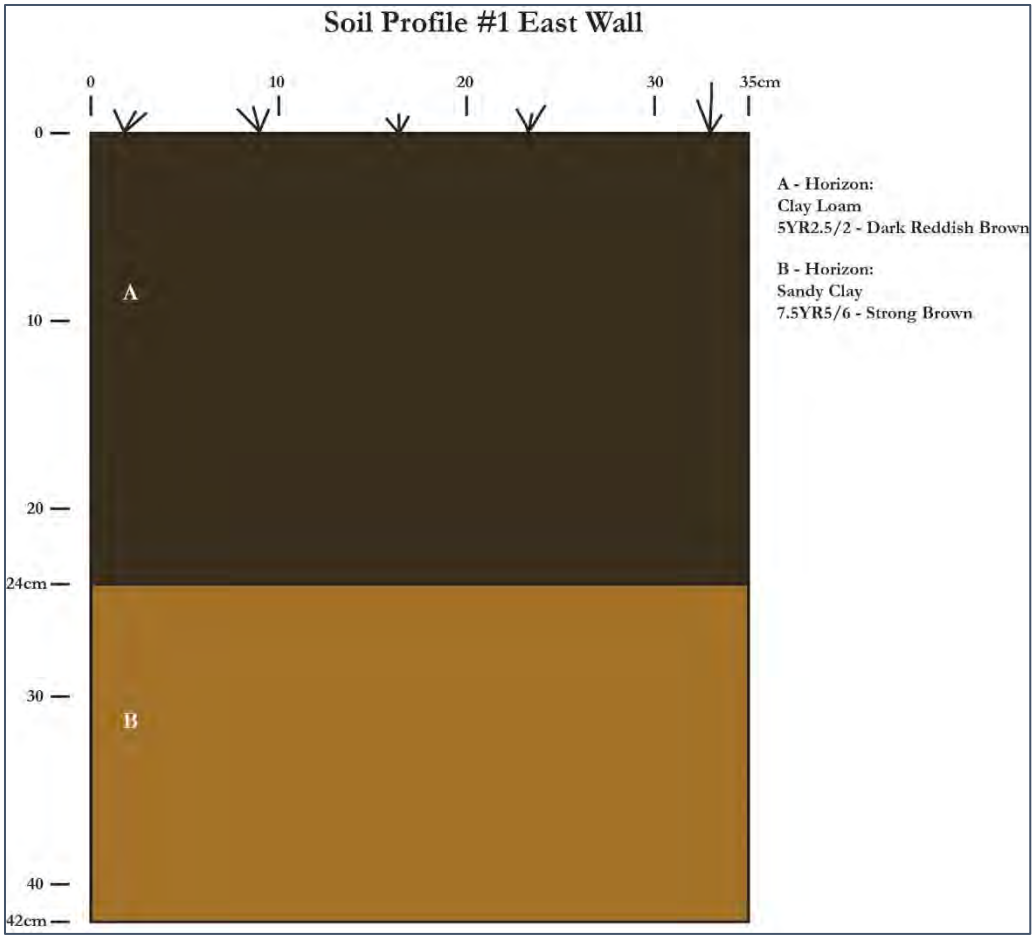


Figure 19. Soil profile #1 of the east wall.

Figure 20. Shovel profile #1 of the east wall.

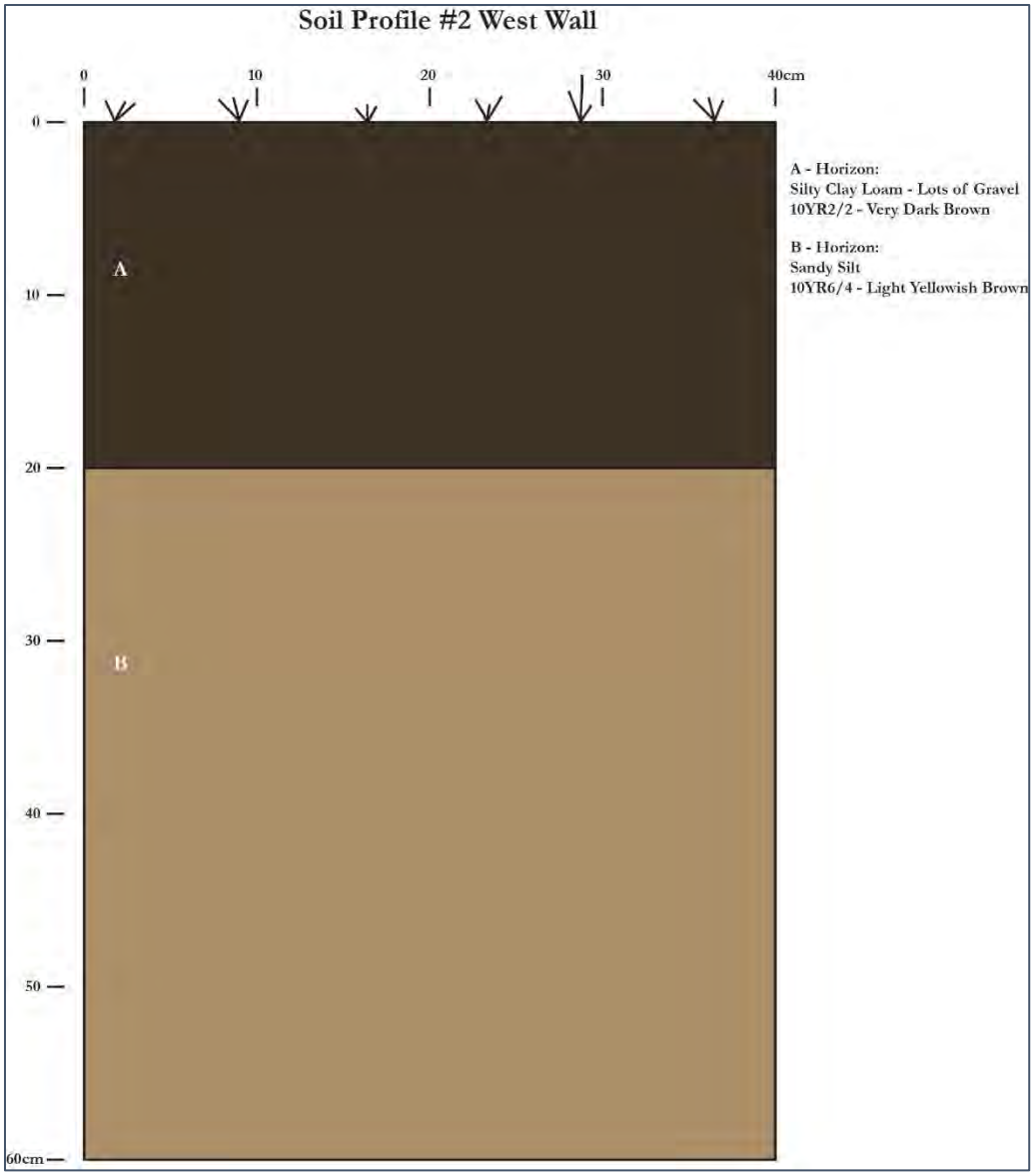


Figure 21. Soil profile #2 of the west wall.

Figure 22. Soil profile #2 of the west wall.

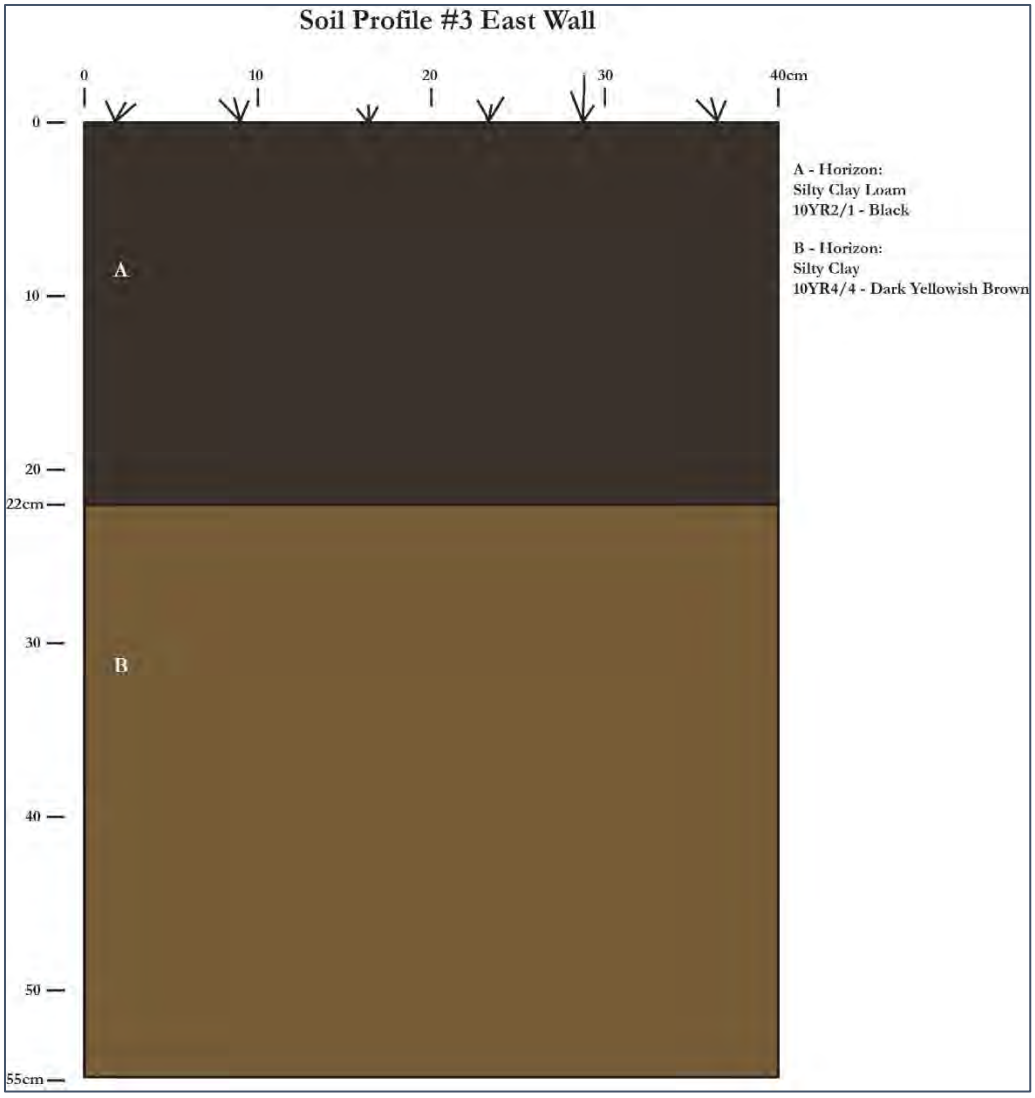


Figure 23. Soil profile #3 of the east wall.

Figure 24. Soil profile #3 of the east wall.

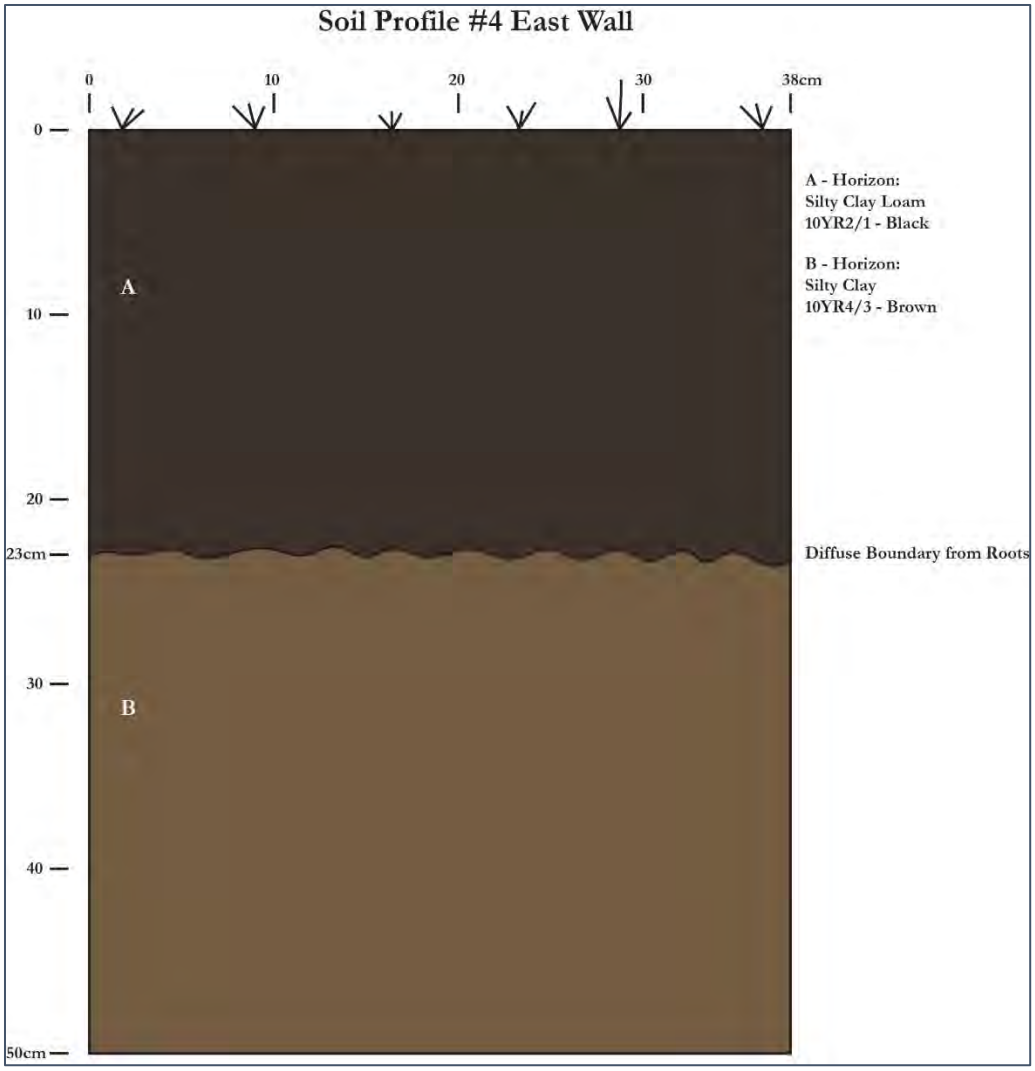


Figure 25. Soil profile #4 of the east wall.

Figure 26. Soil profile #4 of the east wall.

Appendix E: Site Descriptions

Previously Recorded Sites

Site 21CP9, the Harold Schuler site, is the location of archaeological mounds based on a publication by Winchell from 1911. The site form consists of page 203 from Winchell's book with the legal location description and a United States Department of the Interior Geological Survey map of the site. No other information is included on the site form, and neither book title nor references were provided. The site is recommended unevaluated to the NRHP as it has not been fully evaluated.

During the current inventory, the site was noted to be in an agricultural field. Several small hills were located within the area, which may have been mounds that were obfuscated by continual plowing, but no definite mound features were observed. Plowing had exposed glacial till (the lighter color of soil in the photographs) on the hill tops. No cultural material or human remains were found on the surface. While no definite mound features could be confirmed, additional work would be needed to evaluate the site. Due to the archaeological and tribal significance of mounds, the site remains unevaluated to the NRHP and avoidance is recommended.

The proponent made changes to the APE, so this site will no longer be impacted by the proposed project.

Figure 27. Site 21CP9 overview to the northwest.

Site 21CP10, the Conrad Tjosvold I site, is a mound site that is based on a book reference by Winchell from 1911. The site form consists of page 203 from Winchell's book with the legal location description and a United States Department of the Interior Geological Survey map of the site. No other information is included on the site form, and neither book title nor references were provided. The site is recommended unevaluated to the NRHP as it has not been fully evaluated.

During the current inventory, the site was noted to be in an agricultural field on an upland plain. No cultural material, human remains or mounds were noted on the surface. While no definite mound features could be confirmed, additional work would be needed to evaluate the site. Due to the archaeological and tribal significance of mounds, the site remains unevaluated to the NRHP and avoidance is recommended.

The proponent made changes to the APE, so this site will no longer be impacted by the proposed project.

Figure 28. Site 21CP10 overview to the northwest.

Site 21CP11, the Stanley Minsaas I site, is a mound site that is based on a book reference by Winchell from 1911. A field check was conducted in May of 1978 and a power plant substation was noted in the located of the site. The substation covers most of quarter quarter section, and extensive disturbances including substantial leveling and filling for construction would have destroyed the features and any potential cultural material. As such, the site was recommended not eligible to the NRHP.

During the current inventory, the site location was revisited. The substation remains and is surrounded by agricultural fields. No cultural material or potential mound features were observed. The site remains not eligible to the NRHP and no avoidance is recommended.

Figure 29. Site 21CP11 overview to the northwest**.**

Site 21CPa is a site lead for a gravel pit northwest of Granite Falls. Its site name is Stanley Minsaas III and it is marked on a United States Department of the Interior Geological Survey map 1965. No other information is forth coming from the file search or the map. The site lead has been recommended unevaluated for the NRHP, until the entire site lead boundary area has been inventoried or the actual location of the gravel pit has been determined.

During the stage I and stage II surveys, no evidence of the site lead was found within the APE. The APE portions located within the site lead are agricultural fields. Though the site lead is recommended unevaluated for the NRHP, no avoidance is necessary for the portion of the site lead located within the APE.

Figure 30. Site 21CPa overview to the northwest.

Newly Recorded Sites

Site 21CP77 was recorded during the Stage I survey. The site is an abandoned farmstead located on a terrace overlooking the Minnesota River. There is an overgrown two-track that enters at the northeast end of the site. The site overall is heavily overgrown and the agricultural field to the north and west are starting to encroach on the site. The landowner, Chad Schuler, was contacted to ask the age of the site (landowner since 1990). All the information Mr. Schuler gathered is from bits and pieces his now deceased father told him over the years. Mr. Schuler estimated three structures, an old farmhouse, a dairy barn and a chicken coop were constructed between 1900 and 1920. All three structures were dilapidated beyond repair when Mr. Schuler acquired the property, and were burned at that time. At the time of the survey, all structures had been removed except the metal Quonset building, which Mr. Schuler estimated was constructed between 1955 and 1958. Mr. Schuler did not know when the farmstead was abandoned.

The site consists of seven features, five of which were overgrown, broken foundations. Features 1 and 5 are located in the northeast portion of the site, with a field clearing pile between the features. Feature 1 is a concrete foundation that was overgrown and partially torn up, with a considerable amount of burnt material in and around the feature. Feature 5 is a stone and concrete foundation, with a concrete slab west of the foundation and domestic refuse inside the foundation. Feature 3 is a trash pit located near features 1 and 5, which is filled with a variety of household refuse. Feature 2 is a concrete foundation that is located south of features 1, 3 and 5. A silo blower, wooden 2-by-4s, and corrugated metal were located adjacent to the feature. Features 4 and 7 were located at the west end of the site. Feature 4 is a concrete silo foundation and Feature 7, the only standing structure on the property, is a Quonset building. The Quonset building has two doors on the north side and a set of sliding doors on the west side. It has a concrete foundation and it is made of corrugated metal panels. It is in fair condition with weathering in various spots on the structure. Feature 6 is a stone and concrete foundation in the southern portion of the site. It is broken and overgrown, but the size and location suggests that it was the location of the former farmhouse. Cultural material within the site was relatively sparse and was concentrated within features. Cultural material included bottle glass, miscellaneous pieces of metal, bedsprings, recliners, an oven, stove, a laundry machine, a sink, a plastic bucket, car tires, a barn or garage door (corrugated metal), s silo blower, pieces of wood and fence/barbed wire.

Overall, the site condition is very poor. The site retains little integrity as all but one of the structures have been removed. Moreover, the standing structure has been built at a later date than the original, destroyed structures. There is very little cultural material, most of which is fragmented or burnt, and there are no discernable diagnostics. The foundations are broken and have been heavily disturbed by time and human activities. The standing structure is in fair condition, but such Quonset buildings are a common style and the building does not demonstrate any unique or unusual characteristics. There are no characteristics of the site that would suggest it is related to a significant event in history; therefore, it is not eligible under Criterion A. The results of the deed search did not reveal any significant persons associated with the site; therefore, it is not eligible under Criterion B. No features possess any qualities of a distinctive construction style, a masterful work, or artistic value; therefore, it is not eligible under Criterion C. All features have limited research value as the structures themselves have been removed and the remaining structure is not distinctive. The site is not likely to yield any information important to history; therefore, it is not eligible to the NRHP under Criterion D. As such, the site has been recommended not eligible to the NRHP.

The proponent made changes to the APE, so this site will no longer be impacted by the proposed project.

Table 8. Chippewa County deed search for site 21CP77

Book	Page	Date	Grantor	Grantee	Deed Type
N	43	3/10/1886	USA	Gustav Johnson	Patent
G	80	3/14/1904	Gustav Johnson	Rakkel, Ole, Enander, Anna, Marius, & Albert Johnson	Decree of Distribution
31	404	3/6/1905	Rakkel Johnson, Anna (Johnson) & E. O. Minsaas, Marius & Mary Johnson, and Albert Johnson	Ole Johnson & Enander Johnson	Quit Claim Deed
35	559	10/19/1905	Ole & Enander Johnson	C. A. & Sarah Fosnes	WD
35	560	10/20/1905	C. A. & Sarah Fosnes	Chas H. Budd	WD
31	429	2/20/1906	Charles H. & Nellie M. Budd	C. A. Fosness	QCD
36	63	2/20/1906	C. A. and Sarah Fosness	Matt Swenson	WD
59	128	8/19/1936	Matt & Julianne Swenson	State of Minnesota	Foreclosure
63	360	5/24/1943	State of Minnesota	Edward Appleseith	Special WD
72	352	11/3/1948	Edward & Annie Appleseith	Robert H. & Lizzie Spies	WD
128	189	3/11/1985	Elizabeth aka Lizzie Spies	Spies Irrevocable Trust	QCD
149	151	4/8/1992	Delburt & Helen Manee	Spies Irrevocable Trust, Betty Lou Erickson & Dale D. Spies Trustees	QCD
149	243	4/23/1992	Betty Lou Erickson & Dale D. Spies, Trustees of Spies Irrevocable Trust	Chad H. and Randy T. Schuler	WD
149	579	5/27/1992	Elizabeth aka Lizzie Spies	Betty Lou Erickson & Dale D. Spies, Trustees of Spies Irrevocable Trust	Corrected QCD
158	245	3/13/1995	Anita Brightman aka Schuler	Chad H. & Randy Schuler	QCD
160	613	2/29/1996	Kathy Marie Schuler	Chad H. Schuler	QCD
250473		11/30/2001	Randy and Lori Schuler	Chad H. Schuler	QCD
275931		8/20/2008	Kathy Marie Fuerst aka Schuler	Chad H. Schuler	QCD
283321		4/6/2011	Nina Schuler	Chad H. Schuler	Disposition Judgment

Figure 31: Site 21CP77 overview to the north.

Figure 32: Site 21CP77 overview to the northeast.

Figure 33. Feature 1: Foundation overview to the north.

Figure 34: Feature 2: Foundation to the west.

Figure 35. Feature 3: Trash dump view to the east.

Figure 36. Feature 4 and Feature 7: Silo foundation and metal shed view to the southeast.

Figure 37. Feature 5: Foundation view to the northwest.

Figure 38. Feature 6: Fragmented foundation view to the west.

Figure 39. Feature 6: Close-up of south wall made of stones.

Figure 40. Feature 7: Metal shed view to the southwest.

Figure 41. Field clearing pile view to the south.

Figure 42. Green bottle glass by Feature 1.

Figure 43. Metal near Feature 1.

Beaver Creek
ARCHAEOLOGY

BCA16-1321-Site1
UTM: 295,196 E; 4,969,817 N
T116N R39W Sec. 18
Granite Falls Quad. Map
Hawk-Yellow Medicine Drainage
Chippewa County, Minnesota

Meters
0 25 50 75 100

Legend

- Site Boundary (1.92 acres)
- Features
- Field Clearing Pile

0 0.25 0.5 0.75 1 Miles

Author:

Site 21CP78 site consists of one flake and two pieces of raw material found within shovel test 41. Shovel tests were conducted due to low visibility within this portion of the APE. Moreover, the probes were located on a terrace overlooking the Minnesota River, which also makes the location conducive to finding an archaeological site. The site is located on a small patch of disturbed grassland west of a two-track road. Plowed fields are located on the east side of the road. The location combined with the vegetation, including smooth brome and quack grass, suggests that the area has been previously plowed and/or disturbed in the past.

Shovel tests were dug at 15m intervals in the survey area. When the positive shovel test was encountered, radials were conducted at 7.5m-intervals around the positive until two negatives were encountered. The distance of 7.5 m was selected in order to place the radials halfway between the shovel tests that were placed owing to the poor visibility.

The flake and raw material were found within the first 10 cm of shovel test 41. Six radials were dug and all radials were negative. The flake is small piece of KRF chipped stone flaking debris. The material appears workable but is not KRF and does not show clear signs of working. The single artifact was not associated with other cultural material or features. As such, the site was recommended not eligible to the NRHP.

Figure 44: Site 21CP0078 overview to the southwest.

Figure 45: Two fragments of raw material (left) and one flake (right).

Beaver Creek ARCHAEOLOGY

BCA16-1321-Site2
UTM: 296,456 E; 4,968,943 N
T116N R39W Sec. 20
Granite Falls Quad. Map
Hawk-Yellow Medicine Drainage
Chippewa County, Minnesota

Meters
0 8.5 17 25.5 34

Legend

- Site Boundary (.08 acres)
- Feature
- Shovel Probes

0 0.25 0.5 0.75 1
Miles

GE

Site 21CP79 consists of a recently abandoned farmstead located on a bluff overlooking the railroad and the Missouri River to the southwest. The site is surrounded by a shelterbelt on three sites, which obscures the view towards the river. The site comprised of a sparse historic cultural material scatter and four features: one historical archaeological and three architectural structures.

Feature 1 is a 1½-story farmhouse with a basement that was likely built sometime in the 1940s.The structure has wood framing and horizontal metal siding. The farmhouse has a gable roof covered with asphalt shingles and a ridge top cinder block chimney. The farmhouse has been updated and additions were made.

Feature 2 is a 1-story garage/machine storage building that was likely built sometime in the 1940s. The structure has wood framing and horizontal wood siding. The building has a gable roof covered with asphalt shingles. The garage portion of the structure has a concrete slab foundation and the machine storage portion has a dirt floor and concrete wall foundation. The building has been updated and an addition was made.

Feature 3 is either a storm shelter or pump house that is most likely modern. The structure is semi-subterranean with cinder block walls. There is a gable roof covered with corrugated metal sheeting and some asphalt shingles under the gable ends.

Feature 4 is a concrete wall foundation. There is no remaining evidence of the structure that was once on the foundation. Within and surrounding the foundation the vegetation is overgrown; however, cultural material is still visible. Cultural material includes burned/rusted metal fragments, a burned air conditioning unit, burned masonry, a white plastic tarp, clothing, and other miscellaneous items. Based on the burned cultural material and charred trees to the west, it appears that the structure that was associated with the foundation was burned down.

Cultural material located along the interior edge of the shelterbelt include a microwave, approximately four lawn chairs, a metal drum barrel, two metal tubs or water troughs, three plastic buckets, several tires, metal fragments, and miscellaneous modern trash.

The site overall is in good condition, but most of the features are lacking integrity of materials, design and workmanship. Feature 1 and Feature 2 have been updated and additions were added, which has impacted the integrity of the features. All that remains of Feature 4 is a concrete foundation and burned historic material remains. Furthermore, Feature 3 is likely modern. The site does not meet any criteria of significance: it cannot be associated with a significant event (Criterion A) or person (Criterion B); none of the features are representative of a distinctive style or have artistic value (Criterion C); and the site has limited research value, as the standing structures are not distinctive and the structure associated with the foundation was destroyed by a fire (Criterion D). As such, the site has been recommended not eligible to the NRHP and no avoidance is recommended.

Table 9. Chippewa County deed search for site 21CP79

Book	Page	Date	Grantor	Grantee	Deed Type
BLM GLO Records		1/10/1984	USA: Litchfield Land Office	Charles E. Mattison	Patent
C	50	10/23/1876	J. M. Sevrens, Chippewa Co. Auditor	State of Minnesota	Auditor's Deed
C	563	9/2/1878	J. M. Sevrens, Chippewa Co. Auditor	J. W Hixon	Redemption Certificate
S	220	5/25/1891	John W. & Alice R. Hinson [sic]	De Archy McLarty	WD
T	618	5/7/1897	John W. & Alice R. Hixon and Nelson & Sarah Ole	United Trust Limited	Foreclosure
X	386	11/5/1897	United Trust Limited	Nelson & Sarah Ole	QCD
27	434	2/6/1900	Ole Nelson	Benjamin E., William, Eldy, & Lydie Nelson	Final Decree
G	14	4/20/1900	Ole Nelson	Sarah, Clarence, Carrol, Benjamin, Ole Jr., William, Eddy, & Lydie Nelson	QCD
31	434	3/21/1906	Lydie (Nelson) & Ernest C. Hawkins	Ole Nelson Jr.	QCD
38	1	3/26/1906	Nellie (Nelson) & Ole B. Thorpe	Ole Nelson Jr.	QCD
I	550	3/10/1913	Edward O. Nelson	Nellie Thorpe, Lydia L. Hawkins, & Benjamin E., William E., Ole E., Clarence O., & Carroll F. Nelson	Final Decree
42	569	1/31/1916	Lydia (Nelson) & E.C. Hawkins	Benjamin E. Nelson	QCD
43	522	3/18/1916	Nellie Thorpe, William E., Benjamin E., Ole E., Clarence O., & Carroll F. Nelson	John T. & Minnie Russell	WD
45	562	3/1/1920	John T. & Minnie Russell	William H. Bot	WD
46	636	2/24/1923	Sherriff Ole Borgendale	Ole E. Nelson	Foreclosure
51	306	6/17/1926	Ole E. Nelson	Nellie T. Hartwick	WD
72	355	1/11/1949	Nellie T. Hartwick & Ole E. Nelson	Juel G. & Ella Williams	WD
78	12	9/26/1951	Juel G. & Ella Williams	Henry Christensen	WD
75	274	3/25/1952	Henry & Beulah Christensen	Erwin C. & Vivian C. Ockwig	WD
I	504	11/4/1953	Erwin C. Ockwig	Vivian Ockwig	Affidavit of Survivorship
82	144	6/26/1961	Vivian Ockwig	Stanley A. Minsaas	WD
154	185	10/11/1993	Stanley A. & Vivian Minsaas	Zoe Ann Longworth	QCD
154	187	10/11/1993	Zoe Ann Longworth	Stanley A. & Vivian Minsaas	QCD
268090		3/24/2006	Stanley A. Minsaas	Vivian Minsaas	Affidavit of Survivorship
293306		12/30/2014	Vivian Minsaas	Fagen Farms	Contract for Deed
293423		1/5/2015	Vivian Minsaas	Fagen Farms	WD

Figure 46. Overview of site 21CP79 to the south-southwest.

Figure 47. Overview of site 21CP79 to the northeast.

Figure 48. Southeast corner angle of Feature 1. View to the northwest.

Figure 49. Northwest corner angle of Feature 2. View to the southeast.

Figure 50. Northwest corner angle of Feature 3. View to the southeast.

Figure 51. Feature 4. View to the northwest.

Figure 52. Feature 4. View to the west.

Figure 53. Vegetation overgrowth and burned cultural materials within Feature 4.

Figure 54. A burned air conditioning unit within Feature 4.

Figure 55. Modern gazebo. View to the southeast.

Figure 56. A modern concrete pad. View to the southwest.

Figure 57. Historic cultural material. View to the west.

Beaver Creek
ARCHAEOLOGY

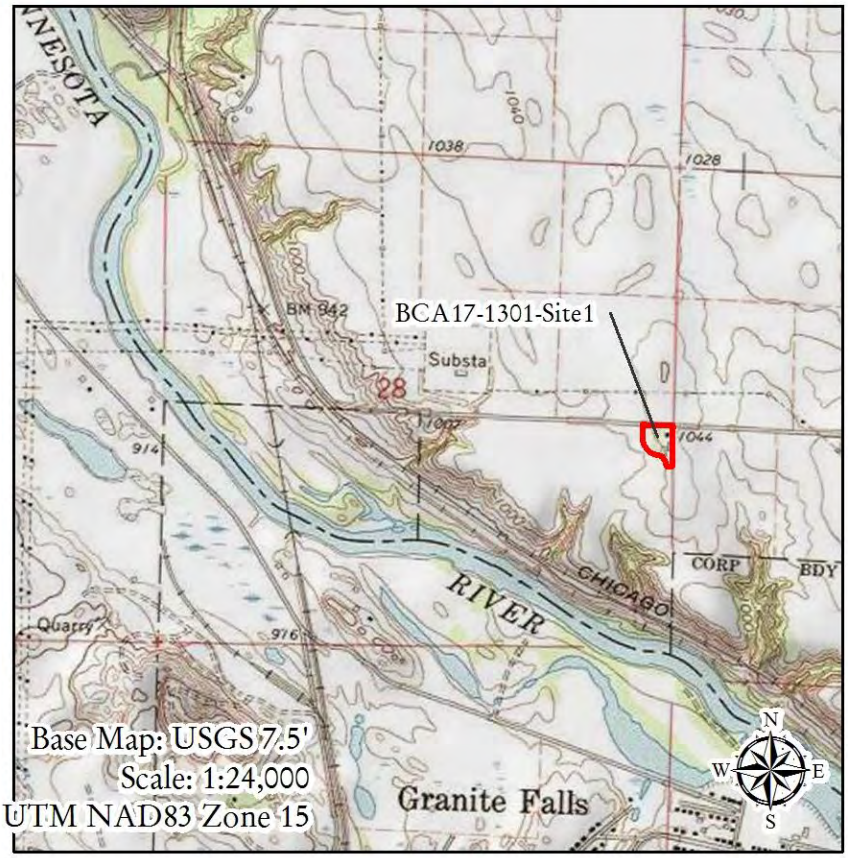
BCA17-1031-Site1
UTM: 298,805 E; 4,966,732 N
T116N R39W Sec. 28, Granite Falls Quad. Map, (1965)
Hawk-Yellow Medicine Drainage
Chippewa County, Minnesota

0 25 50 75 100 Meters

Legend

Site Boundary (9,416 sq. meters)

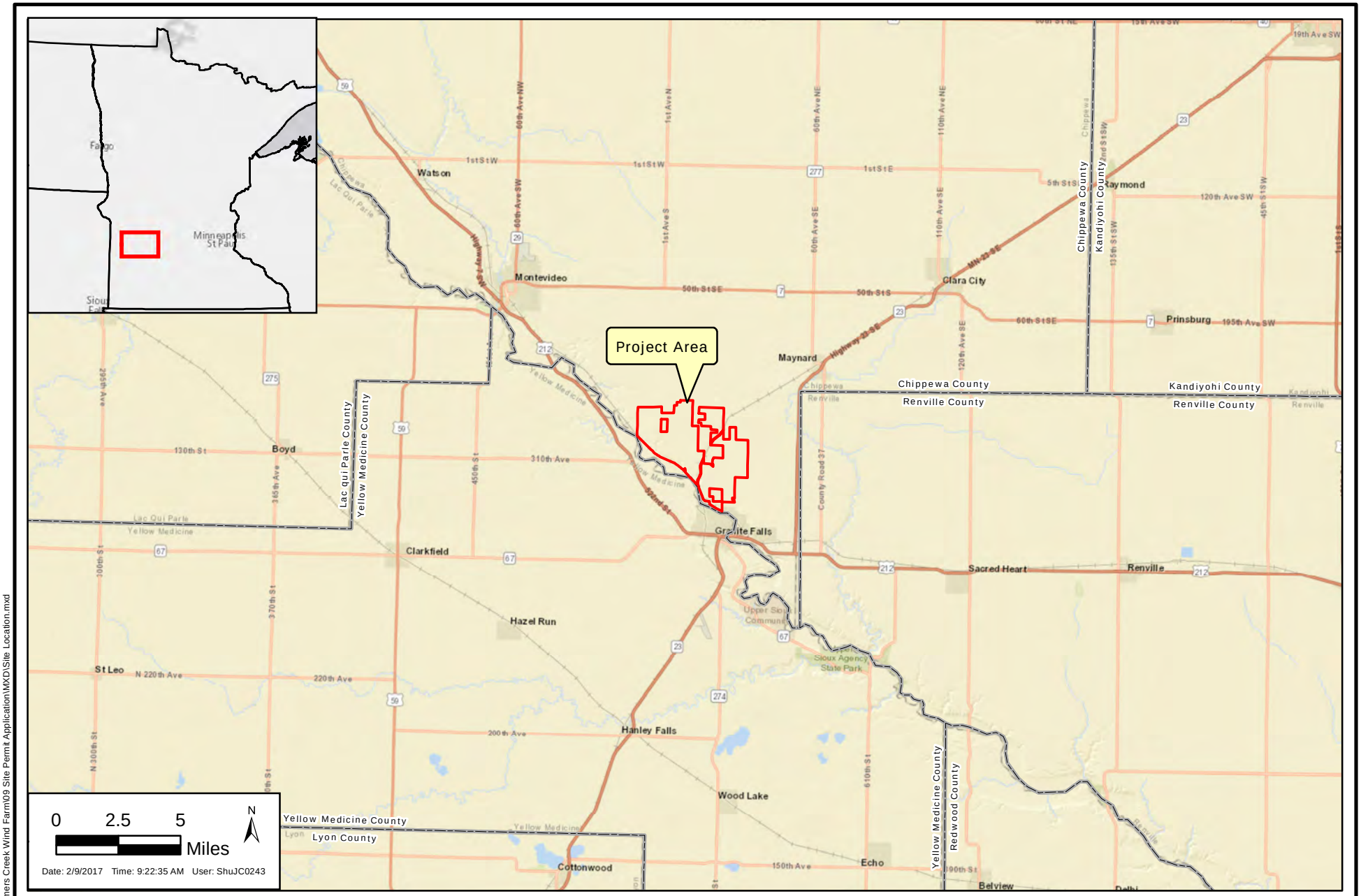
Feature



Base Map: USGS 7.5'
Scale: 1:24,000
UTM NAD83 Zone 15

0 0.25 0.5 0.75 1 Miles

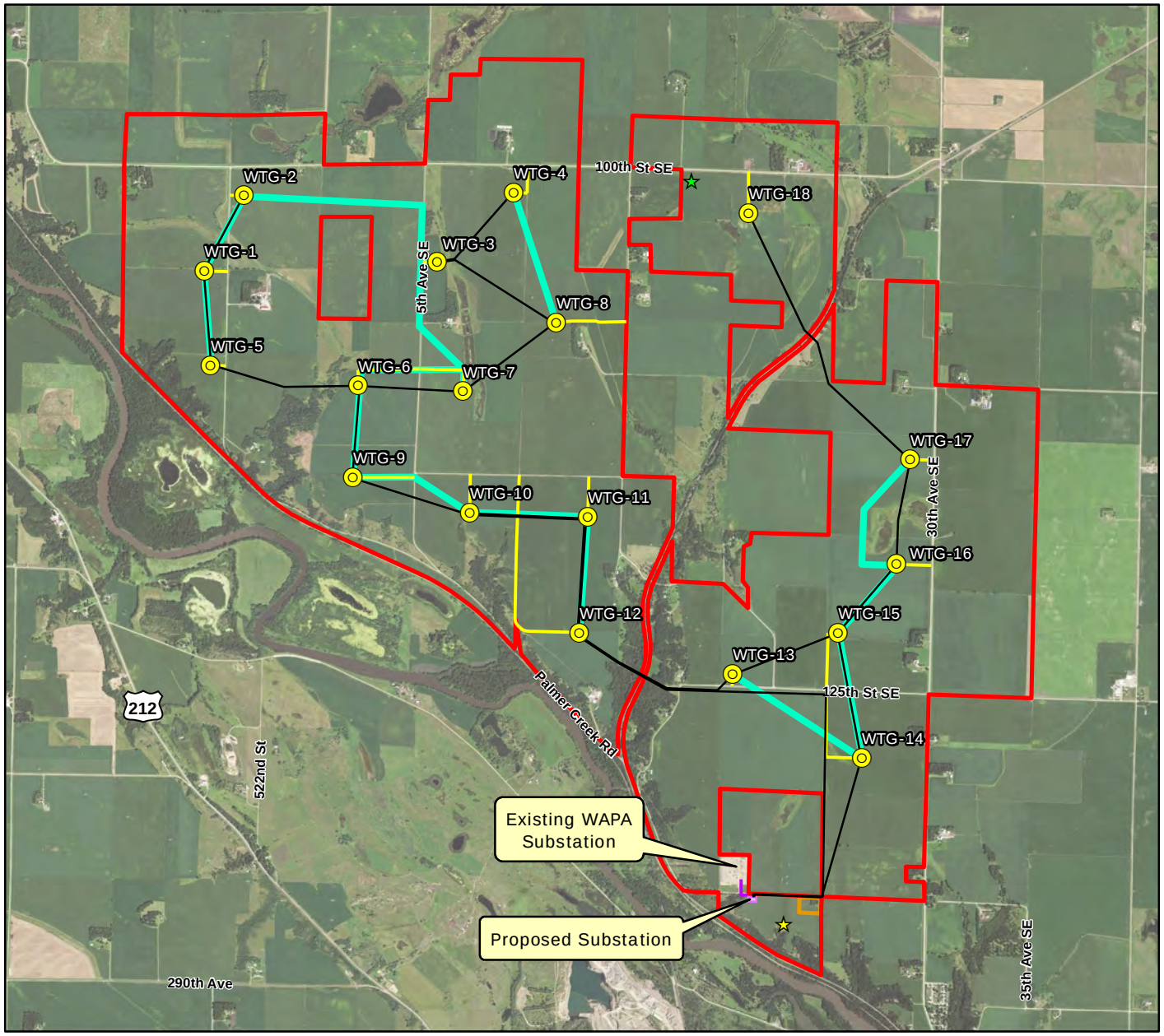
Author:



Path: L:\2759\05 Palmers Creek Wind Farm\09 Site Permit Application\MXD\Site Location.mxd

PALMER'S CREEK WIND FARM, LLC	FEB 2017
Site Location Map	Figure 1

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.



Legend

- Project Boundary
- Turbine Locations
- Collector Lines
- Access Roads
- Temporary Crane Path
- Permanent MET Station
- Temporary MET Station
- Proposed Substation
- Transmision Lines
- O&M Building and Laydown Area

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

N

4,000 2,000 0 4,000

Feet

Path: L:\2759\05 Palmers Creek Wind Farm\09 Site Permit Application\MXD\Site Detail.mxd
Date: 2/9/2017 Time: 1:36:17 PM User: ShuJC0243

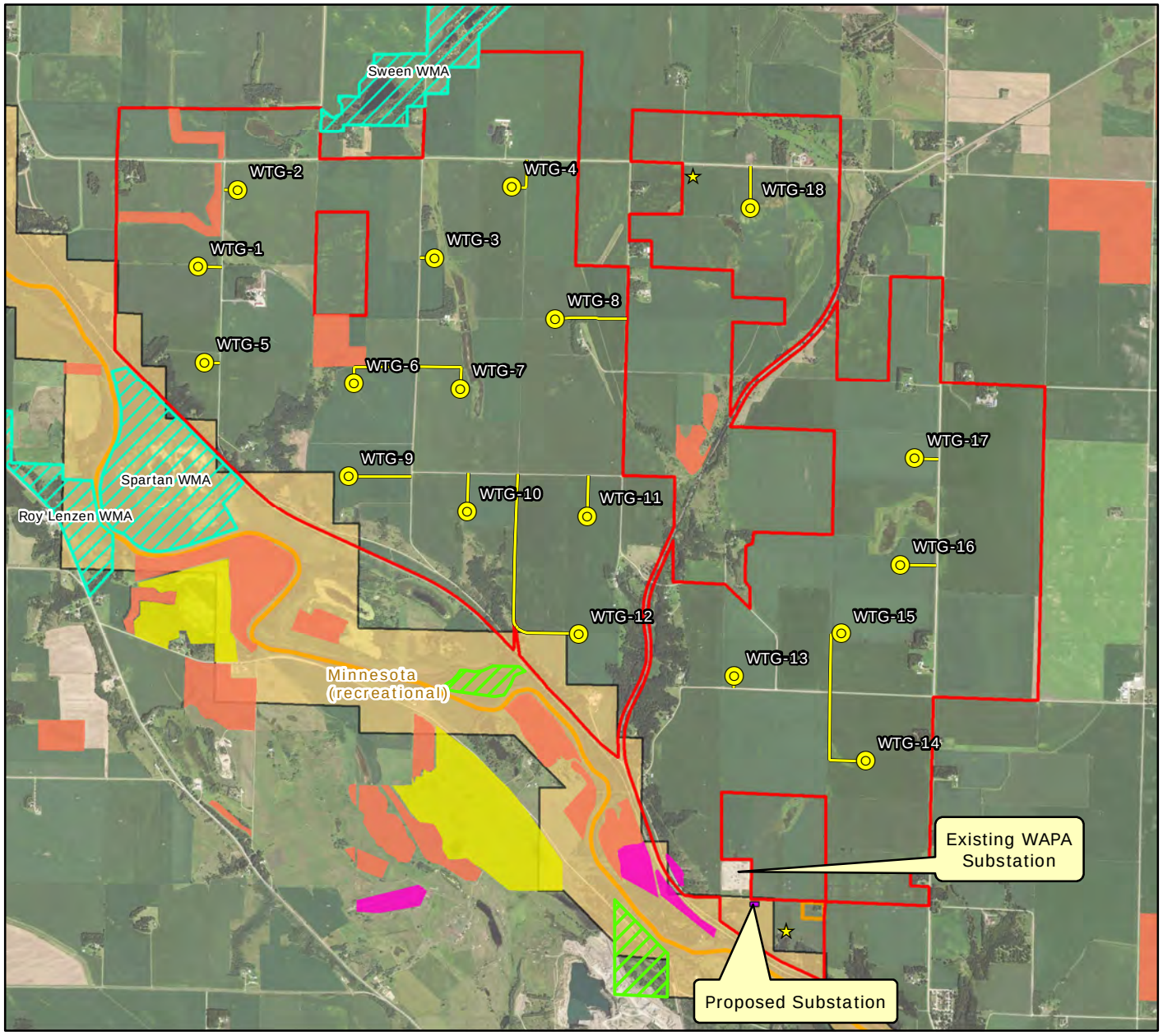
PALMER'S CREEK WIND FARM, LLC

Site Detail Map

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.

FEB 2017

Figure 2



Legend

- Project Boundary
- Turbine Locations
- Access Roads
- Proposed Substation
- O&M Building and Laydown Area
- Meteorological Tower
- MNDNR State Parks

Conservation Easements

- CREP I
- PWP
- RIM
- Wildlife Management Areas (WMA)

Wild and Scenic Recreational Rivers

- State Designation
- MN River Management District

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

N

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PALMER'S CREEK WIND FARM, LLC

Recreation and Conservation Areas

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.

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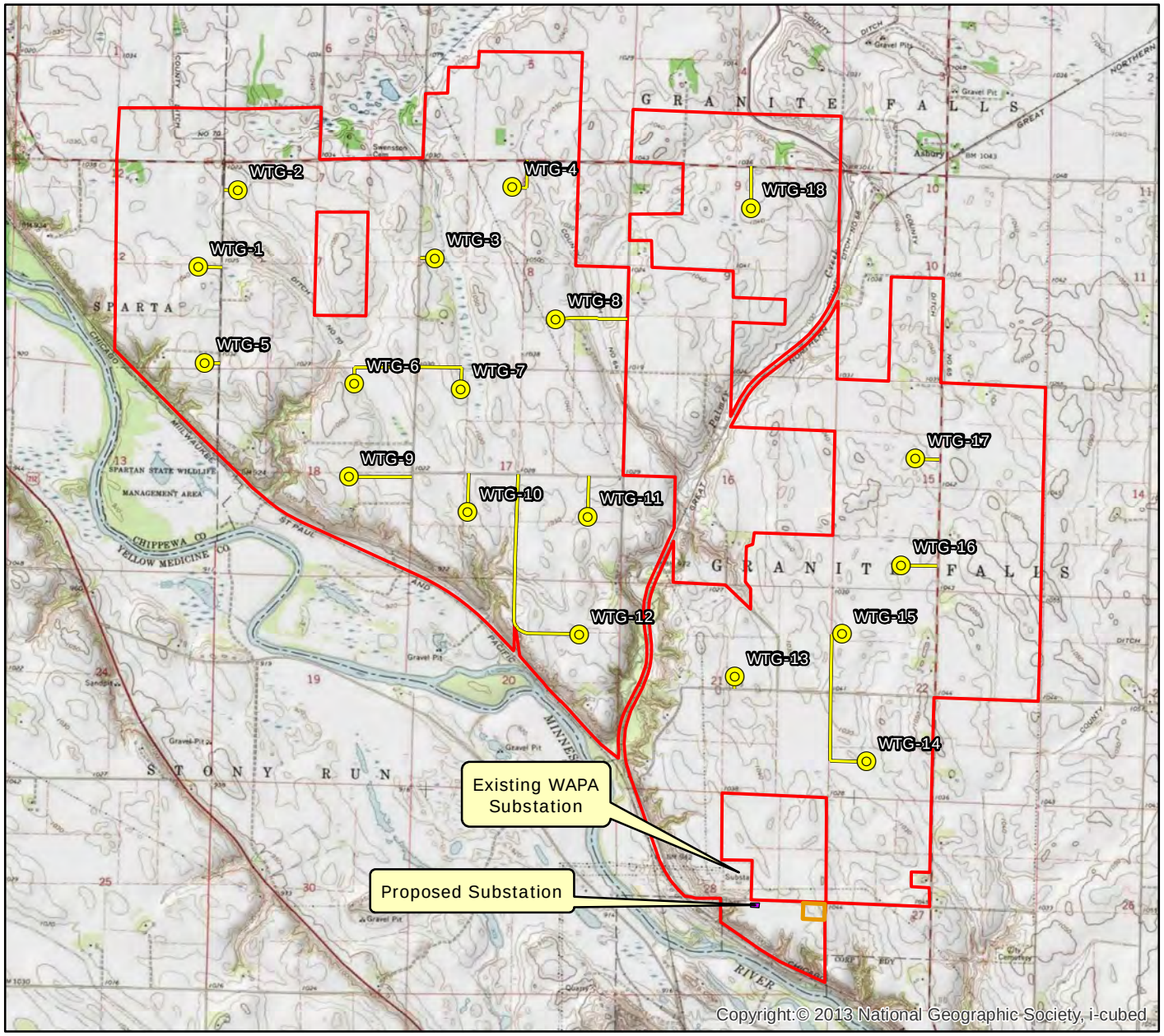
Figure 3



Legend

- Project Location
- Turbine Locations
- Access Roads
- Proposed Substation
- O&M Building and Laydown Area

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Topographic Map

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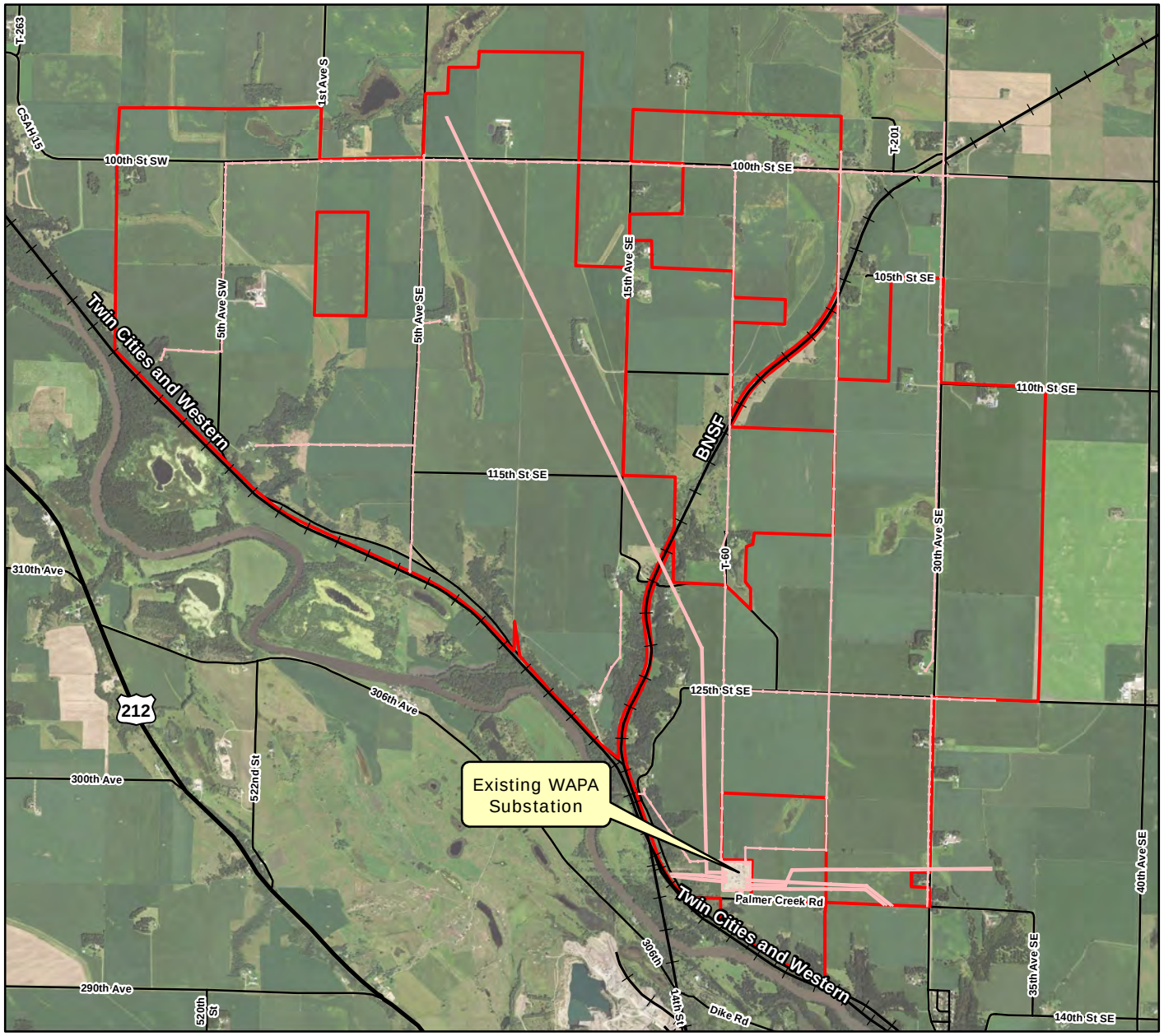
Figure 4



Legend

- Project Boundary
- Existing Overhead Power Lines

Existing Roads

- Interstate Highway
- US Highway
- Minnesota State Highway
- City, County, or Township Road
- Railroad

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

N

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Existing Infrastructure

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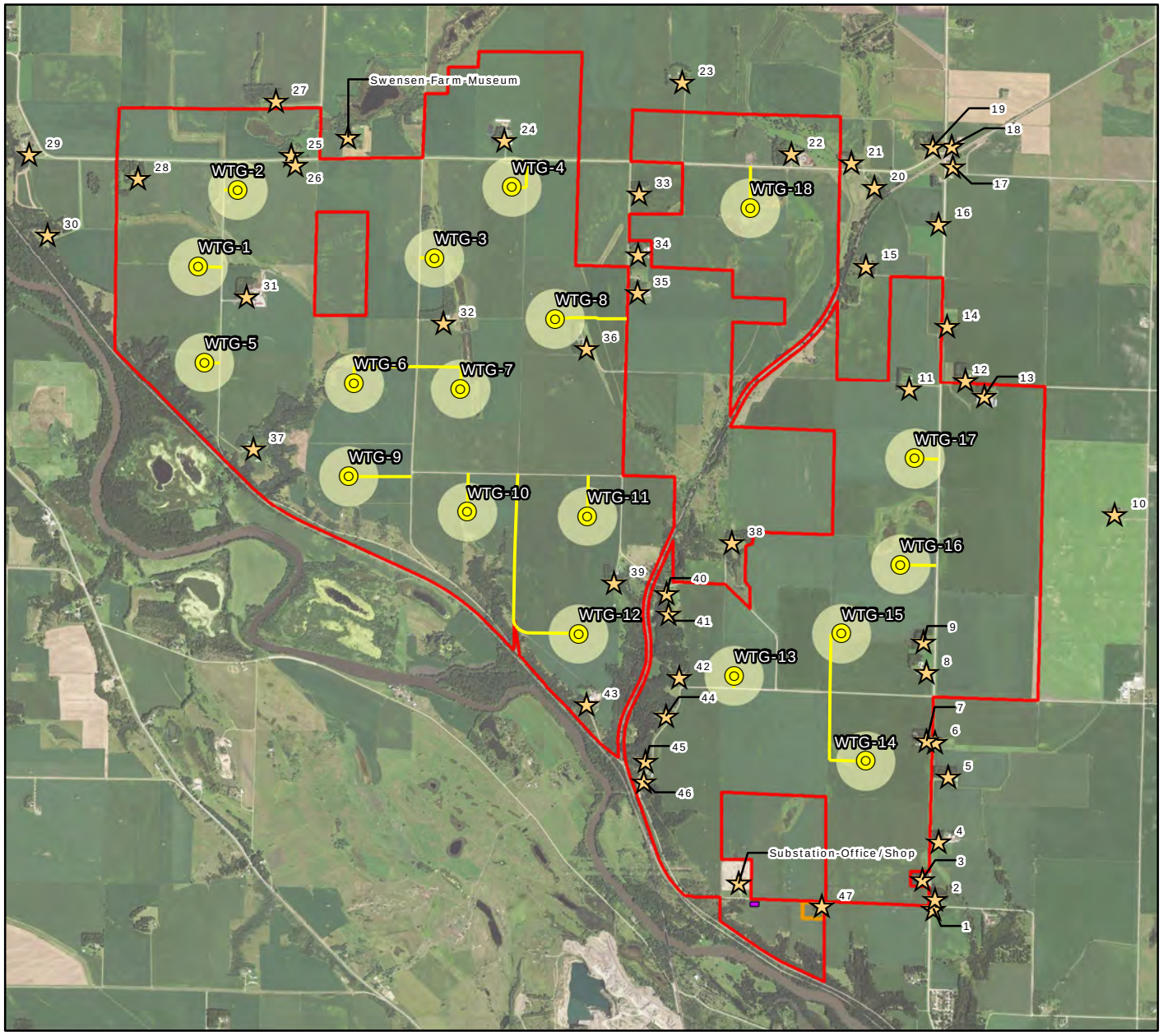
Figure 5



Project

Turbine Locations

Turbine Setbacks (750FT)

Occupied Buildings

Access Roads

O&M Building and Laydown Area

Proposed Substation

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Occupied Buildings

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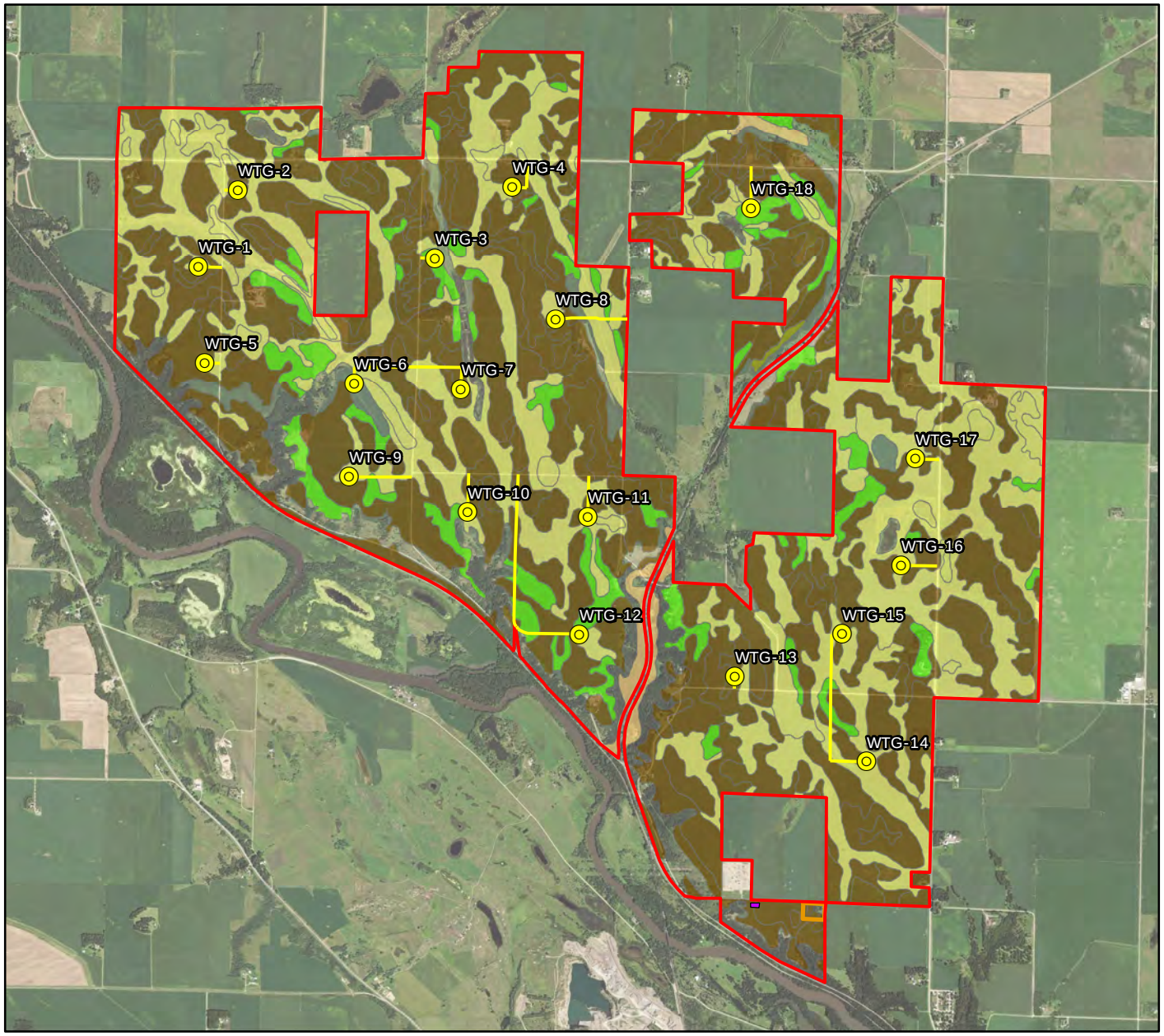
Figure 6



Project

Turbine Locations

Access Roads

Prime

Not prime farmland

Farmland of statewide importance

Prime farmland if drained

Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Prime farmland if protected from flooding or not frequently flooded during the growing season

All areas are prime farmland

O&M Building and Laydown Area

Proposed Substation

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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Prime Farmland

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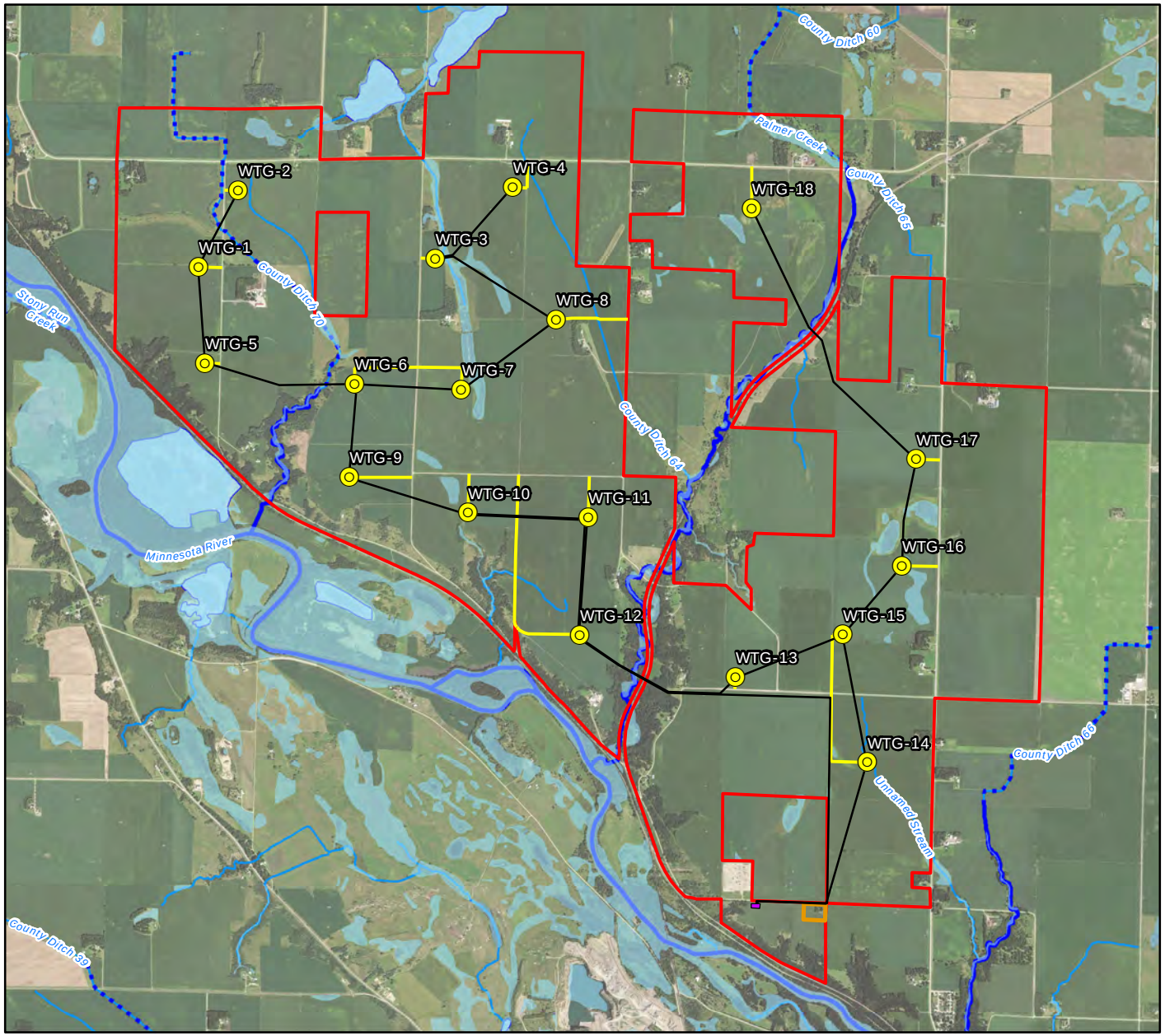
Figure 7



- Project
- Turbine Locations
- Access Roads
- Collector Lines
- National Wetlands
- Public Stream
- Public Ditch/Altered Stream
- Public Waters Basins
- Rivers and Streams
- O&M Building and Laydown Area
- Proposed Substation

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Waterbodies and Wetlands

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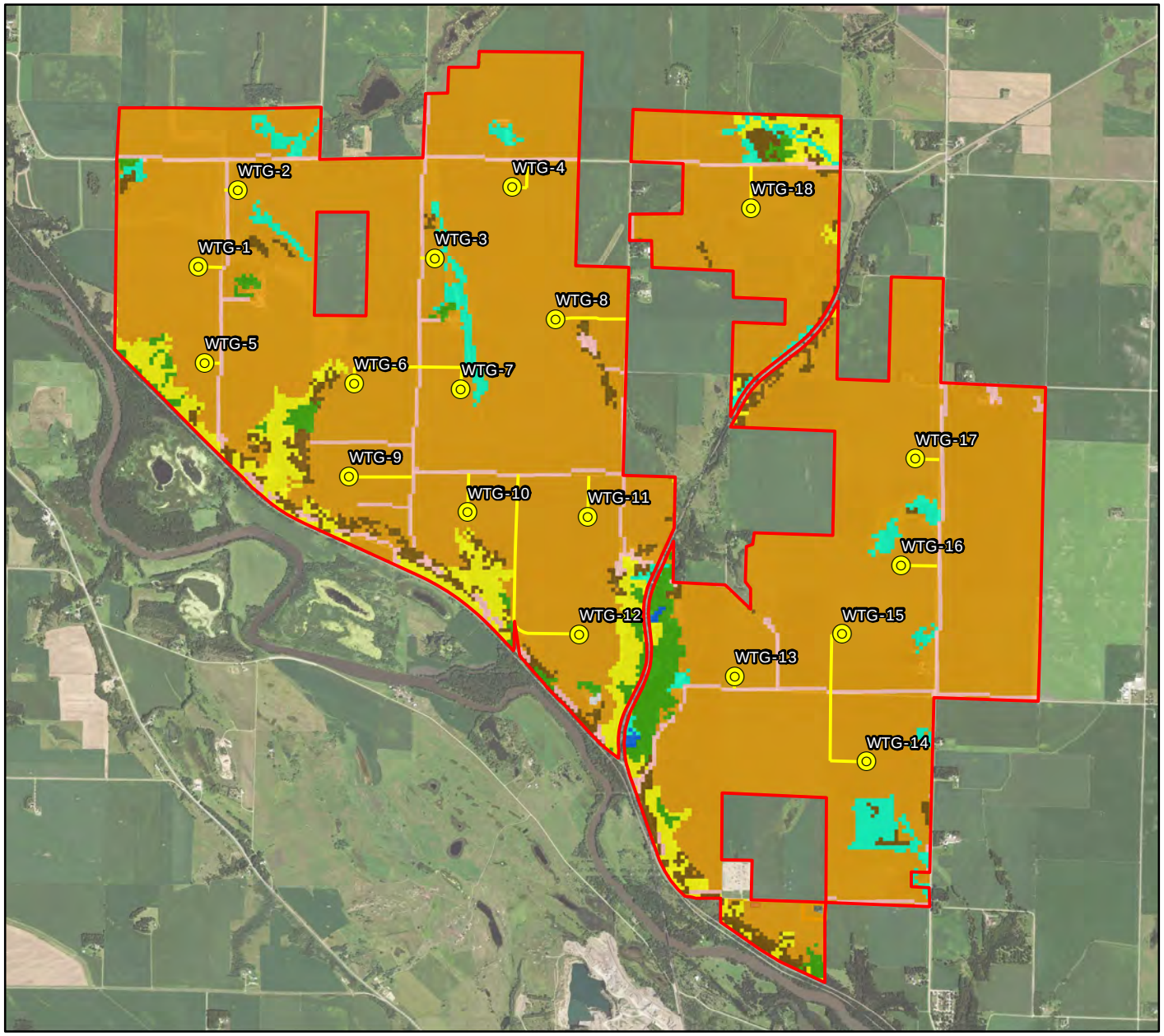
Figure 8



Project
Turbine Locations
Access Roads

NLCD

Barren Land
Cultivated Crops
Wooded
Developed
Wetland
Hay/Pasture
Grasslass
Open
O&M Building and Laydown Area
Proposed Substation

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

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PALMER'S CREEK WIND FARM, LLC

Land Cover

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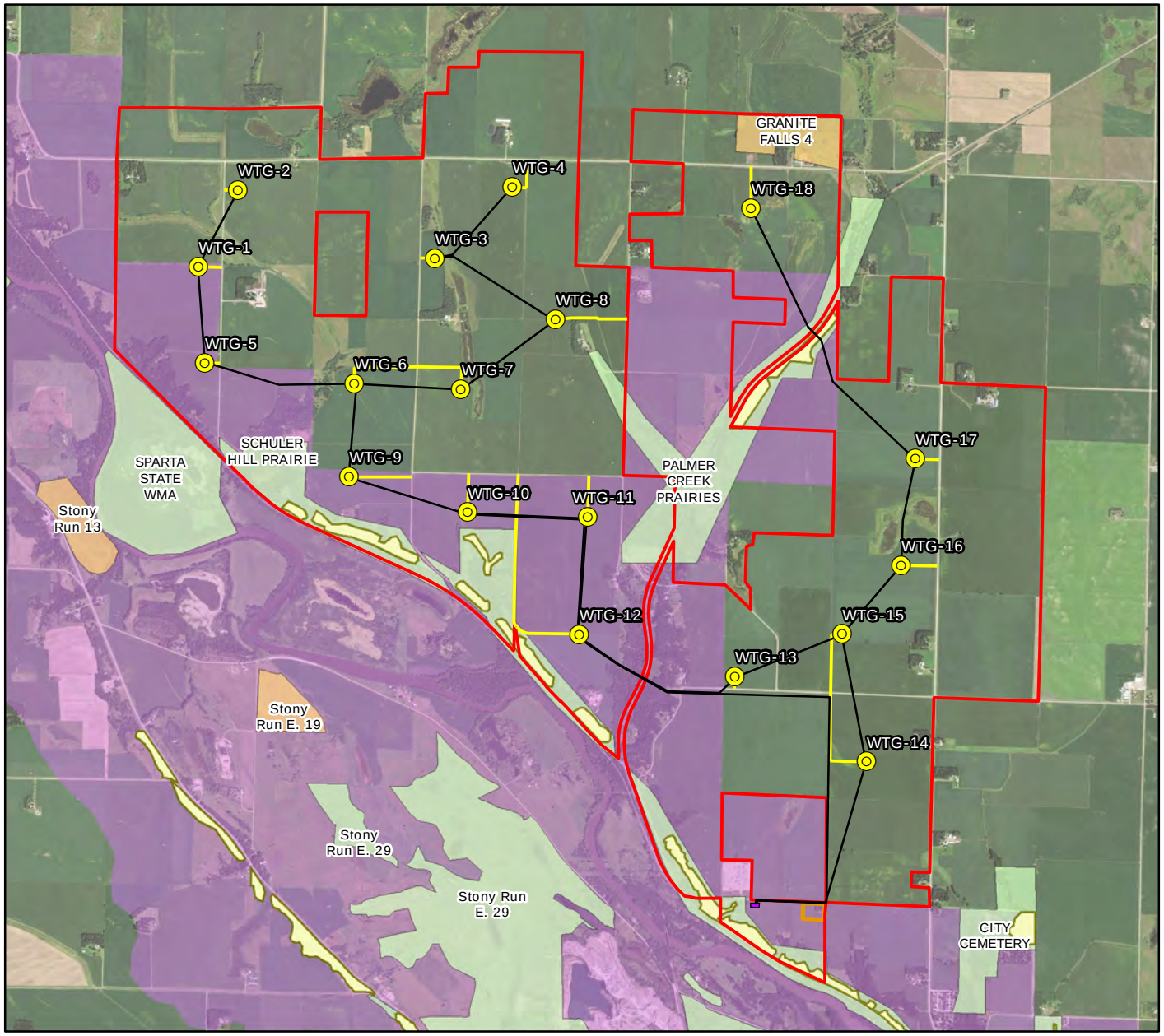
Figure 9



Project
Turbine Locations
Access Roads
Collector Lines
Proposed Substation
O&M Building and Laydown Area
Upper Minn. R. Valley Prairie Corridor Restoration Plan

DNR Prairie Native Plant Communities

Upland Prairie
Wetland Prairie
Complex community

MBS Sites of Biodiversity Significance

Outstanding
High
Moderate
Below

Note:
Project features are approximate. Once final design is completed, area will be surveyed prior to construction for Project feature placement.

N

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Feet

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PALMER'S CREEK WIND FARM, LLC

Ecologically Significant Areas

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Figure 10