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May 4, 2016

Mr. Darrell Nitschke
Executive Director
North Dakota Public Service Commission
600 E. Boulevard, Dept. 408
Bismarck, ND 58505-0480

Dear Mr. Nitschke:

In re: Brady Wind II, LLC
Application for Certificate of Site Compatibility
PSC Case No. PU-16-042
Our File No. 35-218-027

Enclosed please find for filing in the above case (1) 11 copies of the Bat Habitat Assessment; and (2) 11 copies of the Grouse Lek Survey Report, for the Brady II Wind Energy Center Project in Hettinger and Stark Counties, North Dakota.

Please call should you have any questions.

Very truly yours,

Brian R. Bjella

bw
enc.
Zack Pelham
Jerry Lein
Julie Prescott

TETRA TECH

TO: NextEra Energy Resources, LLC

FROM: Tetra Tech

DATE: 5/2/2016

SUBJECT: Brady II Wind Energy Center Grouse Lek Survey Report

Introduction

Brady Wind II, LLC (Brady Wind II), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NextEra) is developing the Brady II Wind Energy Center (Project) located in Hettinger and Stark counties, North Dakota (Figure 1). Brady II Wind is committed to environmental due diligence and has contracted Tetra Tech, Inc. (Tetra Tech) to conduct sharp-tailed grouse lek surveys in the proposed Study Area and a 1-mile buffer around the Study Area (Figure 1).

Sharp-tailed grouse (*Tympanuchus phasianellus*) are identified as Species of Conservation Priority in North Dakota's Wildlife Action Plan (Wildlife Action Plan). Species within the Wildlife Action Plan are categorized into three levels according to their conservation need. Sharp-tailed grouse are considered Level II Species, which are those species having a moderate level of conservation priority, or a high level of conservation priority, but a substantial level of non-state wildlife grant funding is available to them. Sharp-tailed grouse have experienced population declines linked to landscape level land use changes, primarily due to habitat loss through the conversion of grasslands to cropland. State and federal wildlife agencies have regularly expressed concern about the locations of wind turbines with respect to prairie grouse leks (communal male displaying grounds).

At NextEra's request, Tetra Tech, Inc. (Tetra Tech) requested the location of any known sharp-tailed grouse leks from the North Dakota Game and Fish Department (NDGF) on January 11, 2016. NDGF responded on February 3, 2016 that there are no documented leks in the Study Area or vicinity, but noted that the area has not been surveyed by NDGF. NDGF recommended that they help design the survey protocol. Tetra Tech provided the proposed protocol to NDGF on February 8, 2016, and received feedback from NDGF on March 9, 2016. NDGF supplied their standard protocol and suggested that Tetra Tech modify the survey protocol provided to NDGF so that listening stops be made every 0.5 mile rather than every 1 mile in all areas with grassland habitat.

The objective of the grouse lek surveys was to document all sharp-tailed grouse leks within the Study Area and 1-mile buffer. Tetra Tech protocols for the grouse lek surveys were designed to be responsive to the level of effort recommended in Tier 3 of the voluntary U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines (WEG; USFWS 2012).

Methods

Prior to the field surveys, Tetra Tech prepared a preliminary desktop habitat assessment using the National Land Cover Database and aerial imagery to delineate suitable lek habitat within the Study Area and a 1-mile buffer around the Study Area. Open areas with grassland habitat were classified as suitable lek habitat. Preliminary listening stations were then mapped along public roads adjacent to suitable habitat. Based on this assessment, we identified 122 potential listening stations within the Study Area and 1-mile buffer. Habitat suitability was verified and access to the listening stations along the lek survey route was ground-truthed by biologists during spring raptor nest surveys conducted in the Study Area and 1-mile buffer and during the first day of the lek surveys.

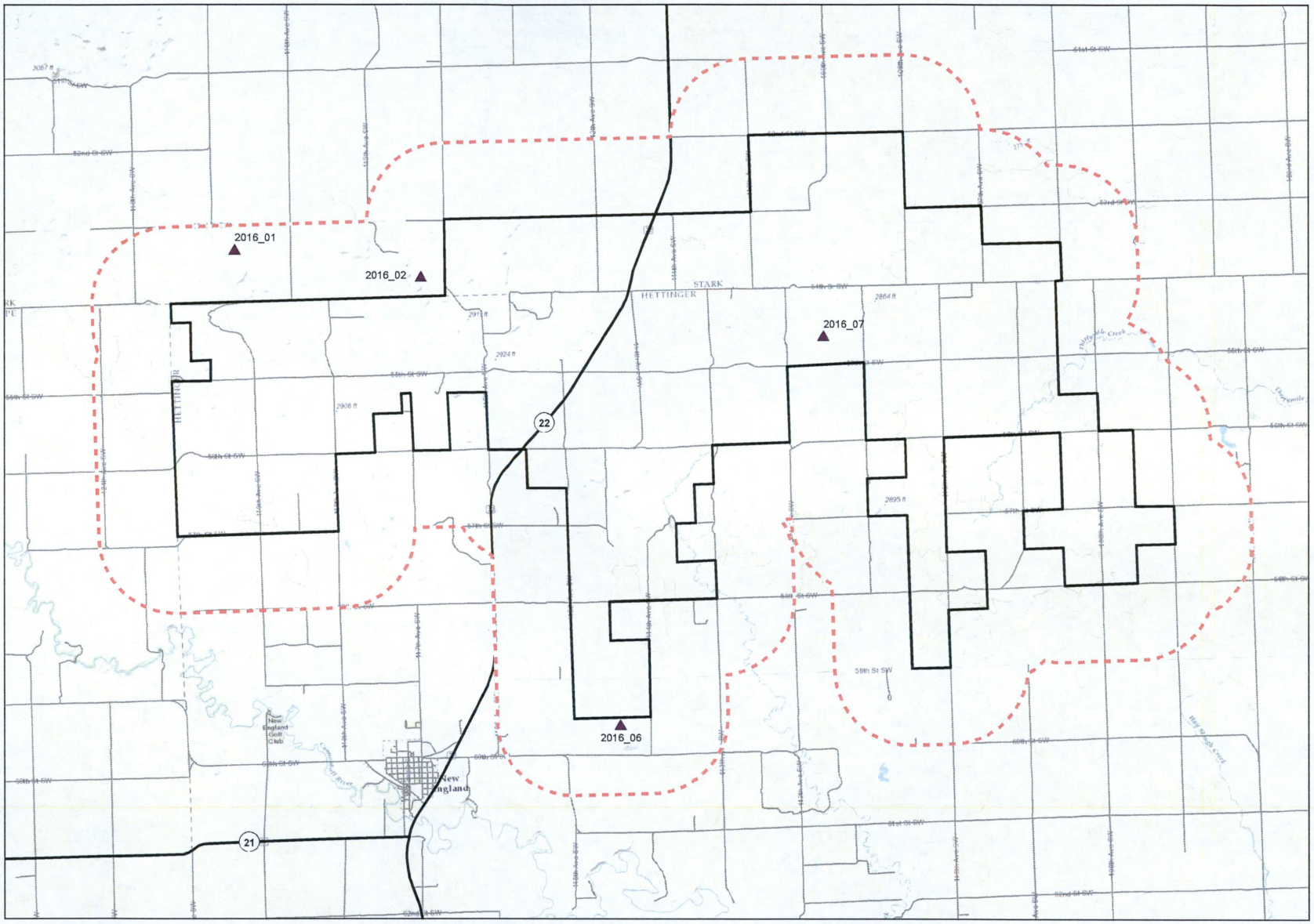
Ground surveys were conducted along public access roads in suitable habitat within the Study Area and 1-mile buffer. Two separate rounds of lek surveys were conducted. The first round of surveys occurred between April 6 and 12, 2016. The second round of surveys occurred between April 25 and 29, 2016. Surveys were conducted from 0.5 hours before sunrise to 2 hours after sunrise, to coincide with peak lekking activity. During the surveys, observers stopped at listening stations located 0.5 mile apart for a minimum of 3 minutes, during which time the observer systematically scanned and listened for displaying sharp-tailed grouse. Observed leks were mapped and numbers of males and females were counted, if possible. Per standard protocol, the lek surveys were not conducted when winds exceeded 20 miles per hour, or if there was any type of precipitation event.

Results

Of the 122 listening stations identified during the desktop analysis, 78 were accessible by public roads, occurred in suitable habitat, and were surveyed. These listening stations were each surveyed twice between April 6 and April 29. Four sharp-tailed grouse leks were documented in the Study Area and a 1-mile buffer during the surveys (Figure 1). Two leks were detected during the first round of surveys (2016_01 and 2016_02), and all four leks were detected during the second round. The number of grouse observed at each lek ranged from 7 to 26 individuals. A total of 88 birds (46 males, 26 females, and 16 unknown) were recorded at the leks during the first round, and 85 birds (72 males, 5 females, and 8 unknown) were recorded at the leks during the second round, although this is a minimum count, as not all birds were visible from the road.

References

USFWS (United States Fish and Wildlife Service). 2012. Land-based Wind Energy Guidelines. Available online at: http://www.fws.gov/windenergy/docs/WEG_final.pdf



NEXTera ENERGY RESOURCES

Brady II Wind Energy Center

Figure 1
Lek Survey Results

Stark County, ND
April 2016

- Lek
- Study Area
- Study Area 1-mile Buffer

1:78,000 WGS 1984 UTM Zone 13N

0 0.5 1 2 3 4 Miles

TETRA TECH

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Bat Habitat Assessment

Brady II Wind Energy Center
Hettinger and Stark Counties, North Dakota

Prepared for:

Brady Wind II, LLC

700 Universe Blvd.

Juno Beach, Florida 33408

April 2016

TETRA TECH

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1.0 INTRODUCTION

Brady Wind II, LLC (Brady Wind II), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NextEra), is proposing to develop the Brady II Wind Energy Center (Project) in Hettinger and Stark Counties, located in southwestern North Dakota approximately 2 miles northeast of the city of New England (Figure 1). The Project has a proposed nameplate capacity of approximately 150 megawatts (MW), anticipated to consist of 72 General Electric (GE) wind turbine generators. Additional Project facilities include access roads, electrical collection systems and cabling, a collection substation, and meteorological towers.

Brady Wind II contracted Tetra Tech, Inc. (Tetra Tech) to evaluate the suitability of habitat for bats within the Study Area established for the Project and within a 1.5-mile buffer (Buffer Area) around the Study Area (Figures 2 and 3). The habitat evaluation focused on the federally listed threatened species, northern long-eared bat (*Myotis septentrionalis*; NLEB).

The objectives of the habitat assessments were to:

- Evaluate habitat features within the Study Area and Buffer Area for bats using a desktop approach, focusing specifically on NLEB;
- Assess the likelihood of NLEB and other bat species occurring within the Study Area and Buffer Area based on known distributions and habitat requirements of bat species in the region.

In October 2013, the NLEB was proposed for listing as endangered under the federal Endangered Species Act (ESA) and was listed as threatened with an interim 4d rule in April 2015 (USFWS 2013, USFWS 2015b). Under the final Section 4(d) rule, incidental take of NLEB is prohibited within the U.S. Fish and Wildlife Service (USFWS) White-Nose Syndrome (WNS) zone, which includes all counties affected by WNS and an additional 150-mile (241-km) buffer around these counties (USFWS 2016b). Lethal take by operating wind turbines is specifically excluded from this prohibition. Take incidental to otherwise lawful activities is not prohibited outside of the WNS zone designated by USFWS. The Study Area is outside of the area where incidental take due to hibernacula disturbance or tree removal is prohibited under the final 4d rule. Tetra Tech examined publically available information and habitat requirements of NLEB and other bat species that may occur in the vicinity of the Study Area, the results of which are summarized in Section 3.0. Sections are subdivided into habitat suitability for NLEB and all bat species.

Letters were sent to USFWS and North Dakota Game and Fish (NDGF) on November 18, 2015, and January 29 and April 14, 2016 introducing the proposed Project and requesting information on sensitive biological resources. NDGF responded with letters dated December 28, 2015 and February 26, 2016 with no specific mention of bats. No response from USFWS has been received to date.

2.0 BACKGROUND

This section describes the Study Area and includes background information on bats in the region, a summary of current information regarding bat interactions with wind energy projects, and a discussion of the legal and regulatory framework applicable to bats and wind energy.

2.1 Study Area Description

The 27,264-acre Study Area is located on privately owned lands in southwestern North Dakota and is approximately 15 miles south of Dickinson, approximately 2 miles southwest of Lefor, and approximately 2 miles northeast of New England (Figure 1). The Study Area is located in the Missouri Plateau subregion of the Northwestern Great Plains Ecoregion (Bryce et al. 1996). Bedrock geology in the ecoregion is primarily sandstone and shale and geology within the vicinity of the Study Area is sandstone and siltstone (Bryce et al. 1996, NDGS and NDDH 2001; Figure 4). Due to the local geology and topography, caves do not form regularly in the sandstone and siltstone of the Study Area and there no known caves within the Study Area. The closest known caves are Bear Cave (9 miles to the southwest) and Snow Cave (28 miles to the southwest) (Murphy 2007; Figure 4).

Land use within the ecoregion is primarily dryland farming and cattle grazing. Coal mining in western North Dakota for lignite coal deposits is common and primarily done through surface mining although underground mines are also used (Figure 4; Murphy n.d.; NDPSC 2013). The topography of the region is a semiarid rolling plain (Bryce et al. 1996). Vegetation in the region was historically mixed-grass prairie with blue grama (*Bouteloua gracilis*), little bluestem (*Schizachyrium scoparium*), prairie sandreed (*Calamovilfa longifolia*), and a wheatgrass-needlegrass association (Bryce et al. 1996). Native grasslands occur in areas of steep topography.

Based upon the National Land Cover Database (NLCD) information for the Study Area, the current land use in the Study Area is primarily cultivated crops (50.9 percent) and grassland/herbaceous, which includes native prairie (31.7 percent) (Figure 2; Jin et al. 2013). There are no major rivers or lakes within the Study Area; however, the Study Area contains numerous small streams and wetlands that vary from shallow vegetated depressions, man-made cattle ponds, and intermittent creeks. The closest major river is the Cannonball River located approximately 1 mile to the south of the Study Area (Figure 1). There are few wetlands evident that are not associated with a stream system. Trees and forested areas are restricted mainly to riparian areas and windbreaks for fields and for residences scattered throughout the Study Area. The topography within the Study Area is primarily rolling plains and lacks prominent landscape features (e.g., hills, valleys); the elevation ranges from 2,619 to 2,924 feet above mean sea level.

2.2 Wind Energy and Bats

Bat mortality associated with wind turbine operations has been reported at locations around the world, including wind energy facilities in the United States (Kunz et al. 2007, Arnett et al. 2008, Rydell et al. 2010, Hayes 2013). Rates of overall bat mortality from wind turbines vary by region (Arnett et al. 2008, Baerwald and Barclay 2009, Cryan 2011, Hein et al. 2013). The highest

numbers of fatalities reported in the United States are from wind energy facilities in the eastern U.S., particularly those located along forested ridges in the Appalachian region where annual mortality estimates have ranged from 20.8 to 69.6 bats per turbine per year, or 14.9 to 53.3 bats per MW per year (Arnett et al. 2008, Strickland et al. 2011). However, relatively high fatality estimates for bats also have been reported at wind energy facilities in agricultural settings in the central and Midwestern U.S. (Table 1; Jain 2005, Gruver et al. 2009, Poulton 2010).

Bat mortality at wind energy facilities is caused primarily by direct collision with moving turbine blades (Horn et al. 2008). There is little information about the indirect causal factors that influence bat mortality at wind energy facilities, although several hypotheses have been proposed (Kunz et al. 2007, Arnett et al. 2008, Cryan and Barclay 2009, Rydell et al. 2010). The current leading hypotheses are that bats are attracted to turbines for several reasons including as potential roosting locations (Kunz et al. 2007), potential pairing or mating sites (Cryan and Barclay 2009), or the potential accumulation of migratory insects around turbine rotors (Rydell et al. 2010). Thus, variables that may contribute to bat fatalities from wind turbines include, but are not limited to: the biology of the bat species, season, region, and turbine design (Kunz et al. 2007). Regardless of the specific causes of bat fatalities, two general patterns of fatalities are consistent across nearly all wind energy facilities:

1. Migratory tree-roosting bats represent the majority of fatalities; and
2. The majority of bat fatalities occur during late summer and early fall, coinciding with the fall migratory movements of bats (Arnett et al. 2008, Cryan 2011).

Some migratory bats travel long distances at altitudes that may overlap with the height of wind turbine blades, making them more susceptible to collisions. The probability of mortality events may also increase during periods of low wind speeds or low barometric pressure, which are conditions associated with increased bat activity (Arnett et al. 2008).

Tree bats, such as eastern red bats (*Lasiurus borealis*), silver-haired bats (*Lasionycteris noctivagans*), and hoary bats (*Lasiurus cinereus*), make long latitudinal migrations to warmer climates, and peaks in fatality rates appear to coincide with increasing bat activity levels associated with the southward migration of these species (Cryan 2003, Arnett et al. 2008). *Myotis* species are not considered particularly susceptible to direct mortality from wind turbines, but individuals, mostly little brown bat (*Myotis lucifugus*), have been found during mortality searches (Arnett et al. 2008, BHE Environmental 2011, Grodsky and Drake 2011).

NLEB may be most susceptible to impacts during the summer residency period if they are present and roosting habitat is cleared during wind project construction, as well as during the spring and fall periods when migrating bats, more likely to be flying within the rotor swept area (RSA), could collide with operational turbines. There are only 41 confirmed records of NLEB fatalities at wind energy facilities (USFWS 2015d). With the exception of fatalities in Missouri, all known NLEB fatalities from wind energy facilities are located east of the Mississippi River (USFWS 2015b). The greatest numbers of NLEB have been found at wind energy facilities on forested ridge tops in West Virginia, where a total of seven fatalities have been documented (Kerns and Kerlinger 2004, Young et al. 2009). NLEB mortality has also been documented in New York, Pennsylvania, and

Table 1. Estimates of Mean Bat Fatalities per Megawatt per Year at Wind Facilities in the northern Great Plains and Midwest Regions from Publicly Available Data.

Wind Facility[1]	State	Habitat	Turbine Model (turbine rotor-swept area)[2]	Estimated mean fatalities/MW/year	Bat Species Recorded as Fatalities (in order of decreasing frequency)	Source
Cedar Ridge	Wisconsin	Agricultural cropland	Unknown, 1.6MW (5,281 m^2)	30.40 (per 169 days)	hoary, silver-haired, big brown, eastern red, little brown	Poulton 2010
Blue Sky Green Field	Wisconsin	Agricultural cropland	Vestas V-82, 1.65MW (5,281 m^2)	24.57	little brown, silver-haired, big brown, hoary, eastern red, unidentified	Gruver et al. 2009
Forward Energy Center	Wisconsin	Agricultural cropland	GE 1.5MW (5,027 m^2)	15.63	hoary, silver-haired, eastern red, unidentified, little brown, big brown	Grodsky and Drake 2011
Top of Iowa (2004)	Iowa	Agricultural cropland	NEG Micon 52 (2,107.69 m^2)	7.94	hoary, little brown, eastern red , big brown, silver-haired	Jain 2005, Jain et al. 2011
Kewaunee County	Wisconsin	Agricultural cropland	Vestas 0.66MW (1,734 m^2)	6.45	eastern red bat, hoary bat	Howe et al. 2002
Top of Iowa (2003)	Iowa	Agricultural cropland	NEG Micon 52 (2,107.69 m^2)	4.94	hoary bat, little brown bat, eastern red bat, big brown bat, silver-haired bat	Jain 2005, Jain et al. 2011
Ainsworth	Nebraska	Mixed grass prairie	Vestas V82 (5,281 m^2)	1.16	hoary bat, unidentified bat species, big brown bat, eastern red bat	Derby et al. 2007
Oklahoma	Oklahoma	Mixed grass prairie	Unknown (4,657m^2)	0.79-1.06	Brazilian free-tailed, hoary bat, eastern red bat, eastern pipistrelle, cave myotis, silver-haired bat, big brown bat	Piorkowski and O'Connell 2010
Buffalo Gap II	Texas	Juniper-oak woodlands	1.5MW (Unknown)	0.14	Hoary bat, Brazilian free-tailed bat, unidentified	Tierney 2009

[1] Facilities arranged by estimated mean fatalities/MW/year

[2] If varying models were used in the project, the largest rotor-swept area is given.

Ontario, Canada (Arnett et al. 2005, Jacques Whitford 2009, Stantec 2011). Recently, WNS has caused large declines in populations of cave-hibernating species throughout eastern North America. WNS has been especially devastating to populations of species in the *Myotis* genus, including NLEB, prompting federal protection under the ESA for this species by USFWS (USFWS 2013, USFWS 2015b). In the final 4d rule, based on the small number of NLEB affected annually, USFWS concluded that adverse effects from wind energy and other activities will not lead to population-level declines of NLEB (USFWS 2016a).

2.3 Regulatory Framework

Although the majority of bird species in the U.S. are protected under the federal Migratory Bird Treaty Act, and selected bird species or groups of species are protected under other statutes, there are relatively few laws or regulations that protect bats. At the federal level, there are no laws or regulations specific to bats; existing environmental laws primarily address the protection of habitat favored by bats, such as caves, and prohibit wanton destruction of wildlife. Bat species determined to be at risk are listed under the federal ESA or at the state level.

Federal Protection

Of the 45 species of bats known to occur in the continental U.S., six species, and two subspecies are currently federally listed as endangered or threatened and protected under the ESA (USFWS 2015a): gray bat (*Myotis grisescens*), Indiana bat (M. *sodalis*), Florida bonneted bat (*Eumops floridanus*), Ozark big-eared bat (*Corynorhinus townsendii ingens*), Virginia big-eared bat (*C. t. virginianus*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae)*, Mexican long-nosed bat (L. *nivalis*), and NLEB. Of these species, only the NLEB is known to occur in North Dakota, although many areas of the state do not support suitable habitat for this species.

Northern Long-eared Bat

On April 2, 2015, the U.S. Fish and Wildlife Service (USFWS) announced that the NLEB was listed as threatened with an interim Section 4(d) rule. The intent of the 4(d) rule is to provide the USFWS flexibility in implementing the ESA by modifying regulations necessary to provide for the conservation of a threatened species while not overburdening private landowners, state agencies, and others with blanket regulations that do not further the conservation of the species. The 4(d) rule underwent a 60-day comment period when the proposed rule was first published on January 16, 2015, and a second 90-day public comment period on the interim rule to engage with stakeholders on whether additional exemptions should be included under the rule (USFWS 2015b). Comments were incorporated in a complete review pursuant to the National Environmental Policy Act (NEPA) leading to the final 4(d) rule released on January 14, 2016 (USFWS 2016a). The Service determined that White-Nose Syndrome (WNS) is the primary threat to NLEB and regulating other sources of mortality or harm, such as from habitat loss, will not effectively conserve this species. The final rule reduces the scope of incidental take of NLEB (USFWS 2016a).

The final 4(d) rule prohibits all *purposeful take*[1] within the range of NLEB except: removal of NLEB from human structures, defense of human health (disease monitoring), or removal of hazardous trees for the protection of human life and property. All take incidental to otherwise lawful activities is allowed outside of the WNS zone designated by USFWS. The WNS zone includes all counties affected by WNS and an additional 150-mile buffer around these counties (Figure 5; USFWS 2016b).

For areas within the WNS zone, *incidental take*[2] is prohibited only if it occurs within a hibernaculum, if tree removal activities occur within a quarter-mile of a known, occupied hibernaculum at any time of year or within 150 feet of a known, occupied maternity roost tree from June 1 through July 31 (USFWS 2016a).

Under the final 4(d) rule, incidental take by wind turbines is not prohibited. Regulatory mechanisms for wind energy facilities were not included in the final 4(d) rule because the primary factor causing the rapid population decline in NLEB is WNS and the best available information suggests that NLEB fatalities caused by wind facilities are not contributing significantly to the species' decline. However, because harm to individual bats by turbines may occur, the USFWS recommends adopting voluntary protocols for best management practices, such as limiting operations of turbines in low-wind speed conditions during the fall bat migration season, to reduce impacts to bats (USFWS 2016a). The Study Area is outside of the WNS zone and therefore no forms of incidental take are prohibited; however, this area may change in the future if new occurrences of WNS are discovered. The USFWS database and WNS Zone Map is updated on a monthly basis[3] (Figure 5).

State Protection

The protection and regulation of bat species not listed under the federal ESA is typically at the discretion of state wildlife agencies. North Dakota does not have a state endangered or threatened species list, but NDGF has identified 100 species of conservation priority, or those in greatest need of conservation in the State (Dyke 2014) to aid in managing these species and prioritizing their conservation; however, these species are not afforded regulatory protection.

Species are categorized into three levels according to conservation need:

- Level I – species in greatest need of conservation;
- Level II – species in need of conservation, but have had support from other wildlife programs; and

[1] "Purposeful take is when the reason for the activity or action is to conduct some form of take. For instance, conducting a research project that includes collecting and putting bands on bats is a form of purposeful take. Intentionally killing or harming bats is also purposeful take and is prohibited" (USFWS 2016c).
[2] "Incidental take is defined by the Endangered Species Act as take that is incidental to, and not the purpose of the carrying out of an otherwise lawful activity. For example, harvesting trees can kill bats that are roosting in the trees, but the purpose of the activity is not to kill bats" (USFWS 2016c).
[3] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf

- Level III – species in moderate need of conservation, but are believed to be on the edge of their range in North Dakota.

There are four bat species on the conservation priority list categorized as Level I: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), little brown bat, and NLEB. Townsend's big-eared bat is rare and most suitable habitat in the state exists in the Little Missouri breaks, approximately 19 miles west of the Study Area. Big brown bat and little brown bat are common throughout the state while the NLEB is considered to be near the western edge of its range and rare in the state.

There are no bat species on the conservation priority list categorized as Level II.

There are three bat species on the conservation priority list categorized as Level III: western small-footed bat (Myotis *ciliolabrum)*, long-eared bat (*Myotis evotis)*, and long-legged bat (*Myotis volans*). These species are known to occur in western North Dakota.

Voluntary Guidelines for Wind Power Projects

The USFWS has developed voluntary Land-Based Wind Energy Guidelines (WEG; USFWS 2012), a non-regulatory, tiered framework for assessing risk and collecting data on wildlife for wind energy projects. These guidelines are voluntary. This bat habitat assessment is consistent with the USFWS recommendations for Tier 2 – Site Characterization in the voluntary WEG. North Dakota has not developed state-specific siting guidelines for wind power developers and other stakeholders for the consideration of potential wind power projects located in North Dakota but defers to the USFWS guidelines (ASFWA 2010).

3.0 SPECIES EXPECTED TO OCCUR IN THE PROJECT VICINITY

Tetra Tech evaluated the potential for all bats known to occur in North Dakota to use the Study Area, with a focus on NLEB. Tetra Tech considered the habitat suitability of both the Study Area and Buffer Area (a 1.5-mile buffer around the Study Area) to develop the list of species expected to occur. The Buffer Area is based upon the NLEB Interim Conference and Planning Guidance from the USFWS, and is the foraging range from roosts used to estimate home ranges for NLEB (USFWS 2014b).

Identifying if a species' constituent habitat elements for roosting and foraging occur in an area is key to determining habitat suitability (Duchamp et al. 2004). Habitat variables evaluated in this assessment included the amount of suitable foraging and roosting habitat, as well as potential migration and movement corridors in and near the Study Area. Habitat variables reviewed in the assessment included identification of the bat species known to occur in the region surrounding the Study Area and their behavioral characteristics relative to roosting, foraging, and migratory activity. This information was used to derive a high, moderate, or low likelihood of occurrence in the Study Area for each species with ranges overlapping the Study Area, and specifically the NLEB (see Table 2 for likelihood of occurrence criteria).

All Bat Species

A total of 11 bat species are known to occur in North Dakota (Table 2; Gullickson *n.d.,* BCI 2016). Of these 11 species, available information about species-specific suitable habitat, known distribution ranges, and documented occurrences indicate that five species (big brown bat, little brown bat, red bat, hoary bat, and silver-haired bat) are expected to have a moderate or high likelihood to occur within, and in the vicinity of the Study Area, and the remaining six species (Townsend's big-eared bat, fringed bat [*Myotis thysanodes*], long-eared bat, long-legged bat, western small-footed bat, and NLEB) are expected to have a low likelihood of occurrence.

Roosting colonies of big brown bat and little brown bat have a high probability of occurring within the Study Area because of their known association with edge habitats and human-made structures (Table 2). Little brown bats are thought to be the most common bat in North Dakota (Gullickson *n.d.*). In addition, big brown bats are known to forage in agricultural lands (Whitaker 1995, Rogers et al. 2006). Both species have been documented as fatalities at wind energy projects (Arnett et al. 2008).

Eastern red bat, hoary bat, and silver-haired bat have a moderate likelihood of occurring in the Study Area, primarily during migration. These species have been the predominant species found during post-construction mortality studies at operational wind energy facilities in North America (Arnett et al. 2008). The eastern red bat, hoary bat, and silver-haired bat are all associated with forested habitats and would most likely occur in small woodlots while moving through the Study Area during migration (Table 2). Each of these species are found in North Dakota from May through September (Cryan 2003, Cryan and Veilleux 2007).

The remaining species found in North Dakota (Townsend's big-eared bat, fringed bat, long-eared bat, long-legged bat, western small-footed bat, and NLEB) are expected to have a low likelihood of occurrence in the Study Area based upon species range, known habitat associations, and occurrence of similar habitats within the Study Area.

Northern Long-eared Bat

NLEB are expected to have a low likelihood of occurrence within the Study Area and Buffer Area during the summer residency period and during migration due to lack of suitable habitat and distance to known occurrences. The species' range includes Hettinger County and Stark County (USFWS 2013, USFWS2015b, BCI 2016; Figure 5). Few data are available on NLEB in North Dakota; however, the species is believed to occur statewide in suitable habitats (Harvey et al. 2011; Gullickson *n.d.*). Surveys conducted in the summers of 2009, 2010, and 2011, confirmed the presence of NLEB in the Turtle Mountains (approximately 200 miles northeast of the Study Area), Missouri River Valley (approximately 50 miles northeast of the Study Area), and in the Badlands regions (approximately 200 miles south of the Study Area; Gilliam and Barnhart 2011). The species has recently been detected in Billings and Hettinger counties (Gilliam and Barnhart 2011, WAPA and USFWS 2015), and could occur in the Study Area during seasonal movements to and from hibernacula; however, no hibernacula are known to occur in the state.

Table 2. Bat Species Known to Occur in North Dakota and their Likelihood of Occurrence at the Brady II Wind Energy Center, Hettinger and Stark Counties, North Dakota.

Likelihood of Occurrence[1]	Common Name	Scientific Name	Habitat Association[2]	Wind-energy Fatalities
High	Little brown bat	*Myotis lucifugus*	Found in close proximity to a water source for foraging and in close proximity to human-made structures. Roosts in tree cavities, caves and human-occupied structures.	Relatively few fatalities documented in North America (Arnett et al. 2008)
High	Big brown bat	*Eptesicus fuscus*	Habitat generalist found in deciduous forests, urban development, and agricultural croplands. Roosts in tree cavities, under loose bark, buildings, mines, bridges, caves, and crevices in cliff faces.	Relatively few fatalities documented in North America (Arnett et al. 2008).
Moderate	Eastern red bat	*Lasiurus borealis*	Migratory Species. Found in hardwood deciduous forests. Generally found in close association with riparian areas. Roosts in foliage of trees.	One of most common fatalities documented in North America; fatalities assumed to be migratory individuals (Johnson et al. 2002, Kunz et al. 2007)
Moderate	Hoary bat	*Lasiurus cinereus*	Migratory Species. Forested upland habitats, including bottomland hardwoods. Roosts in foliage of trees along the edge of clearings.	Most common fatality documented in North America; fatalities assumed to be migratory individuals (Kunz et al. 2007, Arnett et al. 2008)
Moderate	Silver-haired bat	*Lasionycteris noctivagans*	Migratory Species. Closely associated with conifer and mixed hardwood forests; Generally found in association with riparian areas. Roosts in foliage of trees.	One of most common fatalities in North America; fatalities assumed to be migratory individuals (Johnson et al. 2002, Kunz et al. 2007)
Low	Fringed bat	*Myotis thysanodes*	Found in a variety of habitats. Oak and pinyon woodlands are the most commonly used. Roosts in caves, mines, and buildings.	None documented
Low	Long-eared bat	Myotis evotis	Found associated with caves and mines, and closely associated with human-made structures	None documented
Low	Long-legged bat	*Myotis volans*	Found in rugged, rocky terrain in variety of habitats. Roosts in trees, rock crevices, and buildings.	None documented
Low	Northern long-eared bat	*Myotis septentrionalis*	Forages along forested hillsides and ridges. Roosts in cavities, caves and mines, underneath bark, or in crevices of trees and snags; rarely roosting in barns. Hibernate in caves and mines.	Relatively few fatalities documented in North America (Arnett et al. 2008)
Low	Townsend's big-eared bat	*Corynorhinus townsendii*	Typically found in arid western desert scrub and pine forest regions. In spring and summer, females form maternity colonies and males roost individually. Hibernates in caves and abandoned mines.	None documented
Low	Western small-footed bat	*Myotis ciliolabrum*	Found in rugged, rocky terrain in variety of habitats. Roosts in rock crevices, caves, tunnels, buildings, and underneath bark.	None documented

[1] Likelihood of Occurrence: **High** = Suitable habitat, species range overlaps with the Study Area, and known occurrences within and/or near the Study Area. **Moderate** = Species known to occur in habitat similar to the Study Area, species' range overlaps with Study Area, and known occurrences near the Study Area. **Low** = Marginally suitable habitat in the Study Area, species' range does not overlap with the Study Area, no known occurrences within and/or near the Study Area, and/or known as migratory species during spring and fall migration.
[2] Sources: Gullickson *n.d.*, Western Bat Working Group 2005, Harvey et al. 2011, Bat Conservation International (BCI) 2016, American Society of Mammologists 2015.

4.0 HABITAT ASSESSMENT

The habitat assessment was conducted via a desktop evaluation of land cover and land uses within the Study Area and the 1.5-mile Buffer Area (Figures 2 and 3). Identification of suitable habitats in the Study Area, and the bat species that may use these habitats, may prove helpful when designing the Project to minimize interactions between wind turbines and bats (Duchamp et al. 2004). Habitat variables evaluated in this assessment included the amount of suitable foraging and roosting habitat, as well as potential migration and movement corridors in and near the Study Area.

Although there are still substantive information gaps on bat migration patterns across North America, there is speculation that bats migrate in a similar manner to some birds (i.e. possibly as broad-frontal migration; Cryan 2003). Migratory bats moving through the Study Area during migration may be at risk of colliding with wind turbines regardless of habitat conditions. The likelihood of mortality or other impacts during migration on NLEB, and other bats, is difficult to determine based on available data.

4.1 Land Use and Land Cover

Land use and land cover types in the Study Area and Buffer Area were characterized using the National Land Cover Database in Geographic Information System software (Jin et al. 2013). Habitats were compared between the Study Area and Buffer Area to understand if bats would be likely to select habitat within the Study Area in the context of the surrounding landscape. For example, if the Study Area supported a relatively higher concentration of suitable habitat areas than the Buffer Area, it is possible the site would concentrate bats in densities slightly higher than the surrounding areas.

The Study Area and Buffer Area contain the same land uses and cover types and based on the percentage of cover types available in the Study Area versus the Buffer Area. It is unlikely that bats would use the Study Area disproportionately for roosting or foraging over other areas in the vicinity. The percentage of suitable bat habitat cover types (shown in bold in Table 3) are similar between the Study Area and the Buffer Area. Although the Buffer Area is larger than the p Study Area, both are dominated (greater than 82 percent) by cultivated crops and grassland/herbaceous cover types. The majority of cover within the Study Area is cultivated crops (50.9 percent) and grassland/herbaceous (31.7 percent), as is the majority of cover within the Buffer Area (62.4 percent cultivated crops and 23.3 percent grassland/herbaceous). Suitable bat habitat (open water, emergent herbaceous wetlands, deciduous forest, evergreen forest, mixed forest, shrub/scrub, and woody wetlands) comprises 1.8 percent of the total Study Area and 1.7 percent of the Buffer Area.

Table 3. Land Use and Land Cover Present in the Study Area and Buffer Area, Hettinger and Stark Counties, North Dakota.

Land Use/Land Cover Description	Acres in Study Area	Percent of Study Area	Acres in 1.5 mile Buffer Area	Percent of 1.5 mile Buffer Area
Cultivated Crops	13,889	50.9	48,329	62.4
Grassland/Herbaceous	8,646	31.7	18,009	23.3
Pasture/Hay	3,067	11.3	6,607	8.5
Developed, Open Space	1,150	4.2	3,038	3.9
Developed, Low Intensity	19	0.1	92	0.1
Developed, Medium Intensity	N/A	N/A	2	Less than 0.1
Shrub/Scrub	**164**	**0.6**	**540**	**0.7**
Woody Wetlands	**254**	**0.9**	**605**	**0.8**
Deciduous Forest	**46**	**0.2**	**64**	**Less than 0.1**
Emergent Herbaceous Wetlands	**12**	**Less than 0.1**	**32**	**Less than 0.1**
Evergreen Forest	**3**	**Less than 0.1**	**5**	**Less than 0.1**
Open Water	**12**	**Less than 0.1**	**83**	**0.1**
Barren Land (Rock/Sand/Clay)	N/A	N/A	2	Less than 0.1
Total	27,264	100	77,407	100

Note: Bold text indicates habitat types that are most suitable for bat foraging and roosting habitat.

4.2 Roosting Habitat

Non-migratory bats use caves or similar habitat for winter hibernacula, and then disperse onto the landscape for the active period (typically April 15 – November 15) and shelter in "summer roosts". Similarly, migratory bats migrate north from wintering areas and use some of the same habitat features (e.g., tree cavities and bark) as non-migratory species during the summer. This section describes summer roosting habitat in the Study Area; winter hibernacula are discussed in Section 4.3. Summer roosts provide important shelter from the environment and adverse weather, resting places during migration or regional movements, protection from predators, and are used for social interaction and rearing of young. Due to bats' dependence on roost structures during all stages of their life cycle; the preservation of summer roosting habitat, as well as winter hibernacula, has been identified as critical for the conservation of bats in North America (Kunz 1982, Kunz and Fenton 2003).

All Bat Species

Bats may roost in rock formations, caves, human-made structures, live trees (often in the foliage), dead trees (snags), and partially dead trees (partial snags) with cavities and loose bark. North Dakota's species can be broadly classified as tree-roosting bats (those that roost in live trees, snags, and partial snags) and species adapted to roosting in multiple habitats (generalists that

roost in natural habitat, but also frequently roost in human-made structures such as barns) (Harvey et al. 2011).

Most tree-roosting species (including silver-haired bat) prefer larger trees that are large enough to contain colonies and sustain adequate temperatures, which are often found in older forest stands (Crampton and Barclay 1998, Barclay and Brigham 1996). Migratory tree bats (hoary bat and eastern red bat) often prefer to roost in the foliage of live trees (Kunz 1982, Harvey et al. 2011), and NLEB may also roost in live trees that contain cavities. Suitable natural roosting habitats in the Study Area are limited to individual trees, windrows, woodlots, and riparian zones. These wooded locations are generally near homes, along riparian corridors, or are planted windbreaks. The availability of tree-roosting habitat in the Study Area is limited due to the small size and fragmented nature of the wooded habitat and accounts for 1.1 percent of the Study Area. Therefore, roost tree availability is almost certainly a limiting factor to the occurrence of bats in the Study Area (Carter and Menzel 2007).

In addition to trees, potential roosting locations are also available in farmstead buildings (houses, barns, etc.). The suitability of these man-made structures has not been evaluated. However, they are present in the Study Area and Buffer Area and could potentially be used by roosting bats. There are no known abandoned mines within the Study Area that bats could use for roosting (Figure 4; NDPSC 2013).

Northern Long-eared Bat

During the spring, summer, and early fall, NLEB roost in suitable forest habitat typically within 50 miles of wintering sites (USFWS 2013). Like other North American forest bats, reproductive NLEB females will roost colonially during the late-spring and summer maternity period (approximately May to July). Maternity colonies (averaging 30–60 individuals) are most frequently found in mature forests, with a higher abundance of standing dead trees (snags), but the species also may roost in partially live or live mature trees. NLEB typically roost in the bark or cavities of trees, versus foliage like other tree bats (USFWS 2015b). Both male and female NLEB generally prefer dead trees or live trees in early stages of decline (USFWS 2015b). Less commonly, NLEB summer day roost sites may also include human-made structures, including a variety of shelters such as buildings, behind shutters, under live tree bark, and in small tree cavities (Harvey et al. 2011). Roosts are often used for a period of 2–11 nights, but maternity colonies may be occupied for longer. Because of NLEBs' preference for switching roosts, multiple suitable roosting locations in a given forested patch may be indicative of higher quality summer habitat. Summer home ranges for females are estimated to be between 47 and 425 acres (USFWS 2013).

There is no interior forest habitat (wooded habitat at least 300 feet from non-forest land cover) among 15 forested areas in the Study Area and none within the Buffer Area. The majority of forests within the Study Area are associated with riparian areas rather than ridges, which are preferred by NLEB (USFWS 2014b). The only potentially suitable NLEB roosting habitat in the Study Area consists of trees associated with riparian features and small woodlots or windbreaks near homesteads. Although these sites do contain suitable roost trees, they are isolated and not connected with or contiguous to other forest patches and account for 1.1 percent of the Study

Area. Average forest patch size in the Study Area is approximately 1.1 acres and the average forest patch size in the Buffer Area is approximately 1.0 acres. There is evidence suggesting that NLEB select forest patches with greater connectivity to other patches and larger forest patches with a closed canopy (mature forests) than those available in the Study Area (USFWS 2015b, USFWS 2013).

4.3 Winter Habitat

Of the bat species with a moderate or high likelihood of occurring in the Study Area, silver-haired bat, hoary bat, and eastern red bat migrate to southern latitudes during winters. The remaining species, big brown bat and little brown bat, hibernate locally or regionally. The NLEB also hibernates locally. This section focuses on winter habitat for NLEB in the Study Area vicinity, and briefly touches on the suitability of winter habitat for other species as well.

Northern Long-eared Bat

NLEB do not undertake long-distance seasonal migrations between summer and winter ranges but do undertake shorter distance movements between summer roosts and winter hibernacula. These seasonal movements are generally between 35 miles and 55 miles, but may be substantially longer in some areas, perhaps as great as 168 miles (USFWS 2013). Information on habitat use during migration is limited, but individuals in transit are likely to use foraging habitats at least part of the time.

NLEB arrive at hibernacula in August or September, begin hibernation in October and November, and exit hibernacula in March or April (USFWS 2013). NLEB prefers hibernacula with large entrances such as caves and mines, as well as less traditional hibernacula including dams, dry wells, and other human-made structures. Individuals may hibernate in cracks and crevices in hibernacula walls, and as such, may be overlooked during winter surveys. Although NLEB are often found with other congeneric species (i.e. *Myotis* spp.), they generally prefer cooler temperatures and higher humidity (USFWS 2013). Hibernacula where NLEB occur may also be used by big brown bat and little brown bat, and possibly western small-footed bat (*Myotis ciliolabrum*; Brack et al. 2010).

There are no caves or other natural rock or crevice formations in the Study Area or Buffer Area that would be suitable hibernacula (Murphy 2007, NDGS and NDDH 2001). The closest caves are Bear Cave, which is 9 miles to the southwest, and Snow Cave, approximately 28 miles to the southwest (Figure 4). Bear Cave extends only 12 feet into the rock and Snow Cave has been destroyed by falling rock and erosion (Murphy 2007). There are no abandoned mines within the Study Area; the closest mines that could provide potential roosting habitat for bats are approximately two miles south of the Study Area (Figure 4; NDPSC 2013). The suitability of these mines for roosting bats is unknown. No known hibernacula for NLEB have been documented in North Dakota, although a thorough assessment of potential hibernacula in western North Dakota has not been completed (USFWS 2013). The closest known hibernacula occur in the Black Hills of Wyoming and South Dakota over 150 miles to the southwest (USFWS 2013).

4.4 Foraging Habitat

Foraging habitats are not necessarily exclusive of roosting or migrating habitat. However, there are notable preferences among species for different foraging habitats, which are often different from preferred roosting locations (Harvey et al. 2011).

All Bat Species

All bats known to occur in North Dakota are insectivorous, and feed on a variety of prey, including moths, beetles, flies, and mosquitoes (Kunz and Fenton 2003). Bats typically forage in areas with high prey concentrations (i.e. high nocturnal insect densities) in riparian areas (Waldien and Hayes 2001), over waterbodies (Henry et al. 2002, Lacki et al. 2007), and along forest edges (Hayes and Gruver 2000, Rogers et al. 2006). Non-developed and non-agricultural types of habitats (open water, forested, wetlands, and scrub/shrub) provide the best foraging opportunities for bats and account for 1.8 percent of the Study Area. Although there is some evidence to indicate that some species, such as the big brown bat, prefer foraging over agricultural lands (Rogers et al. 2006, BCI 2014), agricultural lands (cultivated crops and pasture/hay) within the Study Area are typically the least suitable locations for foraging and account for approximately 62.2 percent of the Study Area.

Northern Long-eared Bat

Unlike other *Myotis* in the region that typically forage along streams and within floodplains, NLEB are adapted to gleaning and hawking for insects in the sub-canopy of deciduous and mixed forests and therefore typically forage along ridge tops and forested hillsides (Harvey et al. 2011). However, foraging may also occur in forest clearings, above roadways, and along trails or near water (USFWS 2013). Agricultural lands (cultivated crops and pasture/hay) are the least suitable locations for NLEB foraging and comprise approximately 62.2 percent of the Study Area. Suitable foraging habitat for NLEB includes forested areas, wind breaks, riparian corridors, and open water areas in the Study Area. This suitable foraging habitat accounts for 1.2 percent of the Study Area, which is a small percentage of overall land cover.

4.5 Bat Migration and Movement Characteristics

Bat migration includes seasonal movement from summer residency areas to wintering areas. Wintering areas for long-distance migrants are typically in southern latitudes (Fleming and Eby 2003). Long-distance migratory bats such as the eastern red bat, silver-haired bat, and hoary bat undertake seasonal movements greater than 62 miles and less than 1,200 miles (Cryan 2003, Cryan 2011). Wintering areas for other species include natural or man-made hibernacula (Fleming and Eby 2003). NLEB, little brown bat, and others migrate short distances from summer colonies to winter hibernacula (i.e. partial or short-distance migration) (Fleming and Eby 2003). Most species, including NLEB, are thought to move along linear landscape features that connect habitats, such as horizontal forest features, (e.g., forest edges), vertical forest features (e.g., between forest canopy structures), or riparian corridors (Hayes and Gruver 2000, Downs and Racey 2006, Furmankiewicz and Kucharska 2009). Beyond these generalities, the current understanding of bat migration is limited (Baerwald and Barclay 2009, Cryan 2011).

NLEB and other species may fly thorough the Study Area during spring and fall migration en route to hibernacula. The Study Area contains small forested riparian corridors that bats could follow or use as day roosting sites, although these are not significant features from a regional perspective. The limited roosting habitat within the Study Area is a major limiting factor for use of the Study Area by migrating bats. Therefore, bat migration through the Study Area is likely low in magnitude.

5.0 NORTHERN LONG-EARED BAT HABITAT SUITABILITY CONCLUSION

The NLEB Guidance (USFWS 2014b) includes a stepwise assessment approach with specific questions intended to facilitate review of potential impacts to the species. The following questions (in bold) and responses are based on our current knowledge of the Study Area and the results of the 2015 desktop habitat assessment. Sections 4.1 – 4.5 provide information requested by USFWS for habitat assessments, as part of the NLEB interim guidance (USFWS 2014b, USFWS 2015e).

Is the project within the range of NLEB?

Yes. The Study Area is within the range of NLEB (Gullickson *n.d.*, Harvey et al. 2011, USFWS 2016b).

Is suitable summer or winter habitat present?

No. There are no known hibernacula within the Study Area, and although small plots of forested areas are present within the Study Area, they are not considered suitable summer habitat due to their small size and fragmented nature. Approximately 1.1 percent of the 27,264-acre Study Area is forested. Forested habitat in the Study Area (woody wetlands, evergreen forest, and deciduous forest) is relegated to small woodlots that are disconnectedly distributed along riparian areas, as woody wetlands, and as windbreaks along fields or at homesteads. Large, contiguous tracks of upland forested habitat, preferred by NLEB, are not present in the Study Area.

Based on the desktop habitat assessment, the NLEB has a low likelihood to occur in the Study Area during the summer residency period (approximately May 15–August 15) because of the lack of large contiguous woodlots and due to the species being uncommon in the far western extent of its range, which includes the Study Area. The species could occur in the Study Area during seasonal movements to hibernacula. Although we have not assessed the Study Area for potential winter hibernacula, Tetra Tech is not aware of any available data that indicate the occurrence of NLEB hibernacula in western North Dakota and no hibernacula are known in the state (USFWS 2013).

Is lethal take during migration possible?

NLEB have been found during mortality searches at wind energy facilities (e.g., Arnett et al. 2005, Jacques Whitford 2009), so lethal take is possible if NLEB migrate through the Study Area. However, the occurrence of the species in North Dakota, including potential winter hibernacula, is poorly understood and NLEB are expected to be uncommon or rare

in western North Dakota (USFWS 2013). Therefore, the likelihood of NLEB occurring in the Study Area during the summer residency period is low. No clear migratory pathways, or known hibernacula are in the Study Area or vicinity; however, migration patterns are poorly understood. The likelihood of the species occurring during the migration period (spring and fall) is expected to be low because of distance to known hibernacula and low availability of suitable foraging or roosting habitat in the Study Area and Buffer Area. With the exception of fatalities in Missouri, records of NLEB mortalities at wind energy facilities are from projects east of the Mississippi River.

Is there an existing summer or winter occurrence record near the Study Area (e.g., within 1.5 miles of a known roost tree, 3 miles of capture location, or 5 miles of a hibernaculum)?

Tetra Tech is not aware of any existing summer or winter occurrence records within 5 miles of the Study Area.

Was the presence of NLEB documented during surveys?

Acoustic monitoring for bat species started at the proposed Brady II Wind Energy Center in April 2016.

Is this an existing or ongoing project within the range of the Indiana bat with a prior determination for Indiana bat?

No. The Study Area is outside of the range of the Indiana bat.

5.1 Critical Habitat for Listed Species

At the time this report was prepared, the USFWS has not designated or proposed any critical habitat for NLEB and no bats with designated critical habitat occur within the Study Area (USFWS 2013, USFWS 2015b). If USFWS designates critical habitat for NLEB, designated areas would likely consist of large well-known hibernacula, similar to critical habitat designated for the Indiana bat.

6.0 SUMMARY

There is little suitable roosting or foraging habitat in the Study Area or within the Buffer Area for the NLEB. There is slightly more suitable roosting and foraging habitat for other bat species, primarily big brown bat and little brown bat, in the Study Area and the Buffer Area. The small size and small number of wooded parcels in the Study Area and the Buffer Area likely limits the density and diversity of bats in the Study Area. Because of this lack of forested habitat within the Study Area and Buffer Area and the location of the Study Area at the edge of the species' range, NLEB have a low likelihood of occurring in the Study Area. There are no known NLEB hibernacula in North Dakota and the NLEB is considered to be rare in the state (USFWS 2013, Dyke 2014).

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FIGURES

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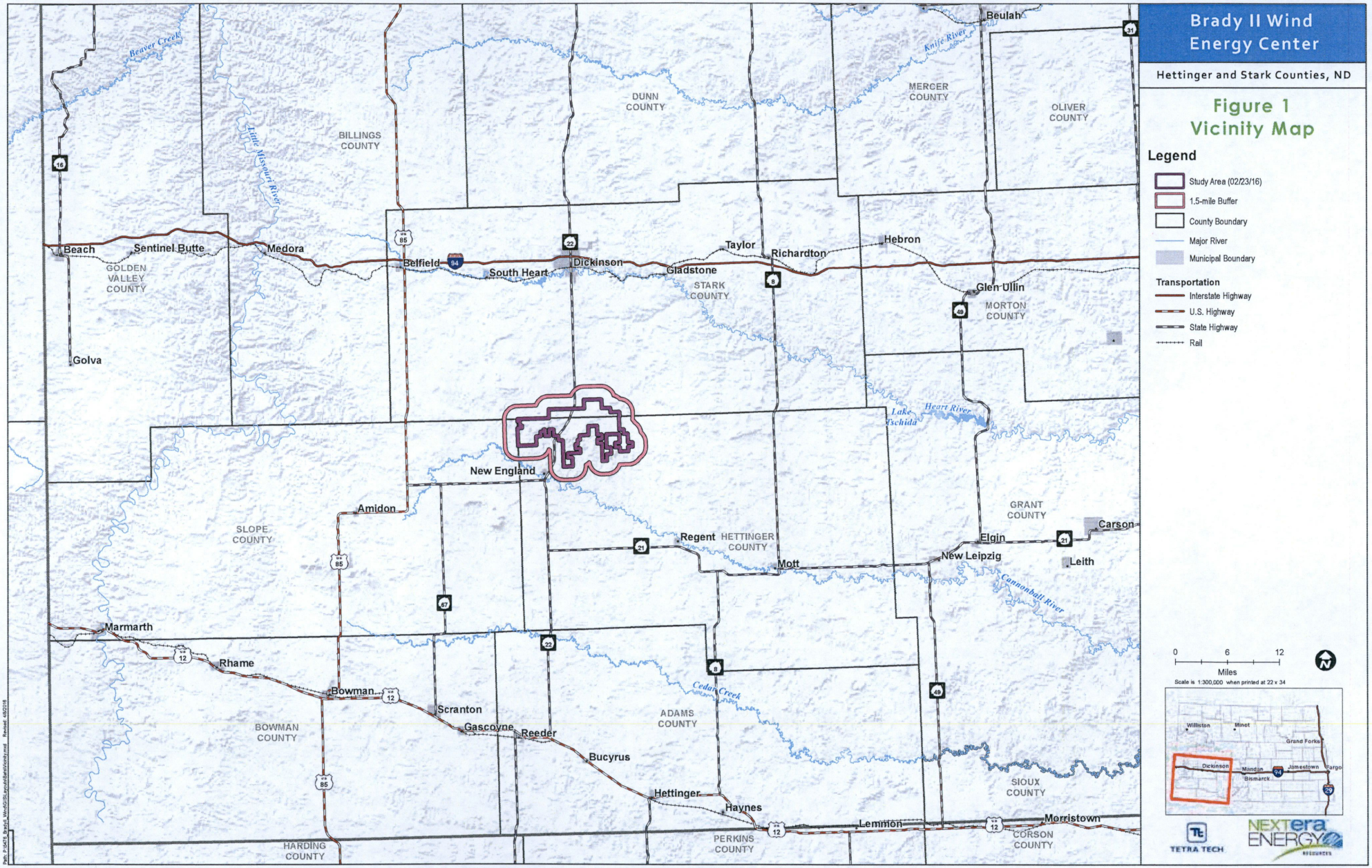
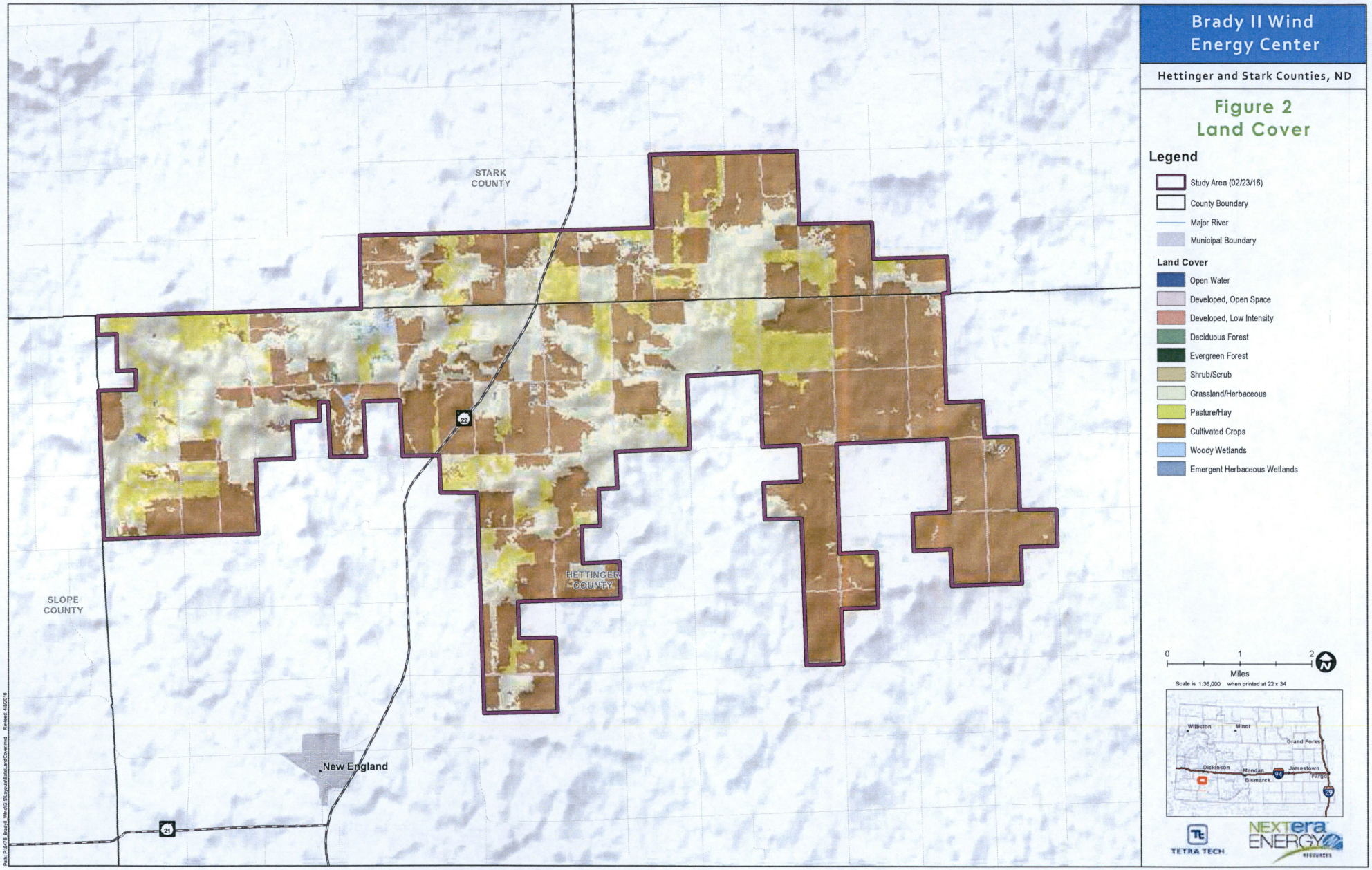
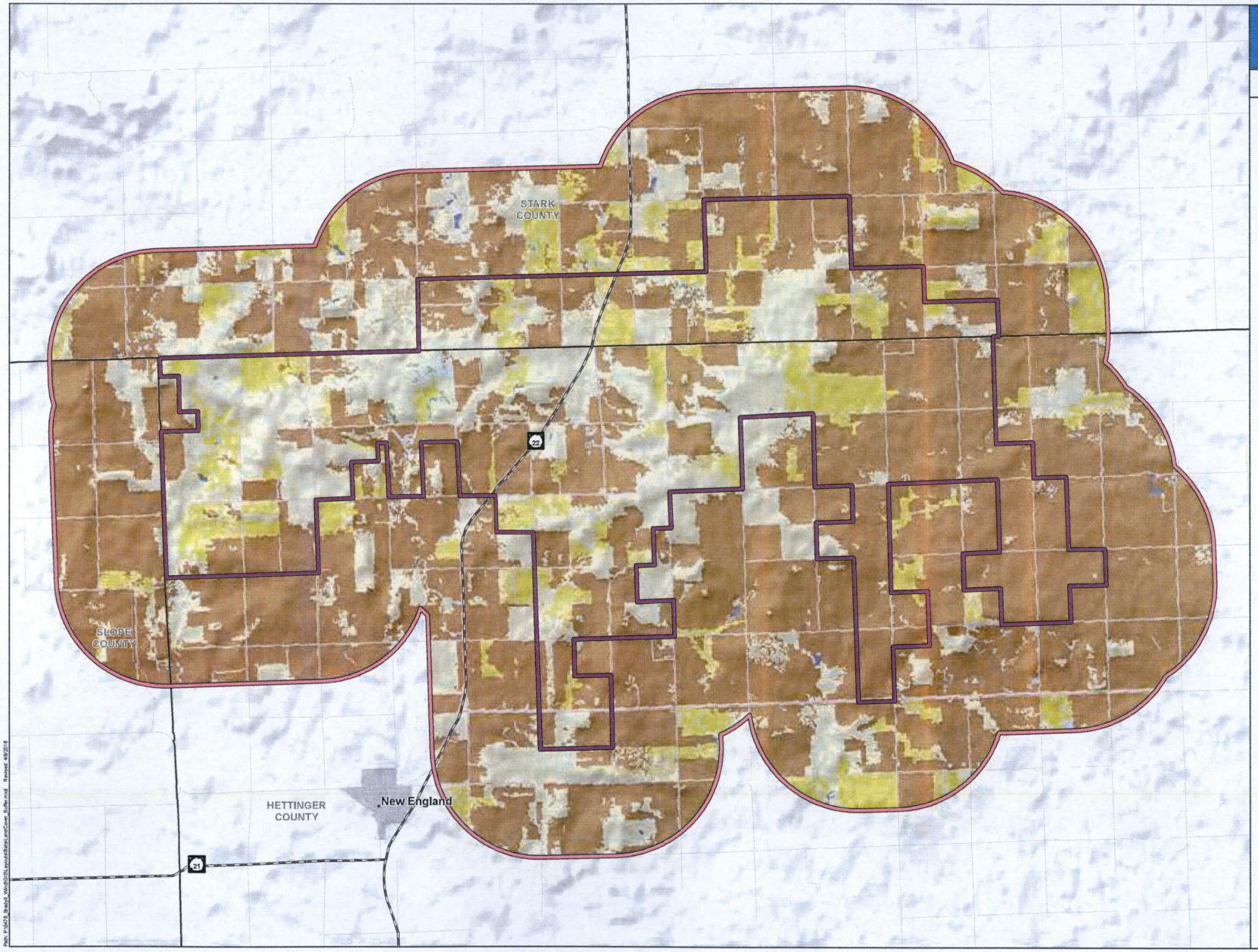

Brady II Wind Energy Center
Hettinger and Stark Counties, ND
Figure 1
Vicinity Map
Legend
Study Area (02/23/16)
1.5-mile Buffer
County Boundary
Major River
Municipal Boundary
Transportation
Interstate Highway
U.S. Highway
State Highway
Rail
Beulah
Knife River
MERCER COUNTY
OLIVER COUNTY
DUNN COUNTY
BILLINGS COUNTY
Beaver Creek
Little Missouri River
Beach
Sentinel Butte
Medora
Belfield
South Heart
Dickinson
Gladstone
Taylor
Richardton
Hebron
Glen Ullin
GOLDEN VALLEY COUNTY
STARK COUNTY
MORTON COUNTY
Golva
Lake Tschida
Heart River
New England
Amidon
SLOPE COUNTY
Regent
HETTINGER COUNTY
Mott
Elgin
New Leipzig
Carson
Leith
GRANT COUNTY
Cannonball River
Marmarth
Rhame
Bowman
Scranton
Gascoyne
Reeder
Bucyrus
Hettinger
Haynes
Lemmon
Morristown
Cedar Creek
ADAMS COUNTY
BOWMAN COUNTY
SIOUX COUNTY
HARDING COUNTY
PERKINS COUNTY
CORSON COUNTY
0 6 12
Miles
Scale is 1:300,000 when printed at 22 x 34
Williston
Minot
Grand Forks
Dickinson
Mandan
Bismarck
Jamestown
Fargo
TETRA TECH
NEXTera ENERGY


STARK COUNTY
HETTINGER COUNTY
SLOPE COUNTY
New England
22
21
Brady II Wind Energy Center
Hettinger and Stark Counties, ND
Figure 2
Land Cover
Legend
Study Area (02/23/16)
County Boundary
Major River
Municipal Boundary
Land Cover
Open Water
Developed, Open Space
Developed, Low Intensity
Deciduous Forest
Evergreen Forest
Shrub/Scrub
Grassland/Herbaceous
Pasture/Hay
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
0
1
2
Miles
Scale is 1:36,000 when printed at 22 x 34
Williston
Minot
Grand Forks
Dickinson
Mandan
Bismarck
94
Jamestown
Fargo
29
TETRA TECH
NEXTera ENERGY
RESOURCES



Brady II Wind Energy Center

Hettinger and Stark Counties, ND

Figure 3
Land Cover - Buffer

Legend

- Study Area (02/23/16)
- 1.5-mile Buffer
- County Boundary
- Major River
- Municipal Boundary

Land Cover

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Barren Land (Rock/Sand/Clay)
- Deciduous Forest
- Evergreen Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

0 1 2 Miles

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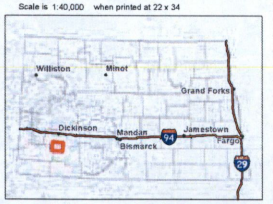

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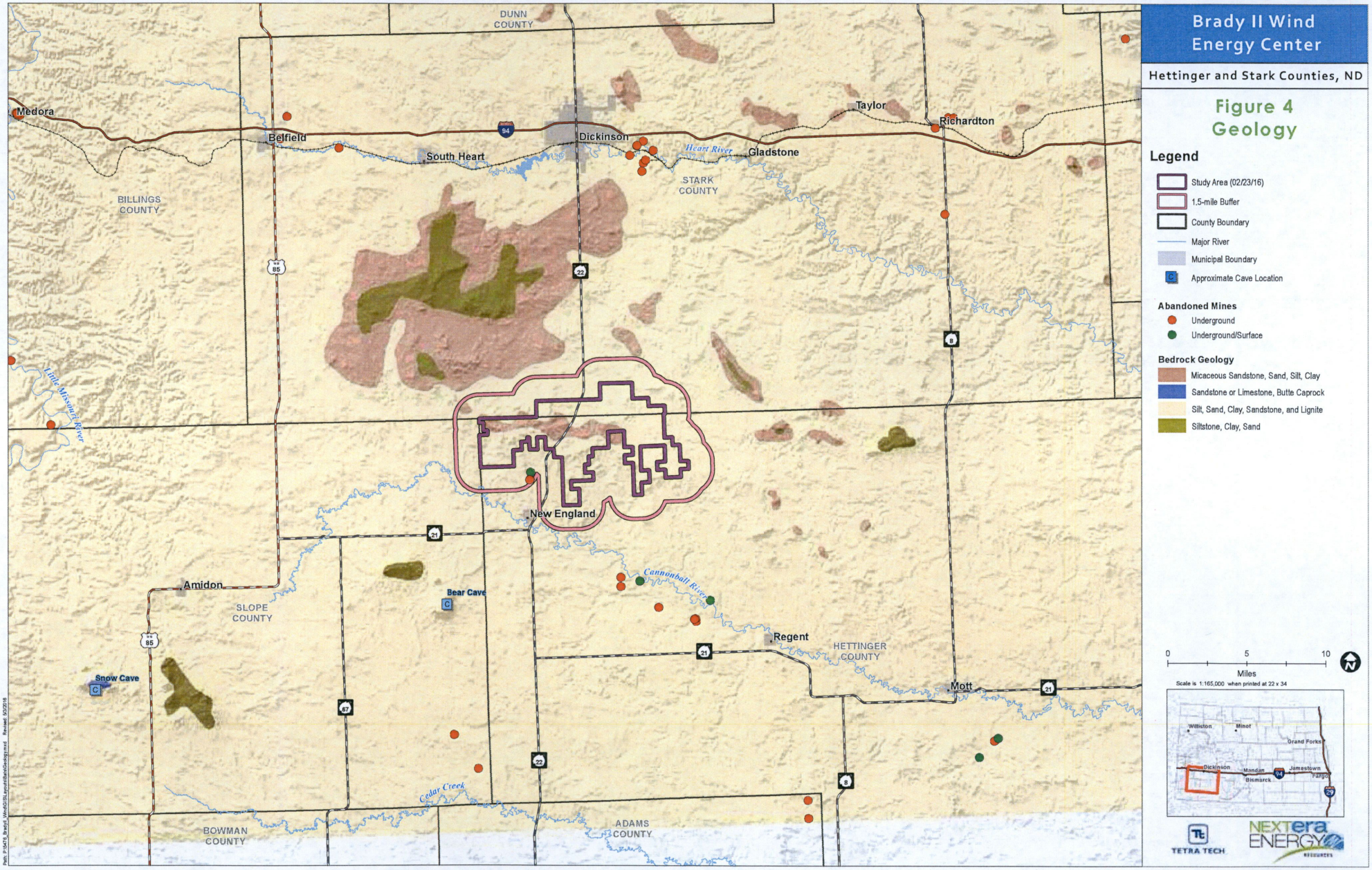

Brady II Wind Energy Center

Hettinger and Stark Counties, ND

Figure 4
Geology

Legend

- Study Area (02/23/16)
- 1.5-mile Buffer
- County Boundary
- Major River
- Municipal Boundary
- Approximate Cave Location

Abandoned Mines

- Underground
- Underground/Surface

Bedrock Geology

- Micaceous Sandstone, Sand, Silt, Clay
- Sandstone or Limestone, Butte Caprock
- Silt, Sand, Clay, Sandstone, and Lignite
- Siltstone, Clay, Sand

0 5 10
Miles

Scale is 1:165,000 when printed at 22 x 34

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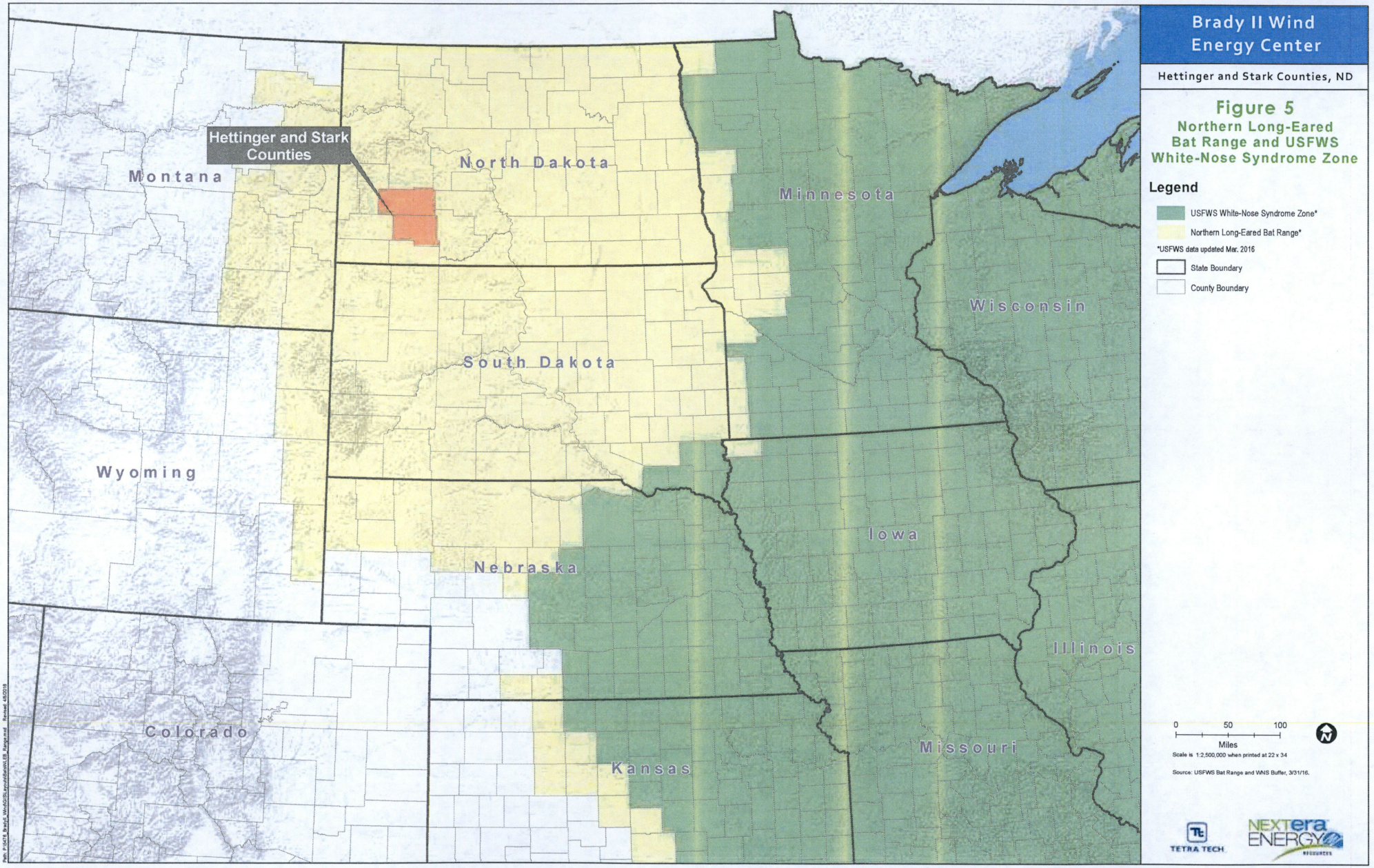
Hettinger and Stark Counties
Montana
North Dakota
Minnesota
Wisconsin
South Dakota
Wyoming
Iowa
Nebraska
Illinois
Colorado
Missouri
Kansas
Brady II Wind Energy Center
Hettinger and Stark Counties, ND
Figure 5
Northern Long-Eared Bat Range and USFWS White-Nose Syndrome Zone
Legend
USFWS White-Nose Syndrome Zone*
Northern Long-Eared Bat Range*
*USFWS data updated Mar. 2016
State Boundary
County Boundary
0
50
100
Miles
Scale is 1:2,500,000 when printed at 22 x 34
Source: USFWS Bat Range and WNS Buffer, 3/31/16.
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