Appendix C – Telecommunication Studies (Comsearch Reports)

Wind Power GeoPlanner™

Microwave Study

Blazing Star II

Prepared on Behalf of
Blazing Star Wind
Farm 2, LLC

July 21, 2017

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1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Blazing Star II

County: Lincoln

State: MN

Number of Turbines: 155

Blade Diameter: 136 meters

Hub Height: 82 meters

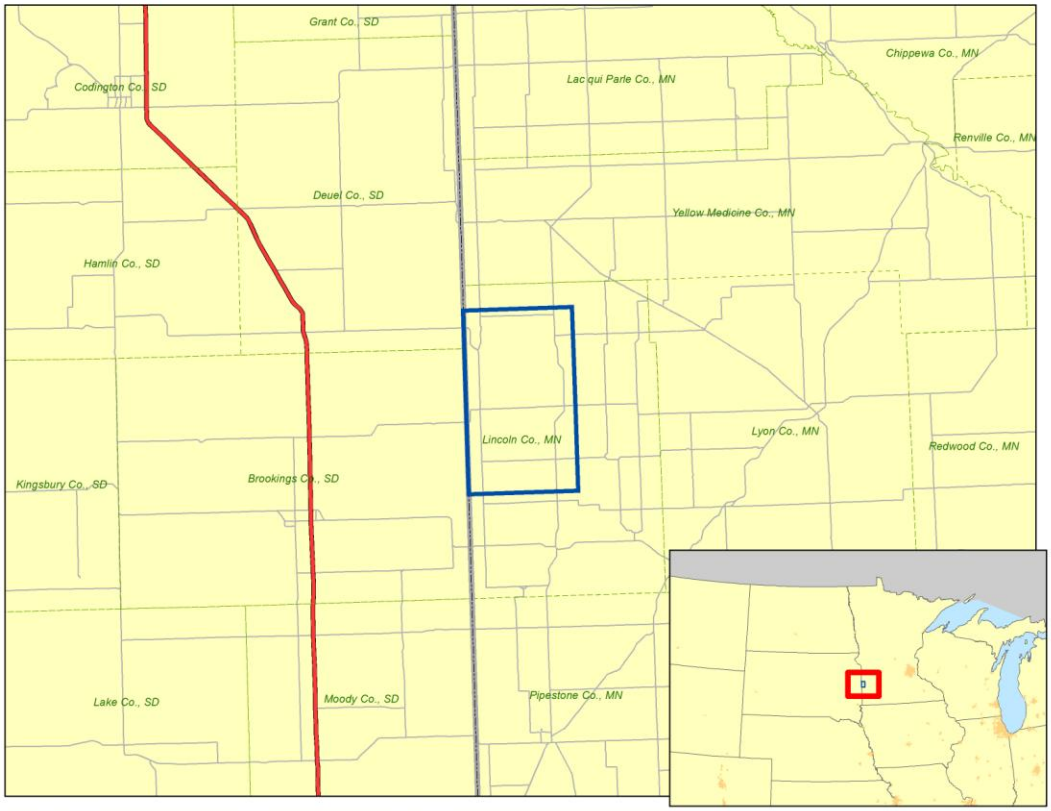


Figure 1: Area of Interest

3. Two-Dimensional Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2] and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

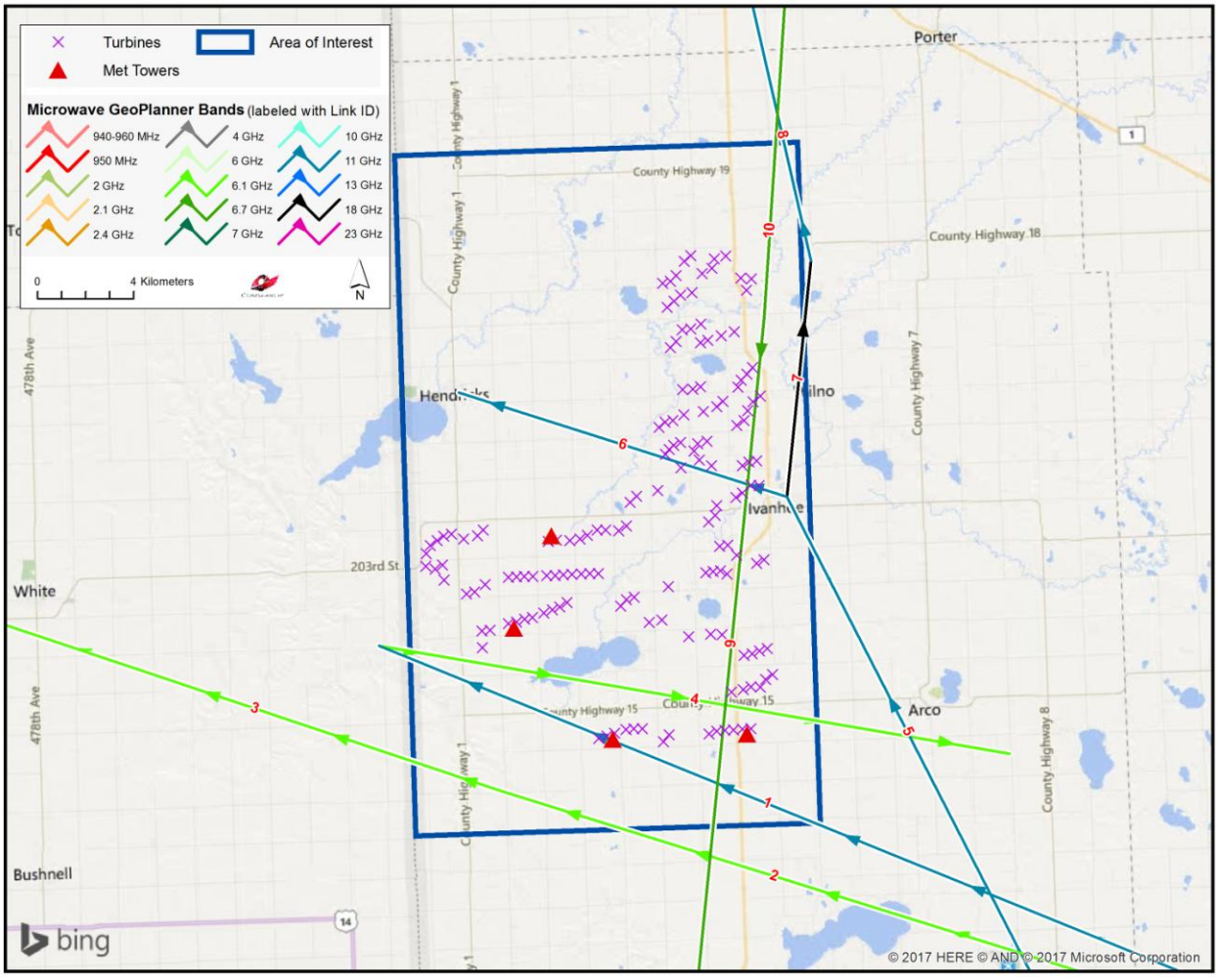


Figure 2: Microwave Paths that Intersect the Area of Interest

[1] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

[2] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Proposed	LYON	HENDRICK	11 GHz	50.81	GW Networks
2	Proposed	LYON	WHITERL	6.1 GHz	44.03	GW Networks
3	Proposed	WHITERL	BRYANTRL	6.1 GHz	88.40	GW Networks
4	Licensed	WQDT289	WQDT283	6.1 GHz	26.58	Northern Border Pipeline Company
5	Licensed	WQGD798	WQGD801	11 GHz	22.32	Affiniti LLC
6	Licensed	WQGD801	WQGD802	11 GHz	14.32	Affiniti LLC
7	Licensed	WQGD801	WQGD809	18 GHz	9.87	Affiniti LLC
8	Licensed	WQGD809	WQGD814	11 GHz	18.07	Affiniti LLC
9	Licensed	WQOH733	WQOT298	6.7 GHz	29.39	Minnesota, State of (DOT)
10	Licensed	WQOI493	WQOH733	6.7 GHz	29.02	Minnesota, State of (DOT)

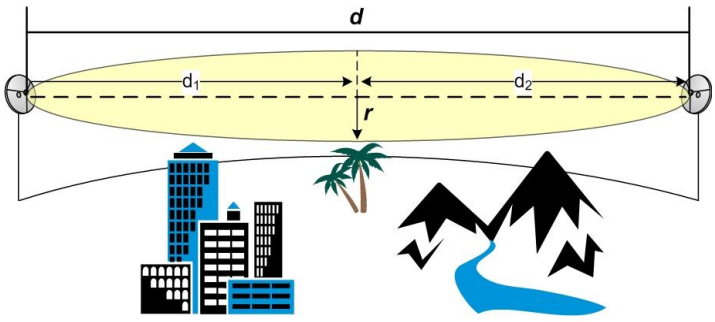
Table 1: Summary of Microwave Paths that Intersect the Area of Interest
(See enclosed mw_geopl.xlsx for more information and
GP_dict_matrix_description.xls for detailed field descriptions)

Verification of Coordinate Accuracy

It is possible that as-built coordinates may differ from those on the FCC license. For this project, five paths cross within close proximity of the proposed turbines and the tower locations for these paths will have a critical impact on the result. Therefore, we verified these locations using aerial photography. Some of the towers were found to be slightly off and were moved to their locations based on the aerial photos[3].

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,

r = Fresnel Zone radius at a specific point in the microwave path, meters
n = Fresnel Zone number, 1
F_{GHz} = Frequency of microwave system, GHz
d_1 = Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2 = Distance from antenna 2 to a specific point in the microwave path, kilometers

[3] See enclosed mw_geopl.shp and mw_geopl_fcc.shp for details.

In general, this is the area where the planned wind turbines should be avoided, if possible. A depiction of the Fresnel Zones for each microwave path listed can be found in Figure 3, and is also included in the enclosed shapefiles[4,5].

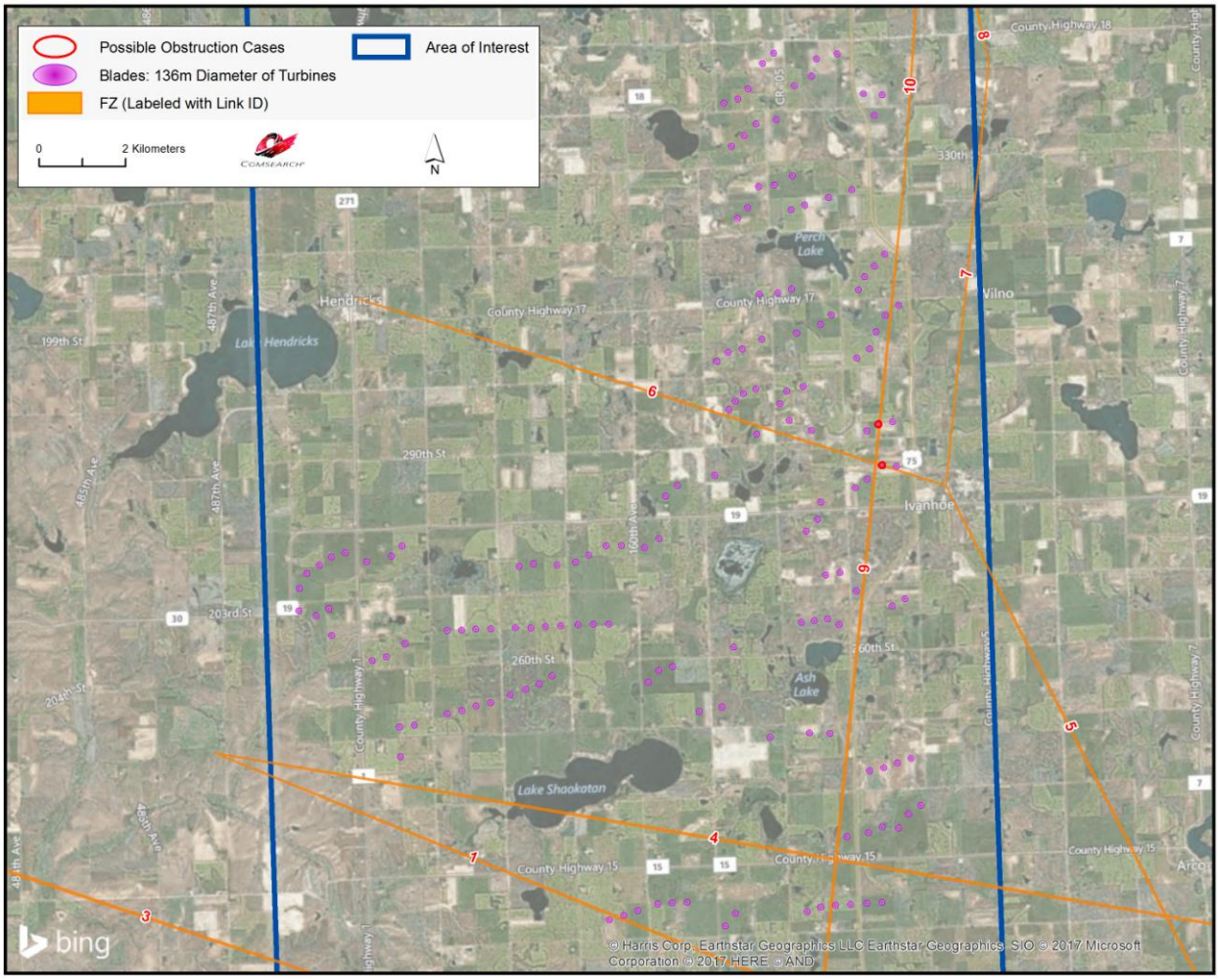


Figure 3: Fresnel Zones in the Area of Interest

[4] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 14 projected coordinate system.

[5] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

Discussion of Potential Two Dimensional Obstructions

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting the Fresnel Zones
10	2	155	2

Table 2: Fresnel Zone Analysis Result

For this project, 155 turbines were considered in the analysis, each with a blade diameter of 136 meters and turbine hub height of 82 meters. Four met towers were also considered with a height of 100 meters. Of those turbines, two were found to intersect the Fresnel Zones of two microwave paths. Figure 4 contains a detailed depiction of the potential obstruction scenarios and Table 3 contains a summary of the affected turbines. A cross sectional analysis was performed in Section 4 to determine the diagonal clearance value for these cases. Figure 5 contains a depiction of met tower M4 which is close to the proposed path 1.

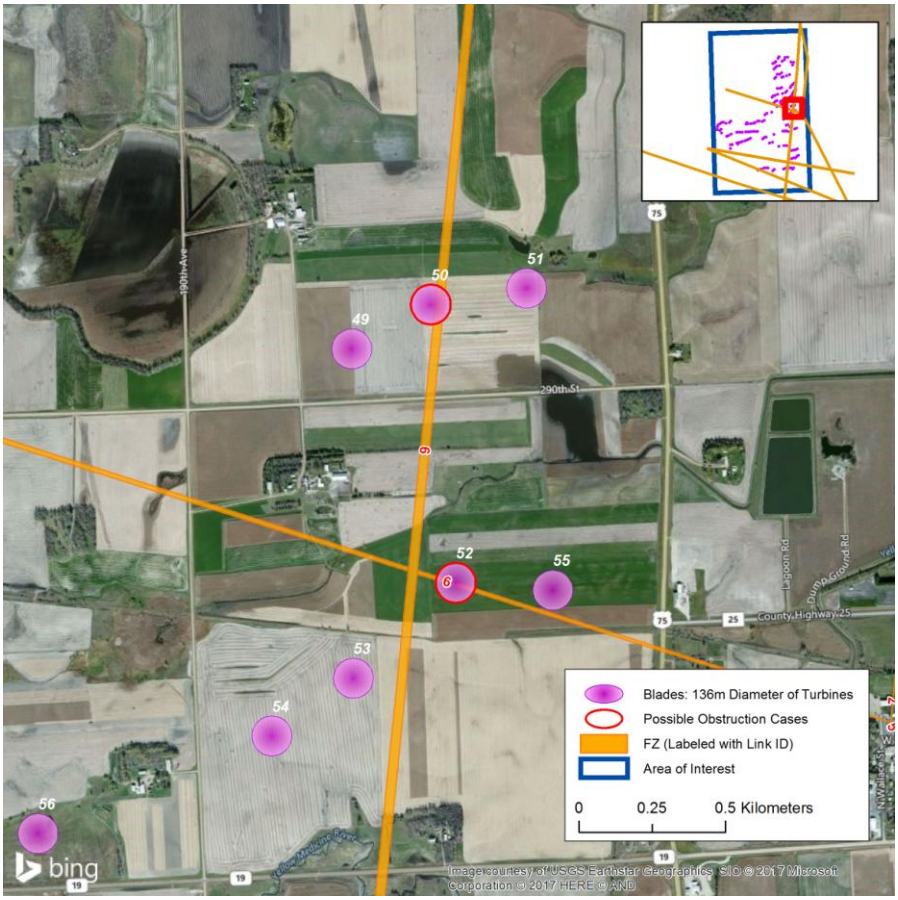


Figure 4: Potential Obstruction Cases 50 and 52

Figure 5: Met Tower M4

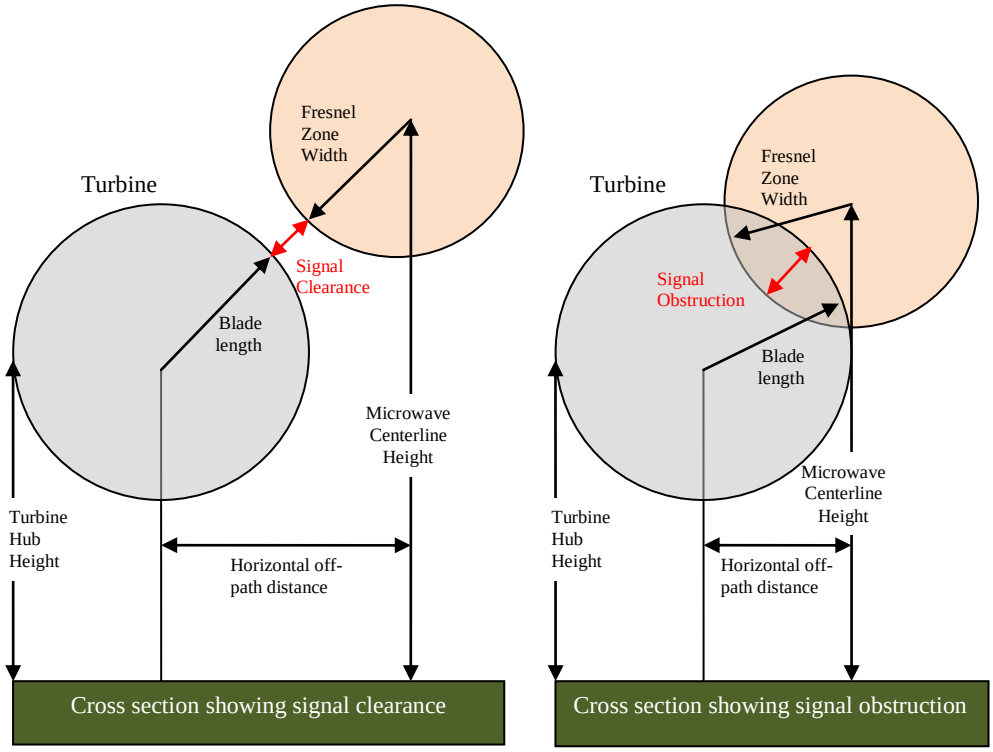
Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Affected Microwave Path ID	Fresnel Zone Width at Turbine Location (m)	Horizontal off-path Distance (m)	Distance along the path from site 1 (km)	Horizontal Clearance (m)
50	44.47723000	-96.27169389	9	14.63	29	6.03	-53.63
52	44.46865278	-96.27102194	6	6.09	5	1.56	-69.09

Table 3: Turbines that Intersect Fresnel Zones

4. Cross Sectional Analysis

Our Fresnel Zone analysis in the previous section identified two potential obstruction cases that need to be further examined from a cross sectional perspective. The cases that will be analyzed in this section can be found in Table 3.

Our cross sectional analysis calculates the precise height and width of 100% of the first Fresnel Zone at the turbine location based on the antenna heights of the two link endpoints and the earth curvature bulge at the specific turbine location. The horizontal off-path distance was calculated in the previous section and the turbine hub height and blade length were provided by the client. The cross sectional analysis uses these values to calculate the clearance between the blades and the microwave Fresnel Zone as shown in the two diagrams below.



The results of the cross sectional calculations can be seen in Table 4 below. It shows negative clearance values indicating obstruction of the Fresnel zones.

Microwave Path ID	Fresnel Zone Width at Turbine Location (m)	Microwave Centerline Height at Turbine Location (m)	Turbine ID	Hub Height (m)	Blade Length (m)	Cross Sectional Clearance (m)
9	14.63	42.47	50	82	68	-33.61
6	6.09	41.72	52	82	68	-33.51

Table 4: Cross Sectional Analysis Results

5. Conclusion

Our study identified ten microwave paths intersecting the Blazing Star II project area. The Fresnel Zones for these microwave paths were calculated and mapped. Two turbines were found to intersect the two dimensional Fresnel Zones of two microwave paths. Based on the cross sectional analysis, it was determined that they may obstruct the microwave paths and potentially cause signal degradation.

Turbine 50 can be made to clear the Fresnel zone of path 9 by adjusting its location either 60 meters to the west or 120 meters to the east. Turbine 52 can be made to clear the Fresnel Zone of path 6 but adjusting its location either 90 meter to the south, or 80 meters to the north. Refer back to Figure 4 for a depiction of these cases.

Met tower M4 is sited 25 meters from the horizontal edge of the Fresnel Zone for proposed path 1. The vertical bottom of the Fresnel Zone for this path is approximately 70 meters above ground level at the location of M4 so its height is great enough to possibly obstruct the Fresnel zone if its radius is greater than 25 meters (50 meter width). Shifting its location to the northeast will add distance between this tower and proposed path 1. Refer back to Figure 5 for a depiction of this case.

6. Contact

For questions or information regarding the Microwave Study, please contact:

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Wind Power GeoPlanner™

Communication Tower Study

Blazing Star II

Prepared on Behalf of
Blazing Star Wind Farm 2, LLC

July 24, 2017

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1. Introduction

This Communication Tower Study was performed for the Blazing Star II project in Lincoln County, Minnesota to identify the tower structures as well as FCC-licensed communication antennas that exist in and around the project area. This information is useful in the planning stages of the wind energy facilities to identify turbine setbacks and to prevent disruption to the services provided by the tenants on the towers. This data can be used in support of the wind energy facilities communications needs in addition to avoiding any potential impact to the current communications services provided in the region.

2. Summary of Results

The communication towers and antennas in the study area were derived from a variety of sources including the FCC's Antenna Structure Registration (ASR) database, Universal Licensing System (ULS), national and regional tower owner databases, and the local planning and zoning boards. The data[1] was imported into GIS software and the structures mapped in the wind energy area of interest. Each tower location is identified with a unique ID number associated with detailed structure and contact information provided in a spreadsheet attachment.

Eleven tower structures and thirty-two communication antennas were identified within or near the Blazing Star II project area using the data sources described in our methodology above. Eight of the structures found were registered with the FCC, which contains eight of the thirty-two communication antennas. The remaining antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops or portable structures. The specific type of structure would normally need to be determined by an on-site visit.

Detailed information about the tower structures and communication antennas is provided in Table 1 and Table 2 including location coordinates, structure height above ground level, and owner-operator name[2].

A discussion of turbine setback distances is provided in section three.

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

[2] Please note that this report analyzes all known operators on the towers from data sources available to Comsearch. Unidentified operators may exist on the towers due to unlicensed or federal government systems, mobile phone operators with proprietary locations, erroneous data on the FCC license, and other factors beyond our control.

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
Tower001	1262603	Affiniti, LLC	45.70	44.46391667	-96.25255556
Tower002	1280185	American Towers, LLC.	76.20	44.46780556	-96.25525000
Tower003	1027538	Mediacom Minnesota LLC	92.30	44.46861111	-96.25500000
Tower004		KGI	74.07	44.46911111	-96.25125000
Tower005		SBA	45.72	44.50678889	-96.42206878
Tower006	1262602	Affiniti, LLC	39.60	44.50688889	-96.42227778
Tower007		American Towers, LLC.	4.27	44.50716000	-96.42572100
Tower008	1023369	Minnesota Valley TV Improvement Corporation	79.20	44.50722222	-96.41694444
Tower009	1278764	Minnesota, State of	100.30	44.53094444	-96.26125000
Tower010	1262599	Affiniti, LLC	42.70	44.55191667	-96.23586111
Tower011	1301137	Alltel Communications, LLC	76.20	44.58772222	-96.28213889

Table 1: Summary of Tower Structures

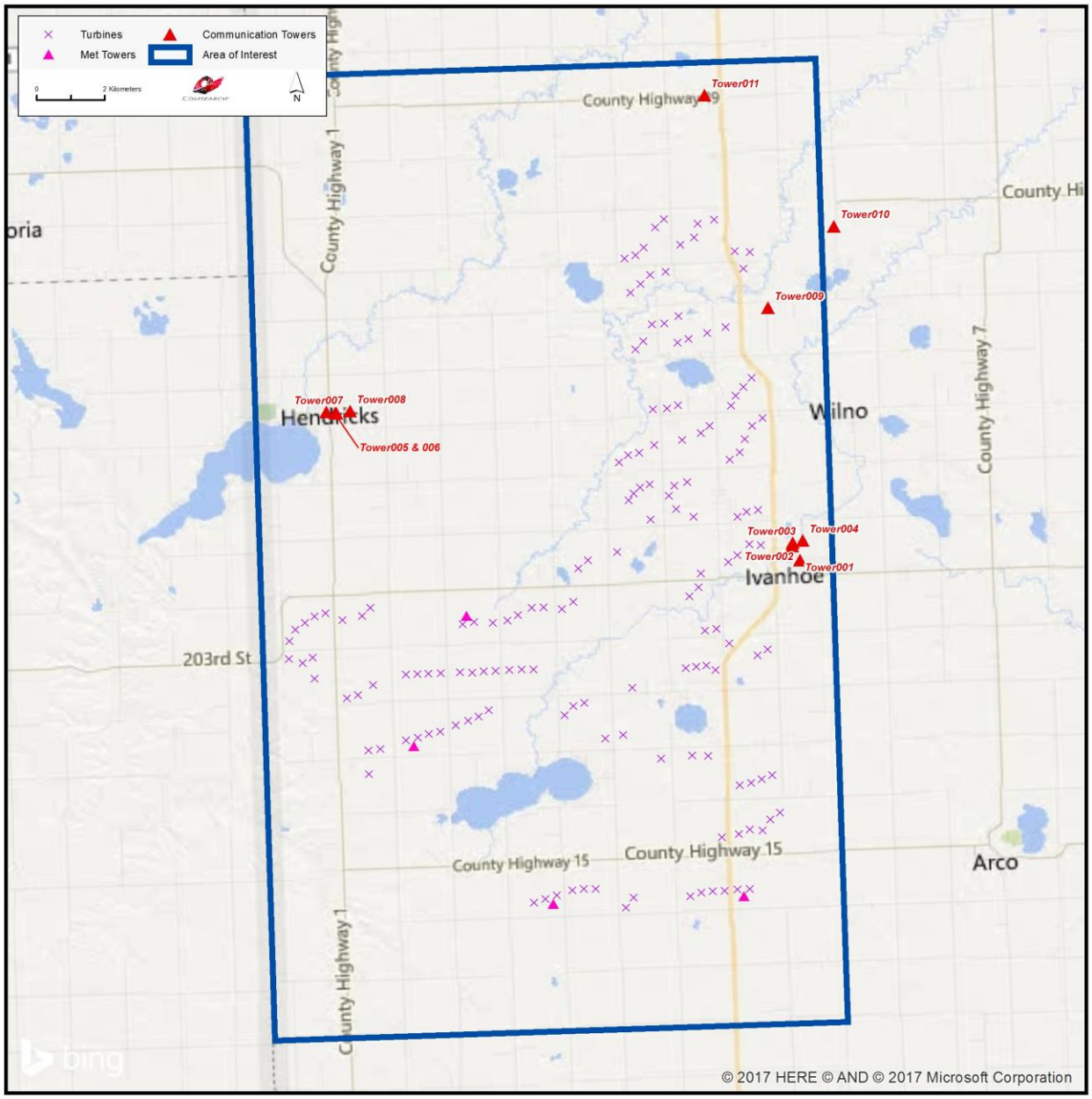

Figure 1: Towers within or near the Area of Interest

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
1		WNQV618	Land Mobile	MINNESOTA WEST COMMUNITY & TECHNICAL CENTER	6	44.35302778	-96.27669444
2		WQSF262	Land Mobile	BULLER, DWIGHT	37	44.42163889	-96.42422222
3		KZR468	Land Mobile	LINCOLN, COUNTY OF	60	44.44497222	-96.26947222
4		WZB424	Land Mobile	STERZINGER CONSTRUCTION LLC.	24	44.44691667	-96.24419444
5		WPUA924	Land Mobile	LINCOLN, COUNTY OF	61	44.44747222	-96.26694444
6		KNEC875	Land Mobile	LINCOLN, COUNTY OF	55	44.44747222	-96.26669444
7		KAJ351	Land Mobile	LINCOLN, COUNTY OF	23	44.45830556	-96.25030556
8		KAJ351	Land Mobile	LINCOLN, COUNTY OF	24	44.45830556	-96.25030556
9		WNYR673	Land Mobile	LINCOLN PIPESTONE RURAL WATER SYSTEM	15	44.46080556	-96.40033333
10		WQVE373	Land Mobile	Lincoln, County of	45.7	44.46305556	-96.25222222
11	Tower001	WQGD801	Microwave	Affiniti, LLC	43.89/45.72	44.46391667	-96.25255556
12		WQQF641	Land Mobile	MINNEOTA PUBLIC SCHOOL	14.6	44.46405556	-96.25172222
13		WPPX829	Land Mobile	LINCOLN PIPESTONE RURAL WATER SYSTEM	40	44.46775000	-96.23752778
14	Tower002	KNKN422	Cellular	Alltel Communications, LLC	Unknown	44.46780556	-96.25525000
15		KAJ351	Land Mobile	LINCOLN, COUNTY OF	61	44.46913889	-96.25169444
16		WQRE693	Land Mobile	HENDRICKS TRACTOR PARTS	30	44.50288889	-96.42494444
17		WQDT477	Land Mobile	NUESE, ALAN	36	44.50355556	-96.42308333
18		WPLX253	Land Mobile	HENDRICKS COMMUNITY HOSPITAL ASSOCIATION	17	44.50469444	-96.41838889
19		WQUA344	Land Mobile	INDEPENDENT SCHOOL DISTRICT 402	18.2	44.50633333	-96.42233333
20	Tower006	WQGD802	Microwave	Affiniti, LLC	38.71	44.50688889	-96.42227778
21		KAJ351	Land Mobile	LINCOLN, COUNTY OF	27.5	44.50694444	-96.42444444
22		KAJ351	Land Mobile	LINCOLN, COUNTY OF	35	44.50694444	-96.42444444
23		KNEC875	Land Mobile	LINCOLN, COUNTY OF	35	44.50694444	-96.42444444
24		WPQD326	Land Mobile	LYON COUNTY FARM SERVICE	60	44.50802778	-96.42922222
25	Tower009	WQTF851	Land Mobile	Precision Consulting Services, Inc.	60.9	44.53094444	-96.26125000
26	Tower009	WQOH733	Microwave	Minnesota, State of	41.1/51.82	44.53094444	-96.26125000
27	Tower009	WQVE373	Land Mobile	Lincoln, County of	30.5	44.53094444	-96.26125000
28	Tower009	WQKZ779	Land Mobile	MINNESOTA, STATE OF	104.5	44.53094444	-96.26125000
29		WQEH340	Land Mobile	Rybinski, Kevin	25	44.53138889	-96.32694444
30		WQIF794	Land Mobile	Janiszeski, Randy	33	44.54169444	-96.26325000
31	Tower010	WQGD809	Microwave	Affiniti, LLC	42.67	44.55191667	-96.23586111
32		WNYR673	Land Mobile	LINCOLN PIPESTONE RURAL WATER SYSTEM	15	44.56108333	-96.39061111

Table 2: Summary of Communication Antennas

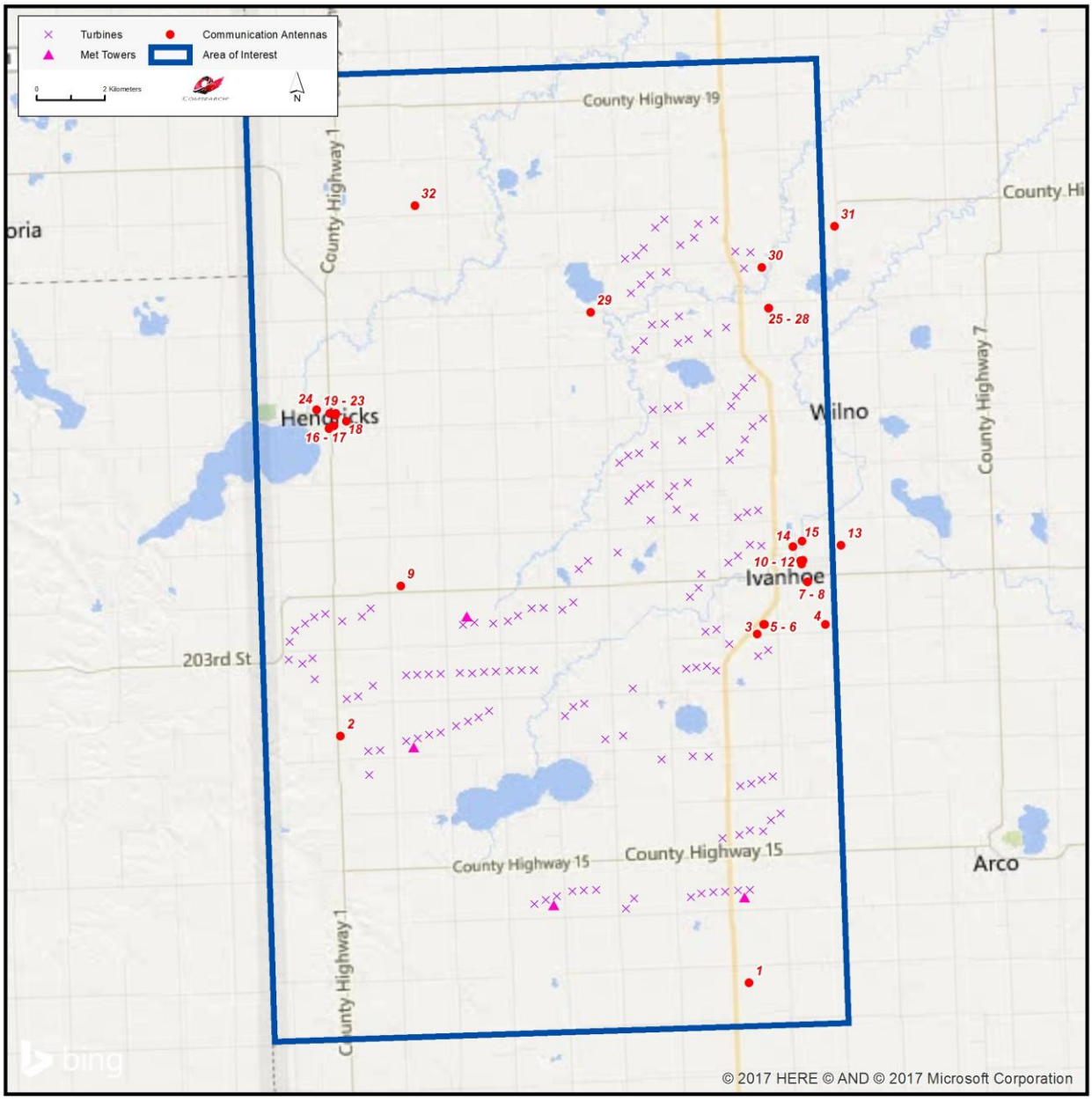

Figure 2: Communication Antennas within or near the Area of Interest

3. Discussion of Separation Distances

In planning the wind energy turbine locations, a conservative approach would dictate not locating any turbines in close proximity to existing tower structures to avoid any possible impact to the communications services provided by the structures. Reasonable distance between communication towers and wind turbine towers is a function of two things: (1) the physical turning radius of the wind turbine blades and (2) the characteristics of the communication systems on the communication tower.

Since wind turbine blades can rotate 360º, the first consideration of separation distance to other structures is clearance of the blades. If the blade radius is 50 meters, then a separation distance greater than 50 meters is necessary. From a practical standpoint, a setback distance greater than the maximum height of the turbine is necessary to insure a "fall" safety zone in the unlikely event of a turbine tower failure. Setback requirements for "fall" safety are typically specified by the local zoning ordinances.

The required separation distance based on the characteristics of the communication systems will vary depending on the type of communication antennas that are installed on the tower. For example, AM broadcast antennas should be separated by distances that allow for normal coverage which can extend up to 3 kilometers. For land mobile and mobile phone systems, setback distances are based on FCC interference emission limits from electrical devices in the land mobile and mobile phone frequency bands.

Finally, the tower structures identified could be a potential benefit in support of communications network needs for the wind energy facility. An example would be the implementation of a Supervisory Control and Data Acquisition (SCADA) system that monitors and provides communications access to the wind energy facility.

4. Conclusions

Our study identified eleven structures and thirty-two communication antennas within or near the project area. They are used for microwave, cellular and land mobile services in the area. Detailed impact assessments should be performed for each service type.

5. Contact Us

For questions or information regarding the Communication Tower Study, please contact:

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Web site:	www.comsearch.com

Wind Power GeoPlanner™

Land Mobile & Emergency Services Report

Blazing Star II

Prepared on Behalf of
Blazing Star
Wind Farm 2, LLC

July 21, 2017

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1. Introduction

An assessment of the emergency services in the Blazing Star II wind energy project area was performed by Comsearch to identify potential impact from the planned turbines. We evaluated the registered frequencies for the following types of first responder entities: police, fire, emergency medical services, emergency management, hospitals, public works, transportation and other state, county, and municipal agencies. We also identified all industrial and business land mobile radio (LMR) systems and commercial E911 operators within the proposed wind energy facility boundaries. This information is useful in the planning stages of the wind energy facility because the data can be used in support of facility communications needs and to evaluate any potential impact on the emergency services provided in that region. An overview of the project area, which is located in Lincoln County, Minnesota, appears in Figure 1.

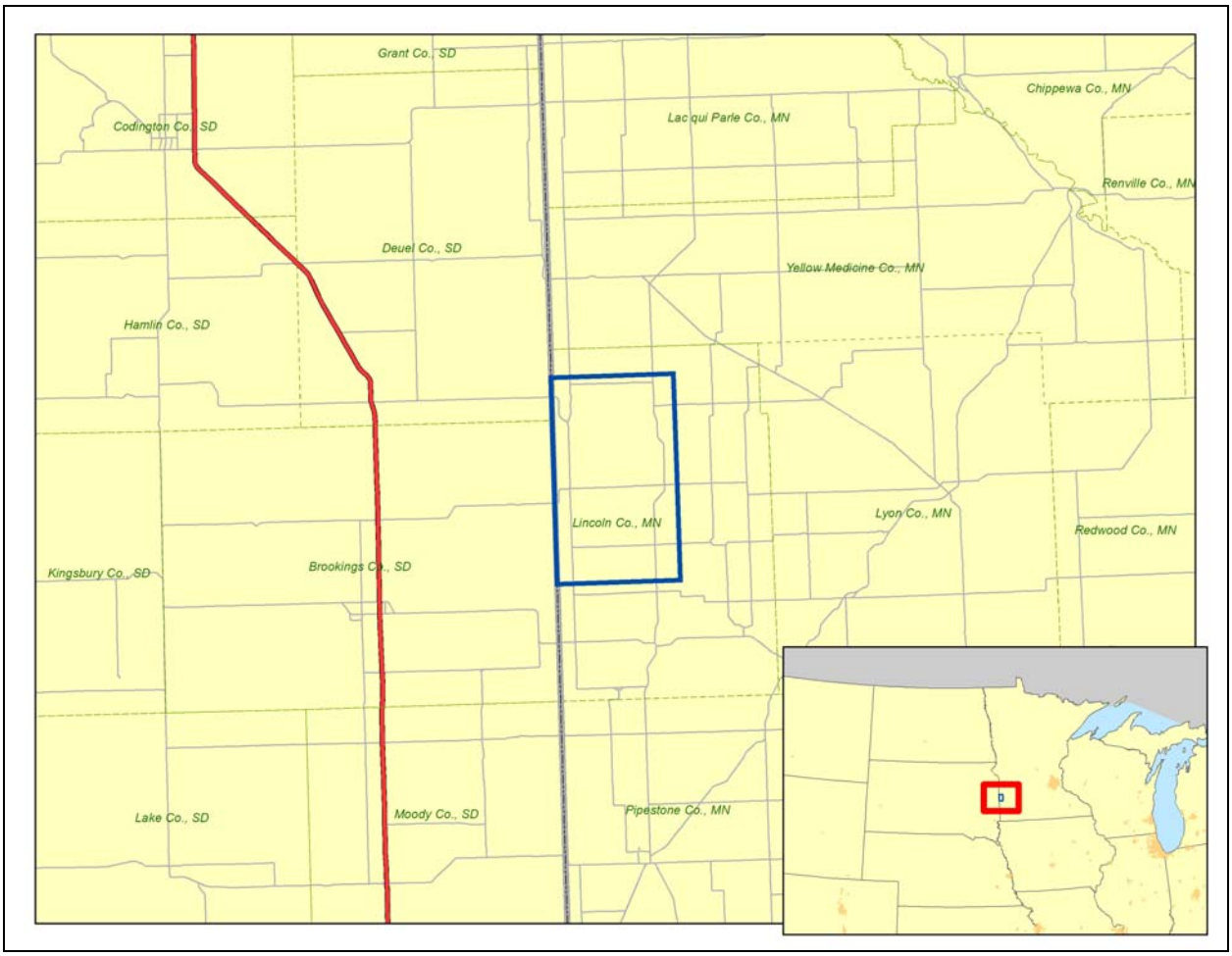

Figure 1: Area of Interest (AOI)

2. Summary of Results

Our land mobile and emergency services incumbent data[1] was derived from the FCC's Universal Licensing System (ULS) and the FCC's Public Safety & Homeland Security bureau. We identified both site-based licenses as well as regional area-wide licenses designated for public safety use.

Site-Based Licenses

The site-based licenses were imported into GIS software and geographically mapped relative to the wind energy project area of interest as defined by the customer. Each site on the map was given an ID number and associated with site information in a data table. A depiction of the fixed-site licenses in and around the project area appears in Figure 2.

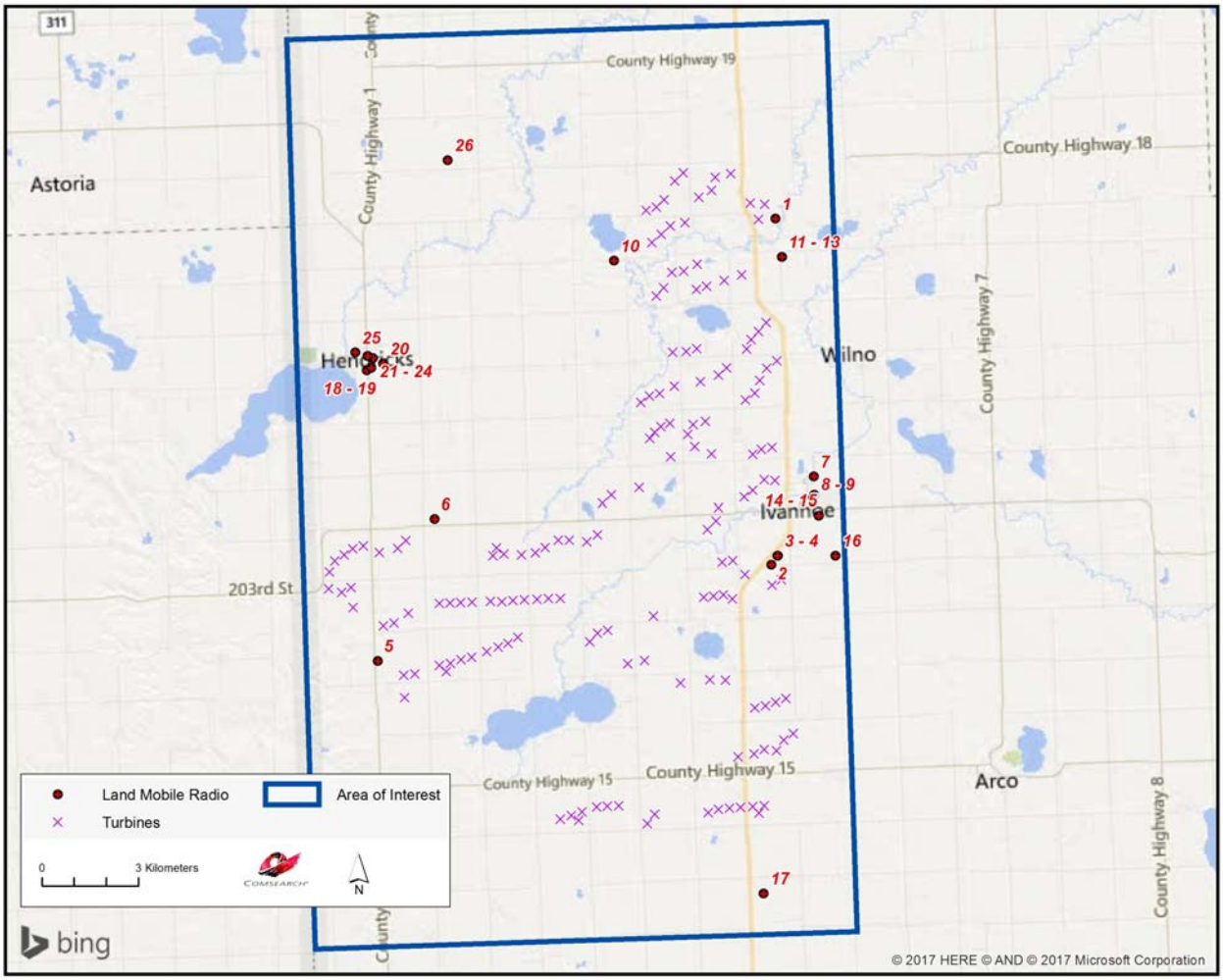

Figure 2: Land Mobile & Emergency Service Sites in Area of Interest

Figure 2 identifies twenty-six site-based licenses in and around the Blazing Star II project area of interest. Specific information about these sites is provided in Table 1.

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
1	WQIF794	450-470	Janiszeski, Randy	33.0	44.541694	-96.263250	0.53
2	KZR468	150-174	Lincoln, County of	60.0	44.444972	-96.269472	0.57
3	KNEC875	150-174	Lincoln, County of	55.0	44.447472	-96.266694	0.77
4	WPUA924	450-470	Lincoln, County of	61.0	44.447472	-96.266944	0.77
5	WQSF262	450-470	Buller, Dwight	37.0	44.421639	-96.424222	0.93
6	WNYR673	150-174	Lincoln Pipestone Rural Water System	15.0	44.460806	-96.400333	1.11
7	KAJ351	150-174	Lincoln, County of	61.0	44.469139	-96.251694	1.21
8	WQQF641	150-174	Minnesota Public Schools	14.6	44.464056	-96.251722	1.30
9	WQVE373	4940-4990	Lincoln, County of	45.7	44.463056	-96.252222	1.30
10	WQEH340	450-470	Rybinski, Kevin	25.0	44.531389	-96.326944	1.31
11	WQKZ779	800/900	Minnesota, State of	104.5	44.530944	-96.261250	1.37
12	WQTF851	450-470	Precision Consulting Services, Inc.	60.9	44.530944	-96.261250	1.37
13	WQVE373	4940-4990	Lincoln, County of	30.5	44.530944	-96.261250	1.37
14	KAJ351	150-174	Lincoln, County of	24.0	44.458306	-96.250306	1.73
15	KAJ351	450-470	Lincoln, County of	23.0	44.458306	-96.250306	1.73
16	WZB424	150-174	Sterzinger Construction, LLC	24.0	44.446917	-96.244194	1.84
17	WNQV618	450-470	MN West Community and Technical Center	6.0	44.353028	-96.276694	2.51
18	WQRE693	150-174	Hendricks Tractor Parts	30.0	44.502889	-96.424944	5.41
19	WQDT477	450-470	Nuese, Alan	36.0	44.503556	-96.423083	5.46
20	WPLX253	150-174	Hendricks Community Hospital Association	17.0	44.504694	-96.418389	5.54
21	WQUA344	150-174	Hendricks Independent School District 402	18.2	44.506333	-96.422333	5.76

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the land mobile station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
22	KAJ351	150-174	Lincoln, County of	35.0	44.506944	-96.424444	5.85
23	KAJ351	450-470	Lincoln, County of	27.5	44.506944	-96.424444	5.85
24	KNEC875	150-174	Lincoln, County of	35.0	44.506944	-96.424444	5.85
25	WPQD326	450-470	Lyon County Farm Service	60.0	44.508028	-96.429222	6.01
26	WNYR673	150-174	Lincoln Pipestone Rural Water System	15.0	44.561083	-96.390611	6.36

Table 1: Land Mobile & Emergency Service Sites in Area of Interest

Area-Wide Licenses

The regional area-wide licenses were compiled from FCC data sources and identified for each county in the wind energy project area. The Blazing Star II wind energy project is located in Lincoln County, Minnesota, part of Public Safety Region #22, which contains all of the counties in the State of Minnesota. The regional public safety operations are overseen by the entity listed below.

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phone: 651-234-7969
email: james.mohn@state.mn.us

The chairperson for Region #22 serves as the representative for all public safety entities in the area and is responsible for coordinating current and future public safety use in the wireless spectrum. In the bands licensed by the FCC for area-wide first responders, which include 220 MHz, 700 MHz, 800 MHz and 4.9 GHz, as well as the traditional Part 90 public safety pool of frequencies, eleven licenses were found for the State of Minnesota and one for the County of Lincoln (see Table 2). These area-wide licenses are designated for mobile use only.

ID	Licensee	Area of Operation	Frequency Band (MHz)
1	American National Red Cross	Statewide: Minnesota	25-50, 450-470
2	Cart Ambulance	Statewide: Minnesota	150-174

ID	Licensee	Area of Operation	Frequency Band (MHz)
3	Hennepin, County of	Statewide: Minnesota	25-50, 150-174, 406-413, 450-470, 800/900
4	Lincoln, County of	Countywide: Lincoln	150-174, 450-470, 4940-4990
5	Minnesota, State of	Statewide: Minnesota	0-10, 150-174, 450-470, 769-775/799-805, 800/900, 2450-2500, 4940-4990
6	Minnesota Canine Search Rescue and Tracking	Statewide: Minnesota	150-174
7	Minnesota Department of Public Safety	Statewide: Minnesota	150-174
8	National Ski Patrol System, Inc.	Statewide: Minnesota	150-174
9	Nevada Division of Forestry	Statewide: Minnesota	150-174
10	Northstar Search and Rescue	Statewide: Minnesota	150-174
11	Rochester, City of	Statewide: Minnesota	150-174, 450-470
12	Saint Louis, County of	Statewide: Minnesota	150-174, 450-470, 800/900

Table 2: Regional Licenses

E911 Operators

Wireless operators are granted area-wide licenses from the FCC to deploy their cellular networks, which often include handsets with E911 capabilities. Since mobile phone market boundaries differ from service to service, we disaggregated the carriers' licensed areas down to the county level. We have identified the type of service for each carrier in Lincoln County, Minnesota in Table 3.

Mobile Phone Carrier	Service[2]
AT&T	AWS, Cellular, WCS, 700 MHz
ClearTalk Wireless (NTCH)	PCS
DISH Network	AWS, 700 MHz
Northstar Wireless	AWS

[2] AWS: Advanced Wireless Service at 1.7/2.1 GHz
CELL: Cellular Service at 800 MHz
PCS: Personal Communication Service at 1.9 GHz
WCS: Wireless Communications Service at 2.3 GHz
700 MHz: Lower 700 MHz Service

Mobile Phone Carrier	Service[2]
SNR Wireless	AWS
Sprint	PCS
Standing Rock Telecommunications	PCS
TerreStar	AWS
T-Mobile	AWS, PCS, 700 MHz
Verizon	AWS, Cellular, PCS, 700 MHz

Table 3: Mobile Phone Carriers in Area of Interest with E911 Service

3. Impact Assessment

The first responder, industrial/business land mobile sites, area-wide public safety, and commercial E-911 communications as described in this report are typically unaffected by the presence of wind turbines, and we do not anticipate any significant harmful effect to these services in the Blazing Star II wind energy project area. Although each of these services operates in different frequency ranges and provides different types of service including voice, video and data applications, there is commonality among these different networks in regards to the impact of wind turbines on their service. Each of these networks is designed to operate reliably in a non-line-of-sight (NLOS) environment. Many land mobile systems are designed with multiple base transmitter stations covering a large geographic area with overlap between adjacent transmitter sites in order to provide handoff between cells. Therefore, any signal blockage caused by the wind turbines does not materially degrade the reception because the end user is likely receiving signals from multiple transmitter locations. Additionally, the frequencies of operation for these services have characteristics that allow the signal to propagate through wind turbines. As a result, very little, if any, change in their coverage should occur when the wind turbines are installed.

When planning the wind energy turbine locations in the area of interest, a conservative approach would dictate not locating any turbines within 77.5 meters of land mobile fixed-base stations to avoid any possible impact to the communications services provided by these stations. This distance is based on FCC interference emissions from electrical devices in the land mobile frequency bands. As long as the turbines are located more than 77.5 meters from the land mobile stations, they will meet the setback distance criteria for FCC interference emissions in the land mobile bands.

4. Recommendations

In the event that a public safety entity believes its coverage has been compromised by the presence of the wind energy facility, it has many options to improve its signal coverage to the area through optimization of a nearby base station or even adding a repeater site. Utility towers, meteorological towers or even the turbine towers within the wind project area can serve as the platform for a base station or repeater site.

5. Contact

For questions or information regarding the Land Mobile & Emergency Services Report, please contact:

Contact person:	Denise Finney
Title:	Account Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5650
Fax:	703-726-5595
Email:	dfinney@comsearch.com
Web site:	www.comsearch.com

Wind Power GeoPlanner™

TV Coverage Impact Study

Blazing Star II

Prepared on Behalf of
Blazing Star Wind
Farm 2, LLC

July 26, 2017

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Table of Contents

1. Introduction

Over-the-air (OTA) television stations broadcast their signals from terrestrially-located facilities that can be received directly by a television receiver. Comsearch identified those television stations whose service could potentially be affected by the proposed Green River Wind Farm project in Lee and Whiteside Counties, Illinois. Comsearch then examined the OTA coverage of these television stations along with the communities within the areas that could potentially have degraded television reception due to the location of the proposed wind energy project.

2. Summary of Affected TV Stations

The proposed wind energy project area of interest (AOI) and local communities are depicted in Figure 1A. A close-up view of the AOI with the proposed wind turbine layout is shown in Figure 1B.

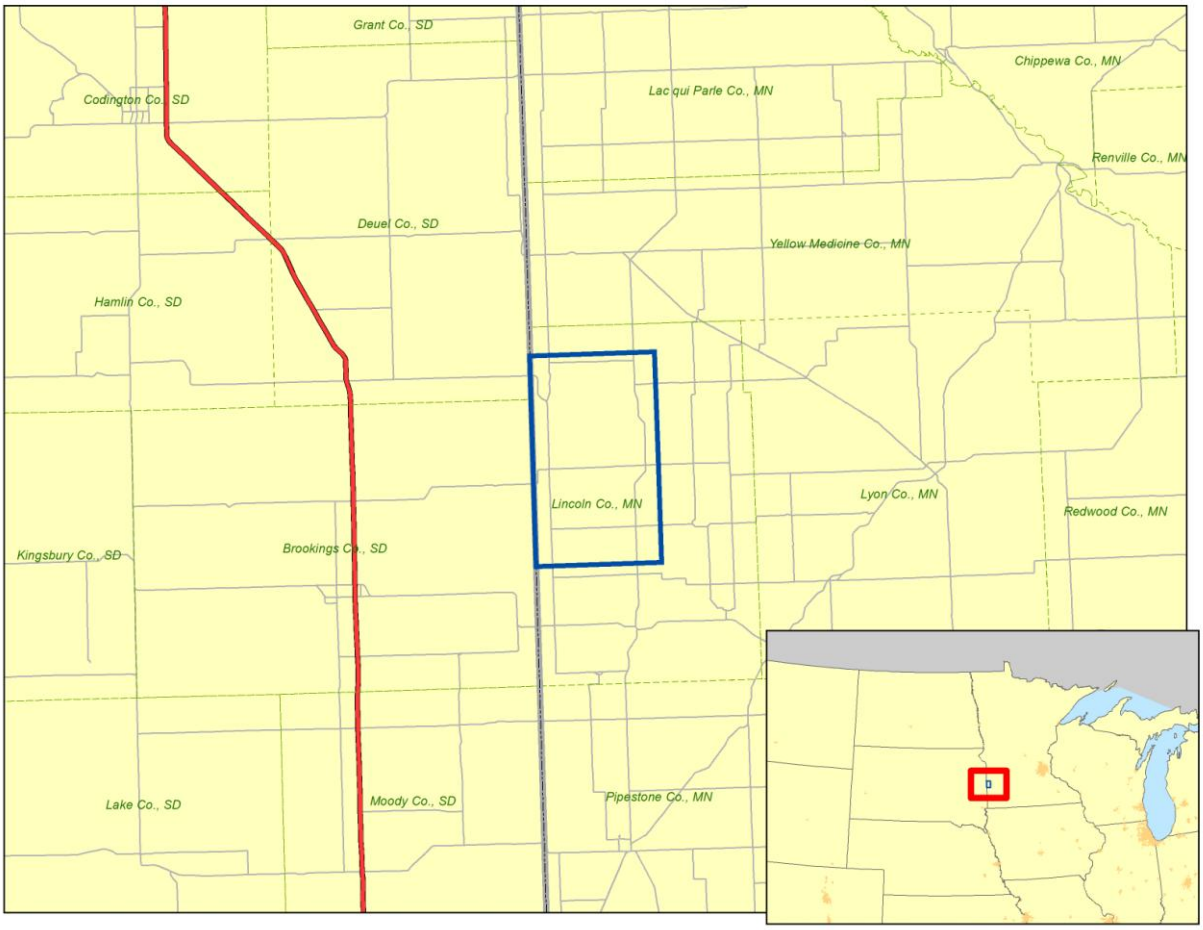


Figure 1A: Wind Farm Project Area and Local Counties

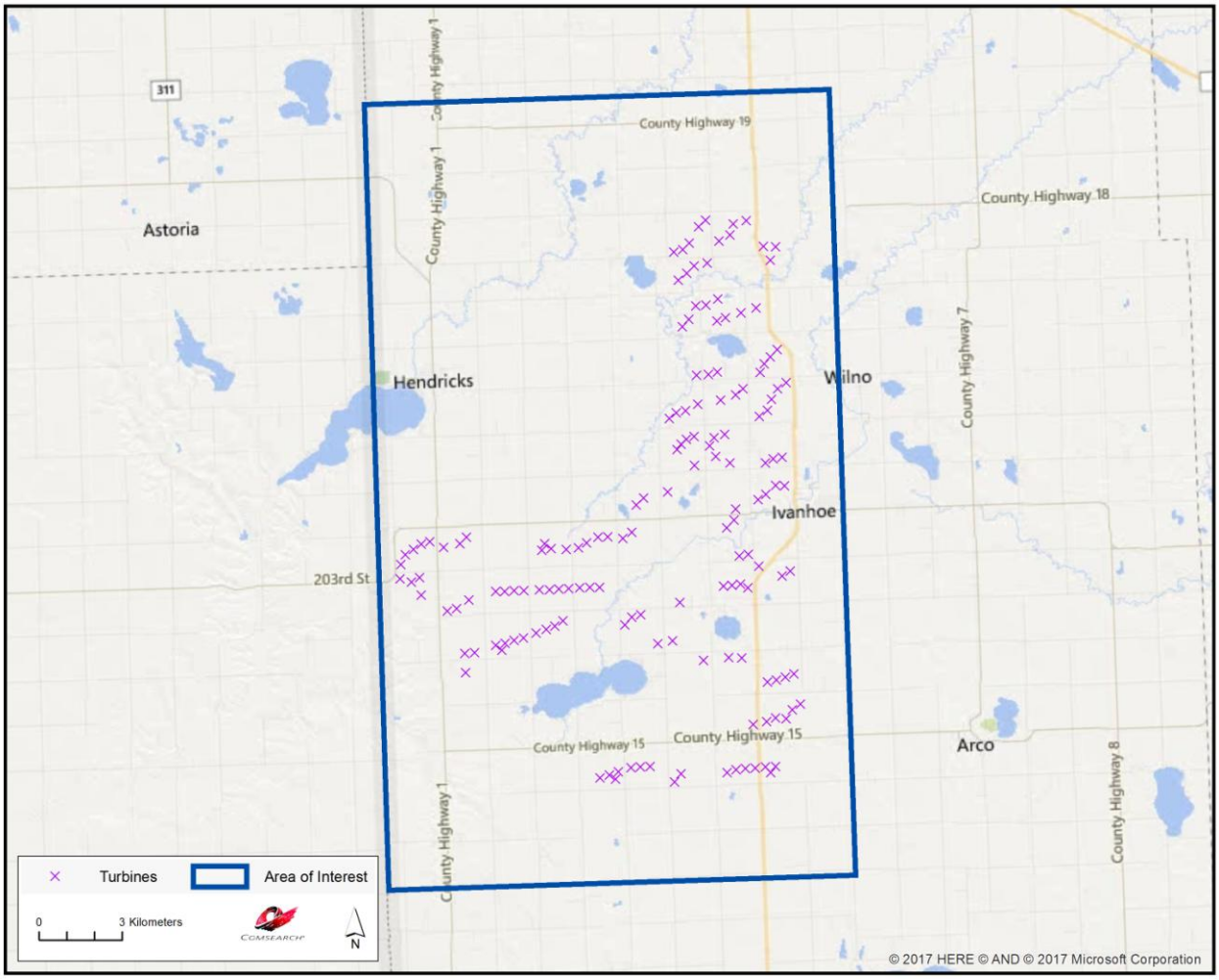


Figure 1B: Wind Farm Project Area and Turbine Layout

Based on the standard range of OTA television coverage, TV stations at a distance of 150 kilometers or less are the most likely to provide coverage to the project area and neighboring communities. To begin the analysis, Comsearch compiled a list of all OTA television stations[1] within 150 kilometers of the project. These stations are listed in Table 1 on the next page, and a plot depicting their geographic locations appears in Figure 2 below. There are a total of 148 database records for stations located within 150 kilometers of the project. Of these stations, 102 are currently licensed and operational and have been listed separately in Table 2. The remaining 46 stations are not operational and were therefore not considered in this analysis.

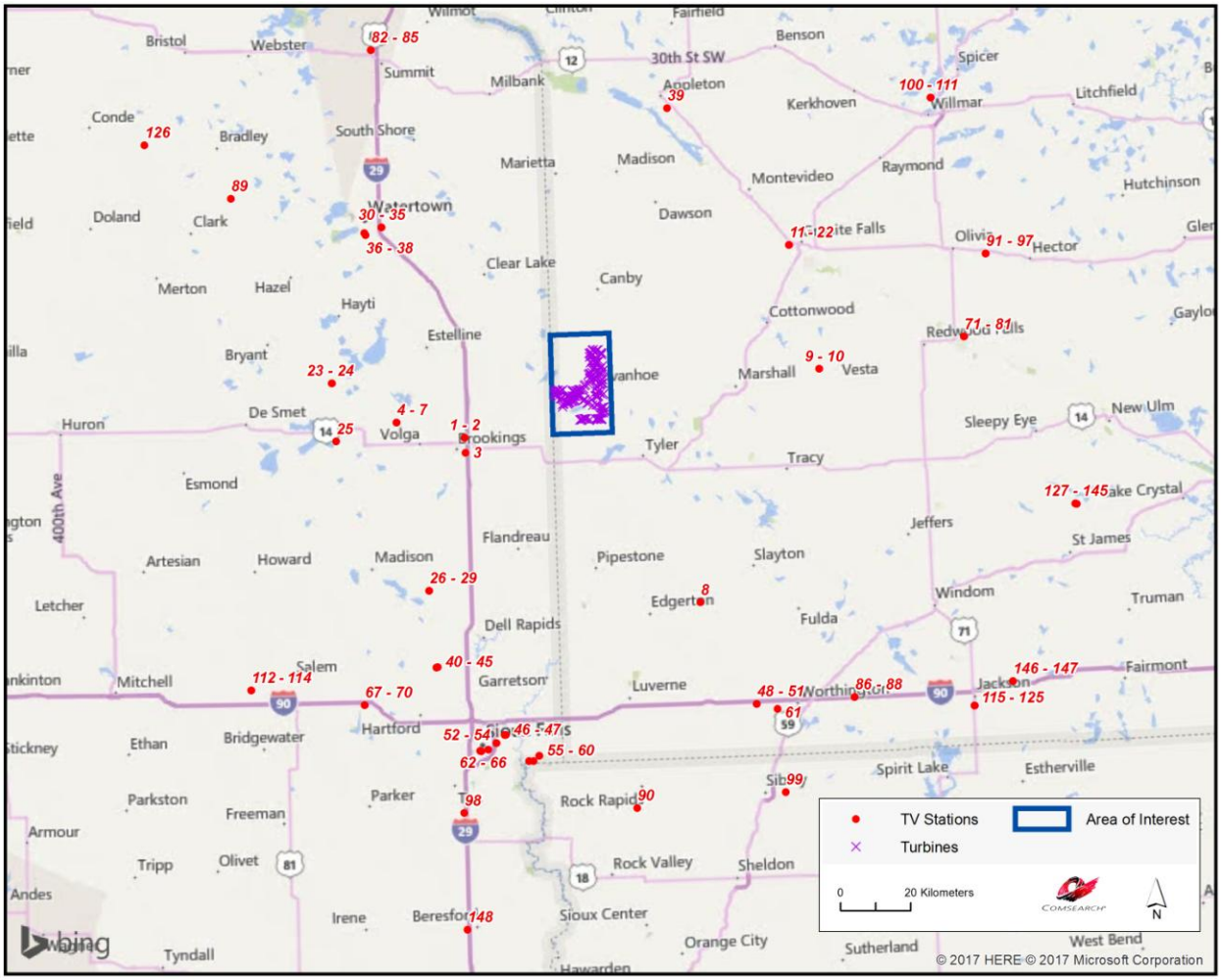


Figure 2: Plot of OTA TV Stations within 100 km of Project Area

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report.

ID	Call Sign	Status	Service[4]	Channel	Transmit ERP[5] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
1	K40FZ-D	LIC	LD	40	7.014	44.339472	-96.768556	28.41
2	K40FZ-D	LIC	TX	40	13.5	44.339444	-96.768611	28.42
3	K50DG-D	LIC	LD	50	4.5	44.300833	-96.766667	30.27
4	K27LB-D	CP	LD	27	2.0	44.383222	-97.010111	45.72
5	K38NI-D	CP	LD	38	2.0	44.383222	-97.010111	45.72
6	K42KO-D	CP	LD	42	2.0	44.383222	-97.010111	45.72
7	K45LV-D	CP	LD	45	2.0	44.383222	-97.010111	45.72
8	KSMN	LIC	DT	15	200.0	43.897778	-95.947222	59.30
9	KRWF	LIC	DT	27	58.0	44.484167	-95.490833	61.55
10	K43MH-D	LIC	LD	43	5.5	44.484167	-95.490556	61.58
11	K14OL-D	LIC	LD	14	1.8	44.804722	-95.580278	61.58
12	K16CP-D	LIC	LD	16	1.8	44.804722	-95.580278	61.58
13	K21LF-D	LIC	LD	21	1.8	44.804722	-95.580278	61.58
14	K22DO-D	LIC	LD	22	1.7	44.804722	-95.580278	61.58
15	K24CS-D	LIC	LD	24	1.8	44.804722	-95.580278	61.58
16	K29JW-D	LIC	LD	29	1.8	44.804722	-95.580278	61.58
17	K32DR-D	LIC	LD	32	1.8	44.804722	-95.580278	61.58
18	K35DK-D	LIC	LD	35	1.8	44.804722	-95.580278	61.58
19	K40MC-D	LIC	LD	40	1.8	44.804722	-95.580278	61.58
20	K41MF-D	LIC	LD	41	1.8	44.804722	-95.580278	61.58
21	K45DJ-D	LIC	LD	45	1.8	44.804722	-95.580278	61.58
22	K49LV-D	LIC	LD	49	1.8	44.804722	-95.580278	61.58
23	K35GR-D	LIC	LD	35	6.76	44.487528	-97.238806	63.60
24	K35GR-D	LIC	TX	35	11.9	44.487500	-97.238889	63.60
25	KESD-TV	LIC	DT	8	15.0	44.337778	-97.228333	63.72
26	K21LK-D	CP	LD	21	2.0	43.949417	-96.909472	64.83
27	K30LV-D	CP	LD	30	2.0	43.949417	-96.909472	64.83
28	K33LR-D	CP	LD	33	2.0	43.949417	-96.909472	64.83
29	NEW	APP	LD	48	2.0	43.949417	-96.909472	64.83
30	K19KH-D	CP	LD	19	2.0	44.884917	-97.047917	68.30
31	K20KZ-D	CP	LD	20	2.0	44.884917	-97.047917	68.30
32	K30LU-D	CP	LD	30	2.0	44.884917	-97.047917	68.30

[4] Definitions of service and status codes:
DT – Digital television broadcast station
LD – Low power digital television broadcast station
TX – Translator station
LIC – Licensed and operational station
APP – Application for construction permit
CP – Construction permit granted
CP MOD – Modification of construction permit

[5] ERP = Transmit Effective Radiated Power

ID	Call Sign	Status	Service[4]	Channel	Transmit ERP[5] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
33	K39LN-D	CP	LD	39	2.0	44.884917	-97.047917	68.30
34	K22KF-D	CP	LD	22	15.0	44.885000	-97.048056	68.32
35	K23LI-D	CP	LD	23	15.0	44.885000	-97.048056	68.32
36	K32DK-D	LIC	LD	32	2.28	44.865556	-97.105833	70.19
37	K42FI-D	LIC	LD	42	6.516	44.871139	-97.109361	70.81
38	K42FI-D	LIC	TX	42	10.0	44.871111	-97.109444	70.81
39	KWCM-TV	LIC	DT	10	50.0	45.167500	-96.000556	71.58
40	K18IW-D	LIC	LD	18	3.0	43.752317	-96.885061	81.27
41	K31KU-D	LIC	LD	31	3.0	43.752317	-96.885061	81.27
42	K32JG-D	LIC	LD	32	3.0	43.752317	-96.885061	81.27
43	K32JG-D	CP	LD	32	3.0	43.751389	-96.889111	81.53
44	K18IW-D	CP	LD	18	3.0	43.751389	-96.889444	81.54
45	K31KU-D	CP	LD	31	3.0	43.751389	-96.889444	81.54
46	NEW	APP	LD	23	3.0	43.574722	-96.650556	92.12
47	KCSD-TV	LIC	DT	24	80.9	43.574444	-96.655278	92.24
48	K17MA-D	CP	LD	17	1.0	43.631861	-95.761556	92.41
49	K27ML-D	CP	LD	27	1.0	43.631861	-95.761556	92.41
50	K42LR-D	CP	LD	42	1.0	43.631861	-95.761556	92.41
51	K50NJ-D	CP	LD	50	1.0	43.631861	-95.761556	92.41
52	K22KD-D	CP	LD	22	3.0	43.553889	-96.684722	95.08
53	K56GF	CP	LD	23	15.0	43.553889	-96.684722	95.08
54	K56GF	LIC	TX	56	10.1	43.553889	-96.684722	95.08
55	K20MB-D	LIC	LD	20	13.2	43.518636	-96.534678	96.32
56	KELO-TV	LIC	DT	11	30.0	43.518611	-96.534722	96.33
57	KSFY-TV	LIC	DT	13	22.7	43.518611	-96.534722	96.33
58	KDLT-TV	LIC	DT	47	1000.0	43.505000	-96.556111	98.09
59	KTTW	LIC	DT	7	7.5	43.505278	-96.571944	98.28
60	KWSD	LIC	DT	36	36.9	43.505278	-96.571944	98.28
61	K22HJ-D	LIC	LD	22	1.8	43.617222	-95.688889	96.58
62	K04RR-D	CP	LD	4	3.0	43.538056	-96.713889	97.44
63	K06QJ-D	CP	LD	6	3.0	43.538056	-96.713889	97.44
64	KAUN-LP	LIC	TX	42	0.88	43.535556	-96.742778	98.42
65	KCWS-LP	LIC	TX	44	0.68	43.535556	-96.742778	98.42
66	KCPO-LP	LIC	TX	26	7.57	43.534167	-96.739167	98.47
67	K33NF-D	CP	LD	33	1.0	43.659861	-97.147083	101.81
68	K35LZ-D	CP	LD	35	1.0	43.659861	-97.147083	101.81
69	K38OZ-D	CP	LD	38	1.0	43.659861	-97.147083	101.81
70	K48OK-D	CP	LD	48	1.0	43.659861	-97.147083	101.81
71	K17BV-D	LIC	LD	17	0.398	44.549722	-94.966667	103.30
72	K19CV-D	LIC	LD	19	0.395	44.549722	-94.966667	103.30

ID	Call Sign	Status	Service[4]	Channel	Transmit ERP[5] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
73	K22KU-D	LIC	LD	22	0.39	44.549722	-94.966667	103.30
74	K25II-D	LIC	LD	25	0.387	44.549722	-94.966667	103.30
75	K28LL-D	LIC	LD	28	0.382	44.549722	-94.966667	103.30
76	K33LB-D	LIC	LD	33	0.375	44.549722	-94.966667	103.30
77	K36KW-D	LIC	LD	36	0.373	44.549722	-94.966667	103.30
78	K39CH-D	LIC	LD	39	0.369	44.549722	-94.966667	103.30
79	K46FY-D	LIC	LD	46	0.36	44.549722	-94.966667	103.30
80	K48GQ-D	LIC	LD	48	0.357	44.549722	-94.966667	103.30
81	K50KF-D	LIC	LD	50	0.354	44.549722	-94.966667	103.30
82	K14OP-D	CP	LD	14	1.0	45.340028	-97.071028	106.41
83	K25MD-D	CP	LD	25	1.0	45.340028	-97.071028	106.41
84	K32KJ-D	CP	LD	32	1.0	45.340028	-97.071028	106.41
85	K35KS-D	CP	LD	35	1.0	45.340028	-97.071028	106.41
86	K20LV-D	CP	LD	20	1.0	43.639583	-95.413722	107.16
87	K24KZ-D	CP	LD	24	1.0	43.639583	-95.413722	107.16
88	K44LS-D	CP	LD	44	1.0	43.639583	-95.413722	107.16
89	KDLO-TV	LIC	DT	3	14.4	44.965556	-97.589444	107.66
90	K43LX-D	LIC	LD	43	15.0	43.376667	-96.196111	111.18
91	K18IR-D	LIC	LD	18	0.79	44.759167	-94.873056	113.09
92	K20JY-D	LIC	LD	20	0.79	44.759167	-94.873056	113.09
93	K23FP-D	LIC	LD	23	0.79	44.759167	-94.873056	113.09
94	K38LC-D	LIC	LD	38	0.79	44.759167	-94.873056	113.09
95	K47JE-D	LIC	LD	47	0.62	44.759167	-94.873056	113.09
96	K49AJ-D	LIC	LD	49	0.79	44.759167	-94.873056	113.09
97	K51AL-D	LIC	LD	51	0.79	44.759167	-94.873056	113.09
98	NEW	APP	LD	35	15.0	43.376667	-96.805167	116.76
99	K26JI-D	LIC	LD	26	14.0	43.402778	-95.670833	118.56
100	K30FZ-D	LIC	LD	30	11.0	45.166111	-95.043889	118.74
101	K14LF-D	LIC	LD	14	0.475	45.166111	-95.043611	118.76
102	K15IS-D	CP	LD	15	0.4	45.166111	-95.043611	118.76
103	K17FA-D	LIC	LD	17	0.5	45.166111	-95.043611	118.76
104	K19IH-D	LIC	LD	19	0.55	45.166111	-95.043611	118.76
105	K28IF-D	LIC	LD	28	0.65	45.166111	-95.043611	118.76
106	K34HO-D	LIC	LD	34	0.65	45.166111	-95.043611	118.76
107	K39FE-D	LIC	LD	39	0.65	45.166111	-95.043611	118.76
108	K44AE-D	LIC	LD	44	0.7	45.166111	-95.043611	118.76
109	K46AC-D	LIC	LD	46	0.7	45.166111	-95.043611	118.76
110	K48AH-D	LIC	LD	48	0.55	45.166111	-95.043611	118.76
111	K50HZ-D	LIC	LD	50	0.54	45.166111	-95.043611	118.76
112	Q14A-D	CP	LD	14	1.0	43.703056	-97.547694	120.19

ID	Call Sign	Status	Service[4]	Channel	Transmit ERP[5] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
113	K30NS-D	CP	LD	30	1.0	43.703056	-97.547694	120.19
114	K40NS-D	CP	LD	40	1.0	43.703056	-97.547694	120.19
115	K19HZ-D	LIC	LD	19	3.1	43.603333	-94.992500	134.11
116	K23FO-D	LIC	LD	23	3.1	43.603333	-94.992500	134.11
117	K30KQ-D	LIC	LD	30	2.1	43.603333	-94.992500	134.11
118	K35IZ-D	LIC	LD	35	3.1	43.603333	-94.992500	134.11
119	K36IV-D	LIC	LD	36	1.5	43.603333	-94.992500	134.11
120	K40LA-D	LIC	LD	40	2.1	43.603333	-94.992500	134.11
121	K41EG-D	LIC	LD	41	3.1	43.603333	-94.992500	134.11
122	K43MJ-D	LIC	LD	43	2.1	43.603333	-94.992500	134.11
123	K45EH-D	LIC	LD	45	3.1	43.603333	-94.992500	134.11
124	K50KL-D	LIC	LD	50	2.1	43.603333	-94.992500	134.11
125	K51KT-D	LIC	LD	51	3.1	43.603333	-94.992500	134.11
126	KABY-TV	LIC	DT	9	19.4	45.106389	-97.899167	136.65
127	K16CG-D	LIC	LD	16	1.8	44.107778	-94.598611	136.76
128	K20LP-D	LIC	LD	20	1.3	44.107778	-94.598611	136.76
129	K23MF-D	LIC	LD	23	1.3	44.107778	-94.598611	136.76
130	K24JV-D	LIC	LD	24	1.8	44.107778	-94.598611	136.76
131	K29IE-D	LIC	LD	29	3.0	44.107778	-94.598611	136.76
132	K31KV-D	LIC	LD	31	1.8	44.107778	-94.598611	136.76
133	K35KI-D	LIC	LD	35	1.8	44.107778	-94.598611	136.76
134	K40BU-D	LIC	LD	40	1.8	44.107778	-94.598611	136.76
135	K45LJ-D	LIC	LD	45	1.8	44.107778	-94.598611	136.76
136	K49HE-D	LIC	LD	49	3.0	44.107778	-94.598611	136.76
137	K23MF-D	CP	LD	51	3.0	44.107778	-94.598611	136.76
138	K14KE-D	LIC	LD	14	1.5	44.106944	-94.595556	137.02
139	K21DG-D	LIC	LD	21	2.0	44.106944	-94.595556	137.02
140	K26CS-D	LIC	LD	26	2.0	44.106944	-94.595556	137.02
141	K30FN-D	LIC	LD	30	12.0	44.106944	-94.595556	137.02
142	K32GX-D	LIC	LD	32	1.2	44.106944	-94.595556	137.02
143	K34JX-D	LIC	LD	34	2.0	44.106944	-94.595556	137.02
144	K41IZ-D	LIC	LD	41	2.0	44.106944	-94.595556	137.02
145	K44AD-D	LIC	LD	44	2.0	44.106944	-94.595556	137.02
146	K33MW-D	CP	LD	33	2.0	43.661250	-94.853194	139.04
147	K39MD-D	CP	LD	39	2.0	43.661250	-94.853194	139.04
148	K38NJ-D	CP	LD	38	2.0	43.076944	-96.804528	148.79

Table 1: OTA TV Stations within 150 Kilometers of Project Area

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
1	K40FZ-D	LIC	LD	40	7.014	44.339472	-96.768556	28.41
2	K40FZ-D	LIC	TX	40	13.5	44.339444	-96.768611	28.42
3	K50DG-D	LIC	LD	50	4.5	44.300833	-96.766667	30.27
8	KSMN	LIC	DT	15	200.0	43.897778	-95.947222	59.30
9	KRWF	LIC	DT	27	58.0	44.484167	-95.490833	61.55
10	K43MH-D	LIC	LD	43	5.5	44.484167	-95.490556	61.58
11	K14OL-D	LIC	LD	14	1.8	44.804722	-95.580278	61.58
12	K16CP-D	LIC	LD	16	1.8	44.804722	-95.580278	61.58
13	K21LF-D	LIC	LD	21	1.8	44.804722	-95.580278	61.58
14	K22DO-D	LIC	LD	22	1.7	44.804722	-95.580278	61.58
15	K24CS-D	LIC	LD	24	1.8	44.804722	-95.580278	61.58
16	K29JW-D	LIC	LD	29	1.8	44.804722	-95.580278	61.58
17	K32DR-D	LIC	LD	32	1.8	44.804722	-95.580278	61.58
18	K35DK-D	LIC	LD	35	1.8	44.804722	-95.580278	61.58
19	K40MC-D	LIC	LD	40	1.8	44.804722	-95.580278	61.58
20	K41MF-D	LIC	LD	41	1.8	44.804722	-95.580278	61.58
21	K45DJ-D	LIC	LD	45	1.8	44.804722	-95.580278	61.58
22	K49LV-D	LIC	LD	49	1.8	44.804722	-95.580278	61.58
23	K35GR-D	LIC	LD	35	6.76	44.487528	-97.238806	63.60
24	K35GR-D	LIC	TX	35	11.9	44.487500	-97.238889	63.60
25	KESD-TV	LIC	DT	8	15.0	44.337778	-97.228333	63.72
36	K32DK-D	LIC	LD	32	2.28	44.865556	-97.105833	70.19
37	K42FI-D	LIC	LD	42	6.516	44.871139	-97.109361	70.81
38	K42FI-D	LIC	TX	42	10.0	44.871111	-97.109444	70.81
39	KWCM-TV	LIC	DT	10	50.0	45.167500	-96.000556	71.58
40	K18IW-D	LIC	LD	18	3.0	43.752317	-96.885061	81.27
41	K31KU-D	LIC	LD	31	3.0	43.752317	-96.885061	81.27
42	K32JG-D	LIC	LD	32	3.0	43.752317	-96.885061	81.27
47	KCSD-TV	LIC	DT	24	80.9	43.574444	-96.655278	92.24
54	K56GF	LIC	TX	56	10.1	43.553889	-96.684722	95.08
55	K20MB-D	LIC	LD	20	13.2	43.518636	-96.534678	96.32
56	KELO-TV	LIC	DT	11	30.0	43.518611	-96.534722	96.33
57	KSFY-TV	LIC	DT	13	22.7	43.518611	-96.534722	96.33
58	KDLT-TV	LIC	DT	47	1000.0	43.505000	-96.556111	98.09

[6] Definitions of service and status codes:
DT – Digital television broadcast station
LD – Low power digital television broadcast station
TX – Translator station
LIC – Licensed and operational station

[7] ERP = Transmit Effective Radiated Power

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
59	KTTW	LIC	DT	7	7.5	43.505278	-96.571944	98.28
60	KWSD	LIC	DT	36	36.9	43.505278	-96.571944	98.28
61	K22HJ-D	LIC	LD	22	1.8	43.617222	-95.688889	96.58
64	KAUN-LP	LIC	TX	42	0.88	43.535556	-96.742778	98.42
65	KCWS-LP	LIC	TX	44	0.68	43.535556	-96.742778	98.42
66	KCPO-LP	LIC	TX	26	7.57	43.534167	-96.739167	98.47
71	K17BV-D	LIC	LD	17	0.398	44.549722	-94.966667	103.30
72	K19CV-D	LIC	LD	19	0.395	44.549722	-94.966667	103.30
73	K22KU-D	LIC	LD	22	0.39	44.549722	-94.966667	103.30
74	K25II-D	LIC	LD	25	0.387	44.549722	-94.966667	103.30
75	K28LL-D	LIC	LD	28	0.382	44.549722	-94.966667	103.30
76	K33LB-D	LIC	LD	33	0.375	44.549722	-94.966667	103.30
77	K36KW-D	LIC	LD	36	0.373	44.549722	-94.966667	103.30
78	K39CH-D	LIC	LD	39	0.369	44.549722	-94.966667	103.30
79	K46FY-D	LIC	LD	46	0.36	44.549722	-94.966667	103.30
80	K48GQ-D	LIC	LD	48	0.357	44.549722	-94.966667	103.30
81	K50KF-D	LIC	LD	50	0.354	44.549722	-94.966667	103.30
89	KDLO-TV	LIC	DT	3	14.4	44.965556	-97.589444	107.66
90	K43LX-D	LIC	LD	43	15.0	43.376667	-96.196111	111.18
91	K18IR-D	LIC	LD	18	0.79	44.759167	-94.873056	113.09
92	K20JY-D	LIC	LD	20	0.79	44.759167	-94.873056	113.09
93	K23FP-D	LIC	LD	23	0.79	44.759167	-94.873056	113.09
94	K38LC-D	LIC	LD	38	0.79	44.759167	-94.873056	113.09
95	K47JE-D	LIC	LD	47	0.62	44.759167	-94.873056	113.09
96	K49AJ-D	LIC	LD	49	0.79	44.759167	-94.873056	113.09
97	K51AL-D	LIC	LD	51	0.79	44.759167	-94.873056	113.09
99	K26JI-D	LIC	LD	26	14.0	43.402778	-95.670833	118.56
100	K30FZ-D	LIC	LD	30	11.0	45.166111	-95.043889	118.74
101	K14LF-D	LIC	LD	14	0.475	45.166111	-95.043611	118.76
103	K17FA-D	LIC	LD	17	0.5	45.166111	-95.043611	118.76
104	K19IH-D	LIC	LD	19	0.55	45.166111	-95.043611	118.76
105	K28IF-D	LIC	LD	28	0.65	45.166111	-95.043611	118.76
106	K34HO-D	LIC	LD	34	0.65	45.166111	-95.043611	118.76
107	K39FE-D	LIC	LD	39	0.65	45.166111	-95.043611	118.76
108	K44AE-D	LIC	LD	44	0.7	45.166111	-95.043611	118.76
109	K46AC-D	LIC	LD	46	0.7	45.166111	-95.043611	118.76
110	K48AH-D	LIC	LD	48	0.55	45.166111	-95.043611	118.76
111	K50HZ-D	LIC	LD	50	0.54	45.166111	-95.043611	118.76
115	K19HZ-D	LIC	LD	19	3.1	43.603333	-94.992500	134.11
116	K23FO-D	LIC	LD	23	3.1	43.603333	-94.992500	134.11
117	K30KQ-D	LIC	LD	30	2.1	43.603333	-94.992500	134.11

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
118	K35IZ-D	LIC	LD	35	3.1	43.603333	-94.992500	134.11
119	K36IV-D	LIC	LD	36	1.5	43.603333	-94.992500	134.11
120	K40LA-D	LIC	LD	40	2.1	43.603333	-94.992500	134.11
121	K41EG-D	LIC	LD	41	3.1	43.603333	-94.992500	134.11
122	K43MJ-D	LIC	LD	43	2.1	43.603333	-94.992500	134.11
123	K45EH-D	LIC	LD	45	3.1	43.603333	-94.992500	134.11
124	K50KL-D	LIC	LD	50	2.1	43.603333	-94.992500	134.11
125	K51KT-D	LIC	LD	51	3.1	43.603333	-94.992500	134.11
126	KABY-TV	LIC	DT	9	19.4	45.106389	-97.899167	136.65
127	K16CG-D	LIC	LD	16	1.8	44.107778	-94.598611	136.76
128	K20LP-D	LIC	LD	20	1.3	44.107778	-94.598611	136.76
129	K23MF-D	LIC	LD	23	1.3	44.107778	-94.598611	136.76
130	K24JV-D	LIC	LD	24	1.8	44.107778	-94.598611	136.76
131	K29IE-D	LIC	LD	29	3.0	44.107778	-94.598611	136.76
132	K31KV-D	LIC	LD	31	1.8	44.107778	-94.598611	136.76
133	K35KI-D	LIC	LD	35	1.8	44.107778	-94.598611	136.76
134	K40BU-D	LIC	LD	40	1.8	44.107778	-94.598611	136.76
135	K45LJ-D	LIC	LD	45	1.8	44.107778	-94.598611	136.76
136	K49HE-D	LIC	LD	49	3.0	44.107778	-94.598611	136.76
138	K14KE-D	LIC	LD	14	1.5	44.106944	-94.595556	137.02
139	K21DG-D	LIC	LD	21	2.0	44.106944	-94.595556	137.02
140	K26CS-D	LIC	LD	26	2.0	44.106944	-94.595556	137.02
141	K30FN-D	LIC	LD	30	12.0	44.106944	-94.595556	137.02
142	K32GX-D	LIC	LD	32	1.2	44.106944	-94.595556	137.02
143	K34JX-D	LIC	LD	34	2.0	44.106944	-94.595556	137.02
144	K41IZ-D	LIC	LD	41	2.0	44.106944	-94.595556	137.02
145	K44AD-D	LIC	LD	44	2.0	44.106944	-94.595556	137.02

Table 2: Operational OTA TV Stations within 150 Kilometers of Project Area

The FCC coverage contours for the 102 operational stations were plotted. Of these contours, nine (IDs 1, 8, 9, 25, 39, 56, 57, 58, and 89) were found to intersect at least one wind turbine and were therefore subject to further analysis. As the coverage contours of the other 93 operational stations do not extend into the project area, they should not be impacted by the proposed wind turbines.

In the following section, a detailed analysis is presented to assess the impact of the wind energy project on the nine television stations identified above in terms of coverage, interference, and

demographics. The analysis is based on 155 proposed wind turbines as shown in Figure 1, each having a hub height of 82 meters and a blade diameter of 136 meters, giving them an overall height of 150 meters above ground level (AGL).

3. Impact Analysis of Operational TV Stations

The licensed operational television stations whose coverage is potentially impacted by the planned wind turbines are listed below in Table 3. The analysis performed in this section will define where potential signal reception degradation could occur.

Call Sign	Transmit Channel	Network Affiliate	Power (kW)	Antenna Height AGL (m)	Antenna Height AMSL (m)	Owner	Distance to Nearest Turbine (km)
K40FZ-D	40	-	7.014	103	596.58	Red River Broadcast Co., LLC	28.41
KSMN	15	PBS	200.0	253	810.47	West Central Minnesota Educational TV Corp.	59.30
KRWF	27	ABC	58.0	151	481.73	KSAX-TV, Inc.	61.55
KESD-TV	8	PBS	15.0	230.8	763.03	South Dakota Board Of Directors For Educational Telecommunic	63.72
KWCM-TV	10	PBS	50.0	376	691.40	West Central Minnesota Educational TV Corp.	71.58
KELO-TV	11	CBS	30.0	595	1039.12	Nexstar Broadcasting, Inc.	96.33
KSFY-TV	13	ABC	22.7	595	1039.12	Gray Television Licensee, LLC	96.33
KDLT-TV	47	NBC	1000.0	599	1034.92	Red River Broadcast Co., LLC	98.09
KDLO-TV	3	CBS	14.4	503.2	1064.93	Nexstar Broadcasting, Inc.	107.66

Table 3: Summary of Operational Television Stations with the Potential of Degraded Coverage

Comsearch performed an impact assessment with respect to OTA coverage based on the maximum heights reached by the wind turbine blades relative to the broadcast antenna centerlines of the nine television stations in Table 3. Comsearch determined whether the overall peak height of the rotating blades above sea level would exceed that of any of the television broadcast antennas and thereby cause total blockage on a certain azimuth. Accordingly, station K40FZ-D was determined to have potential blockage with respect to 48 turbines in its service area. As a result, these turbines have the potential to cause some shadowing of OTA coverage along areas located on the opposite side of the project area relative to this television station.

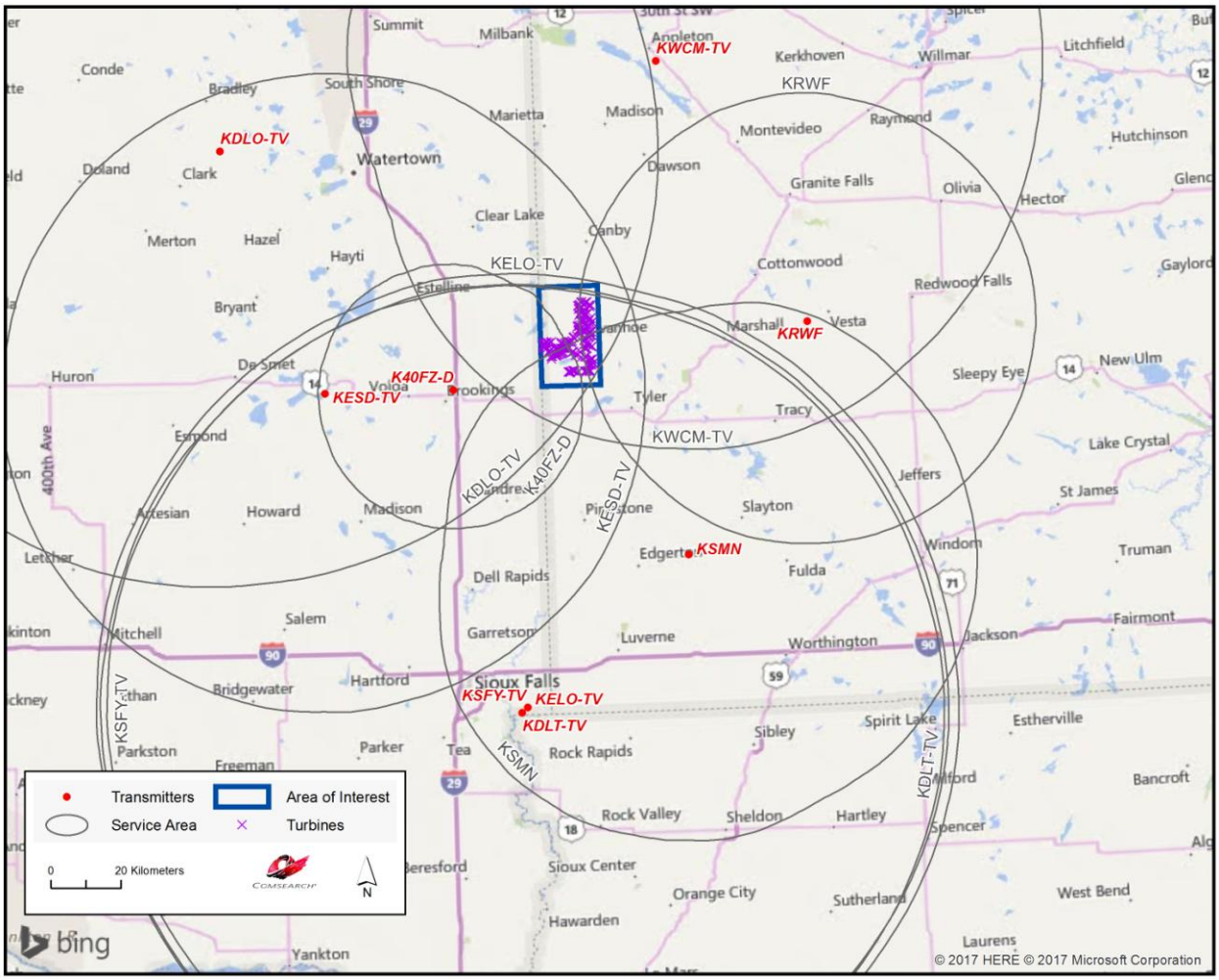


Figure 3: Plot of OTA TV Stations with Service Contours Overlapping Turbines

Compared to the shadowing potential of the proposed wind turbines, their scattering effects are generally considered to have a more significant impact to television signal reception. When signals are reflected and scattered by the wind turbines, they have a potential to cause multipath interference to the direct signal transmitted by the stations to a given receiver. The nine stations listed in Table 3 are depicted in Figure 3 above along with their television coverage contours. Areas within the contours that are especially susceptible to this interference are those where the receiver antenna is within 10 kilometers and has line-of-sight to a wind turbine but no line-of-sight to the serving television station. These areas are depicted in Figures 4 through 12 as hashed regions and labeled as "At-Risk" areas. After the wind turbines are installed, communities and homes in these locations may experience degraded reception of the affected television station(s). The severity of the interference at a given receiver in these areas is a function of the receiver itself, the type and configuration of the receiver antenna, the orientation of the wind turbine, and other signal propagation factors. It should be noted that no disruption will occur to television service from cable company providers or direct broadcast satellite (DBS) service.

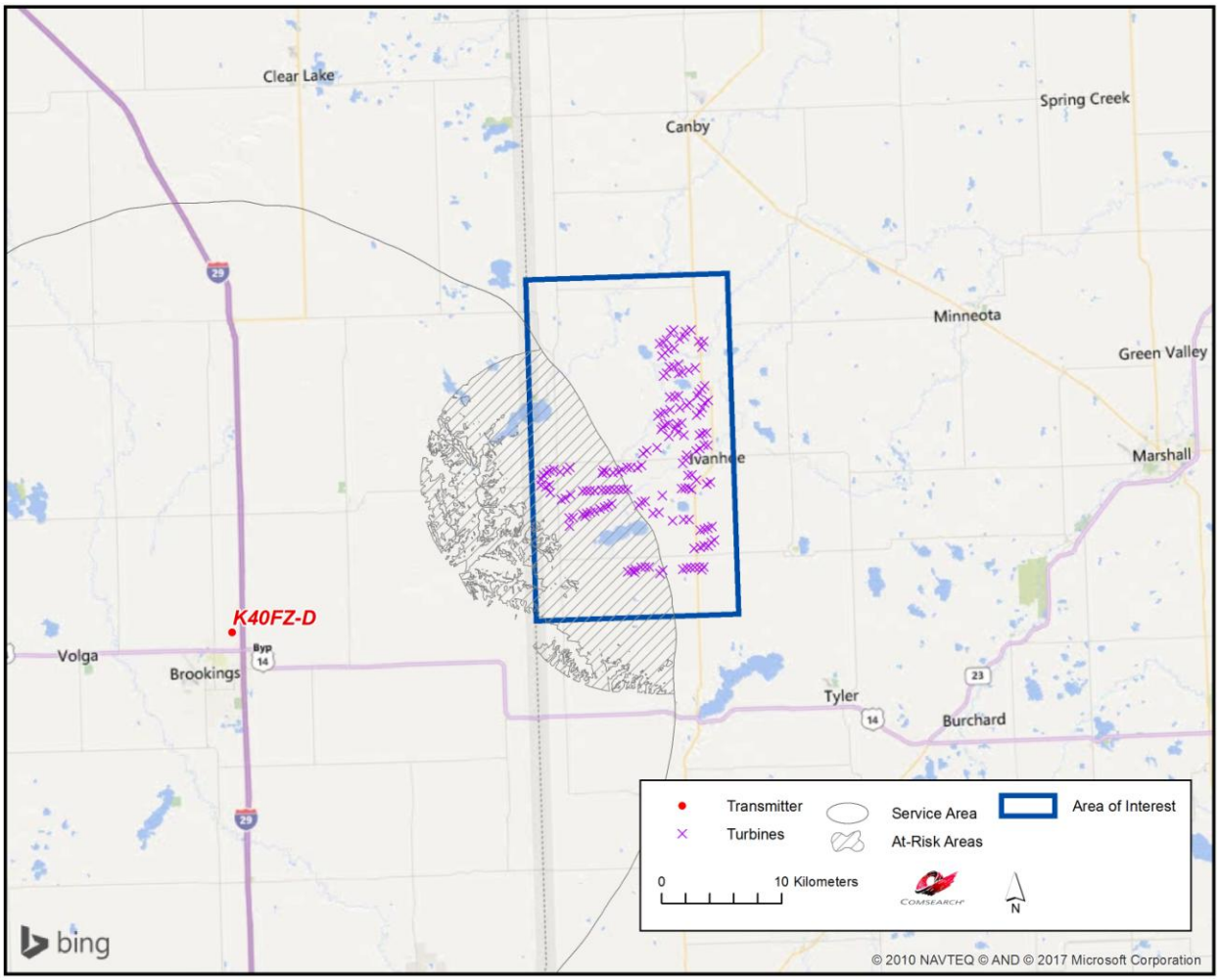


Figure 4: Areas Served by K40FZ-D Station Potentially Impacted by Signal Scattering

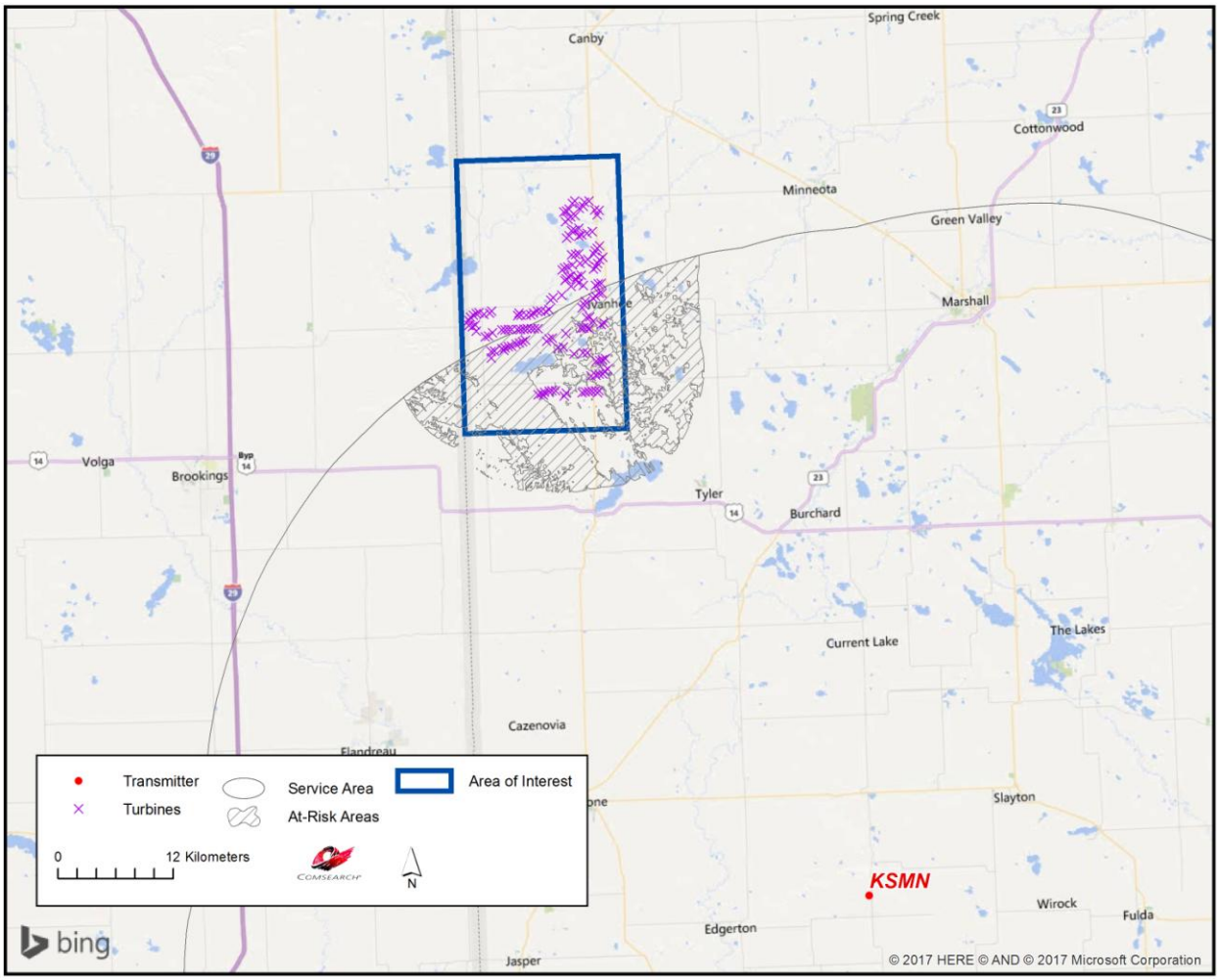


Figure 5: Areas Served by KSMN Station Potentially Impacted by Signal Scattering

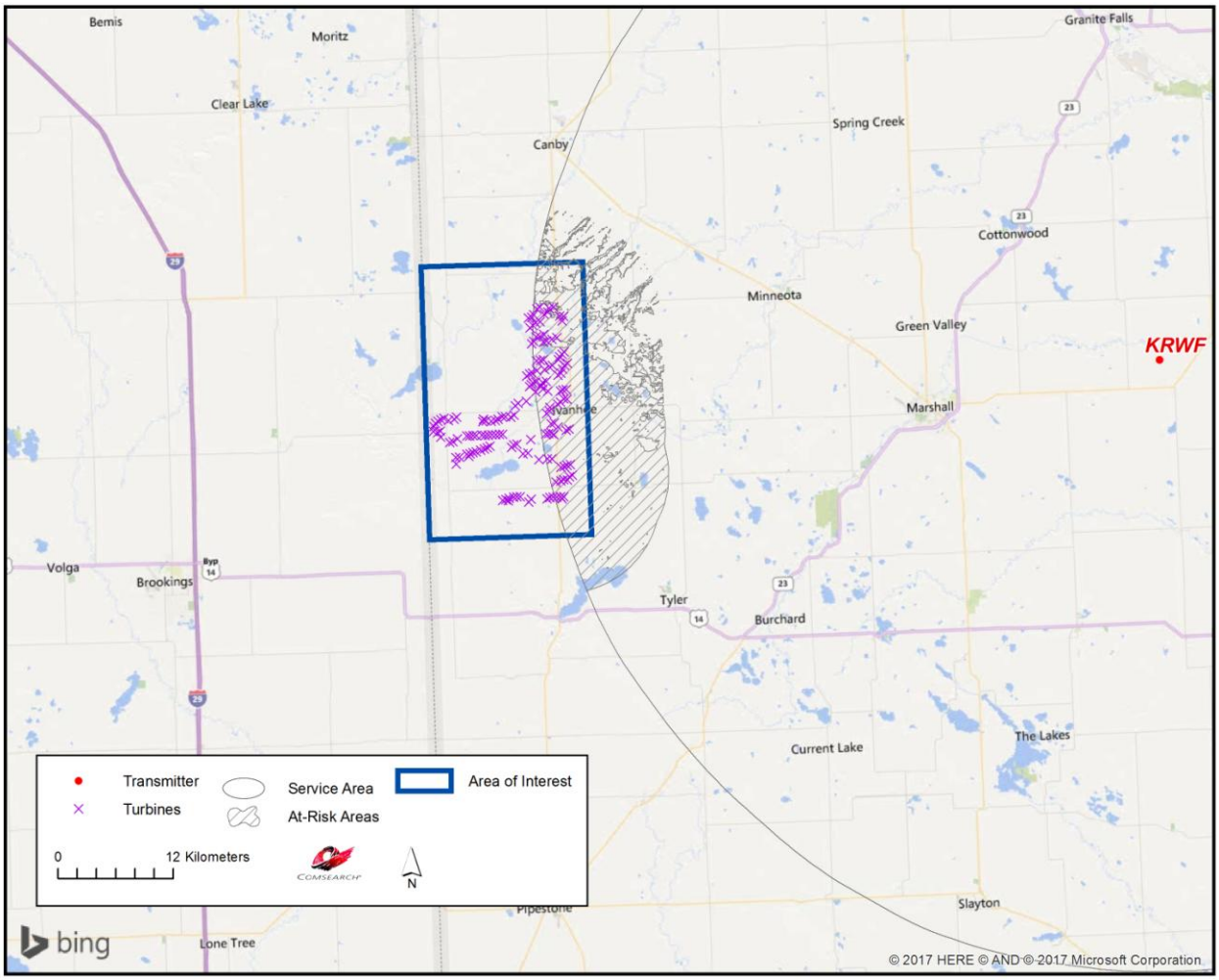


Figure 6: Areas Served by KRWF Station Potentially Impacted by Signal Scattering

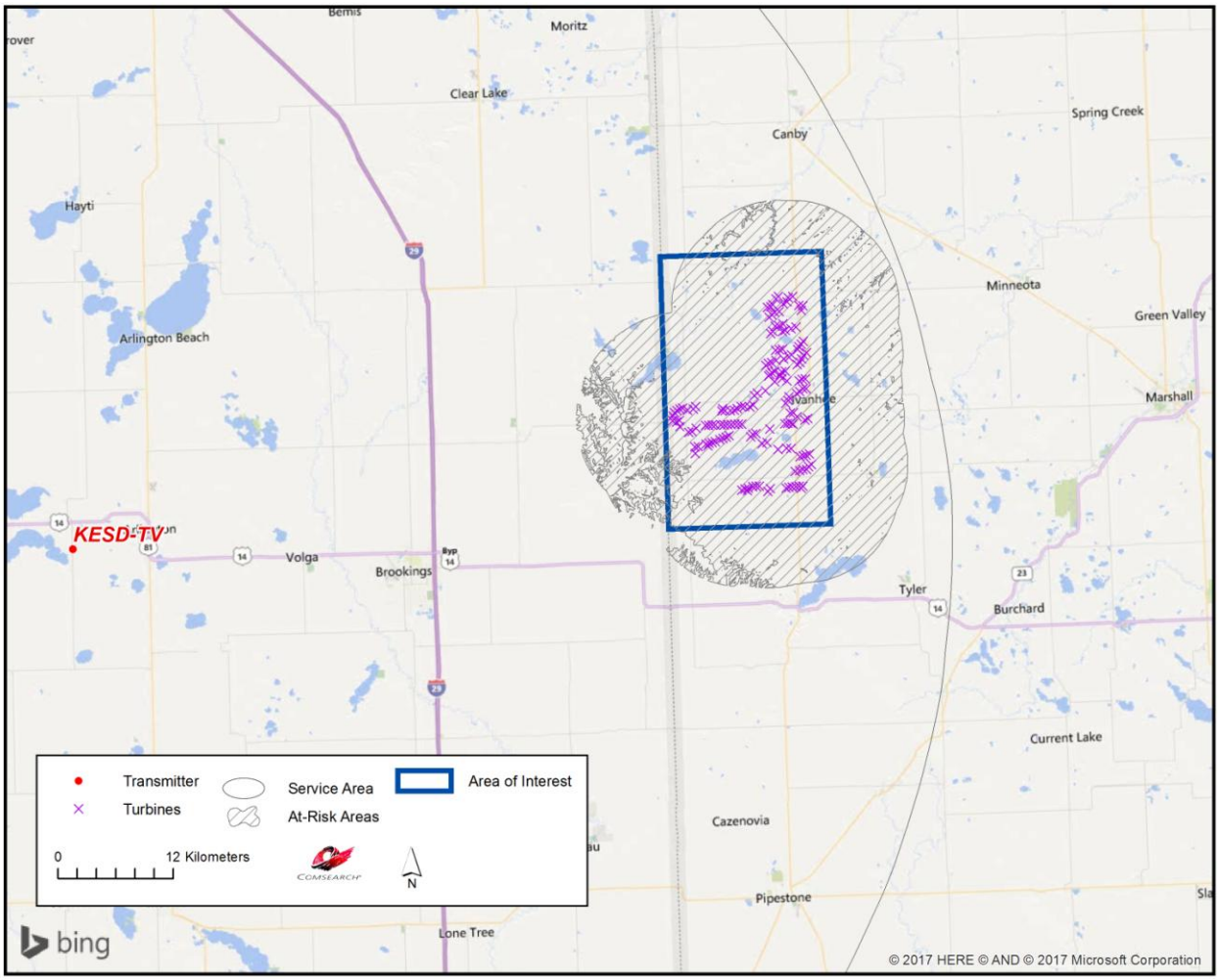


Figure 7: Areas Served by KESD-TV Station Potentially Impacted by Signal Scattering

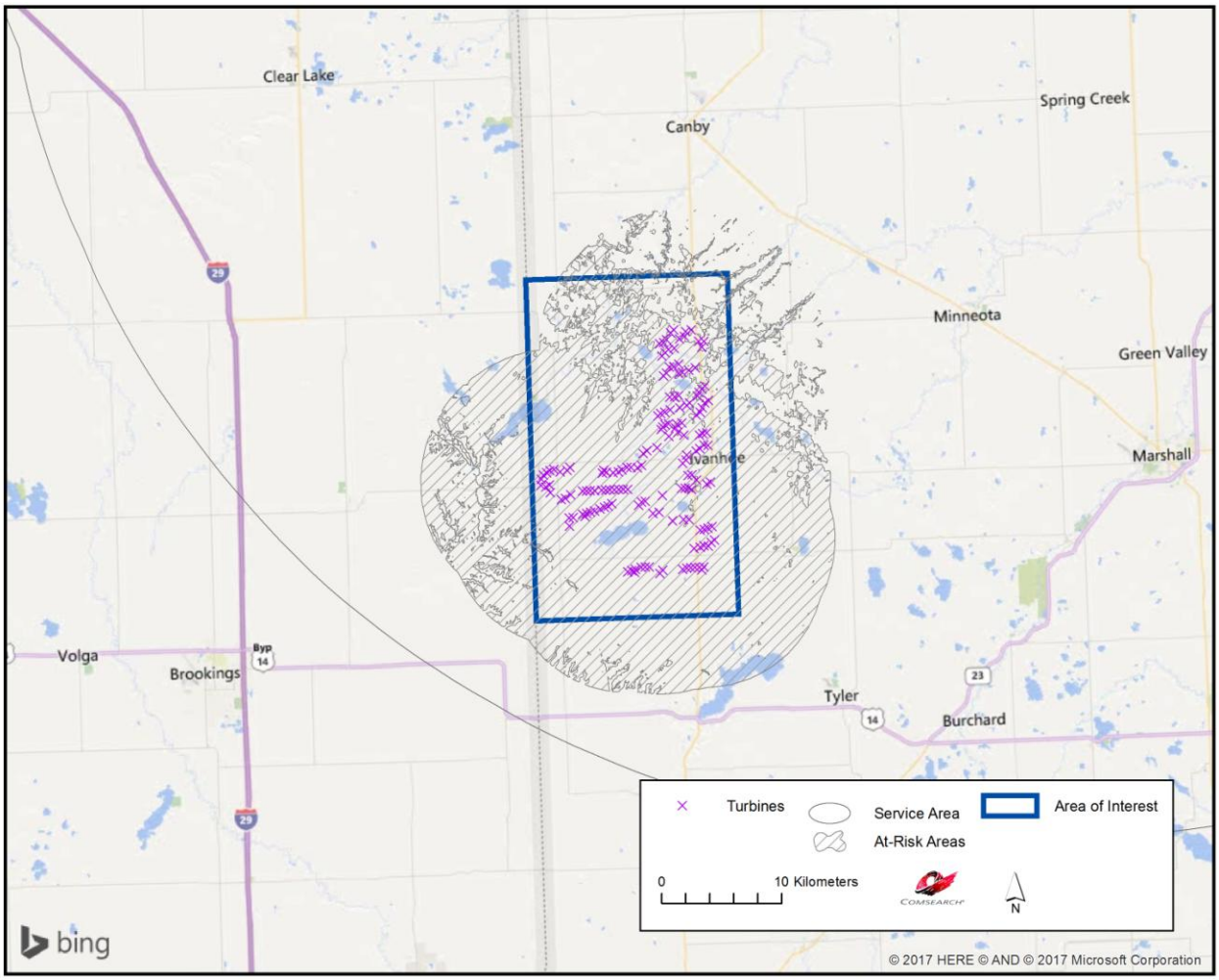


Figure 8: Areas Served by KWCM-TV Station Potentially Impacted by Signal Scattering

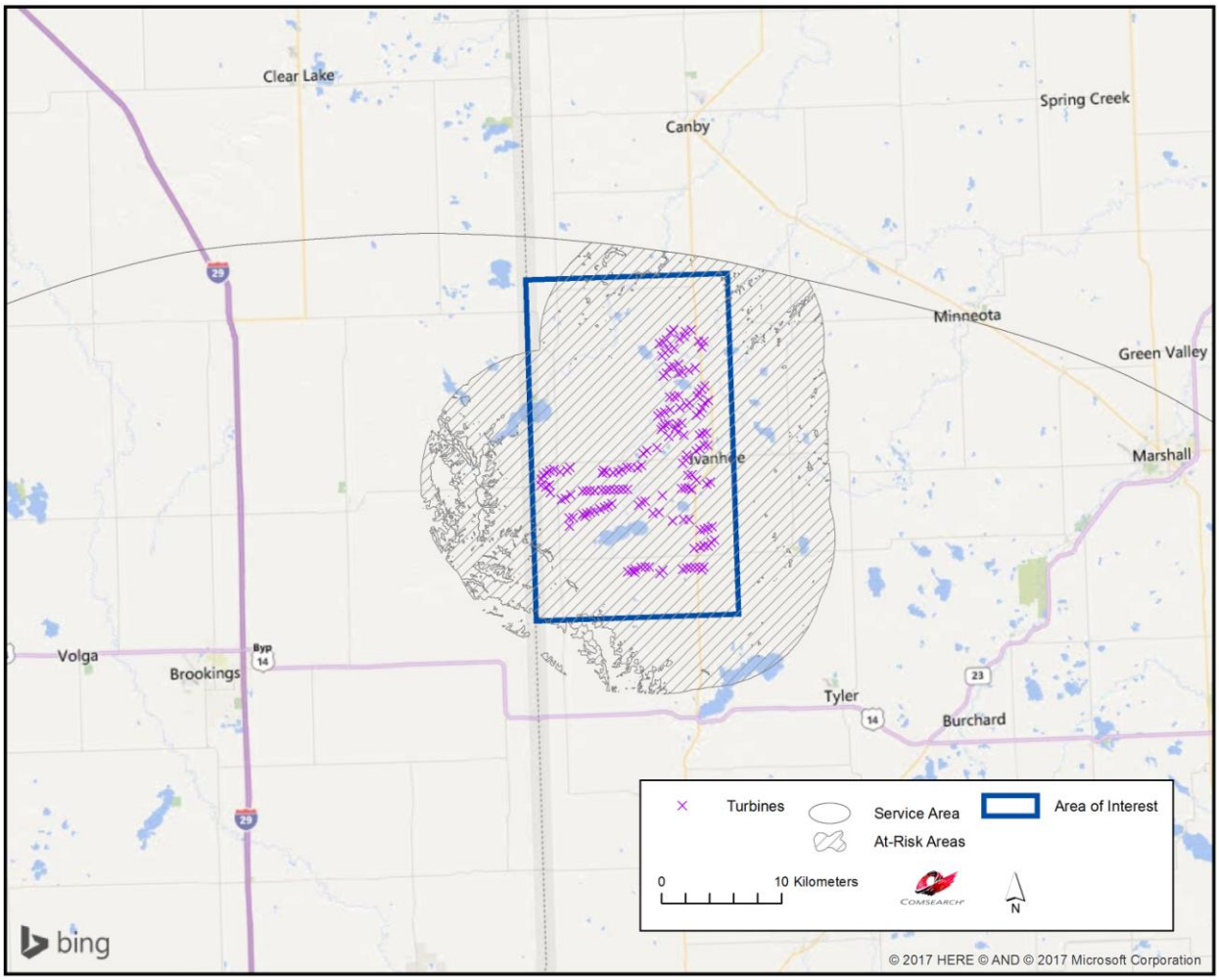


Figure 9: Areas Served by KELO-TV Station Potentially Impacted by Signal Scattering

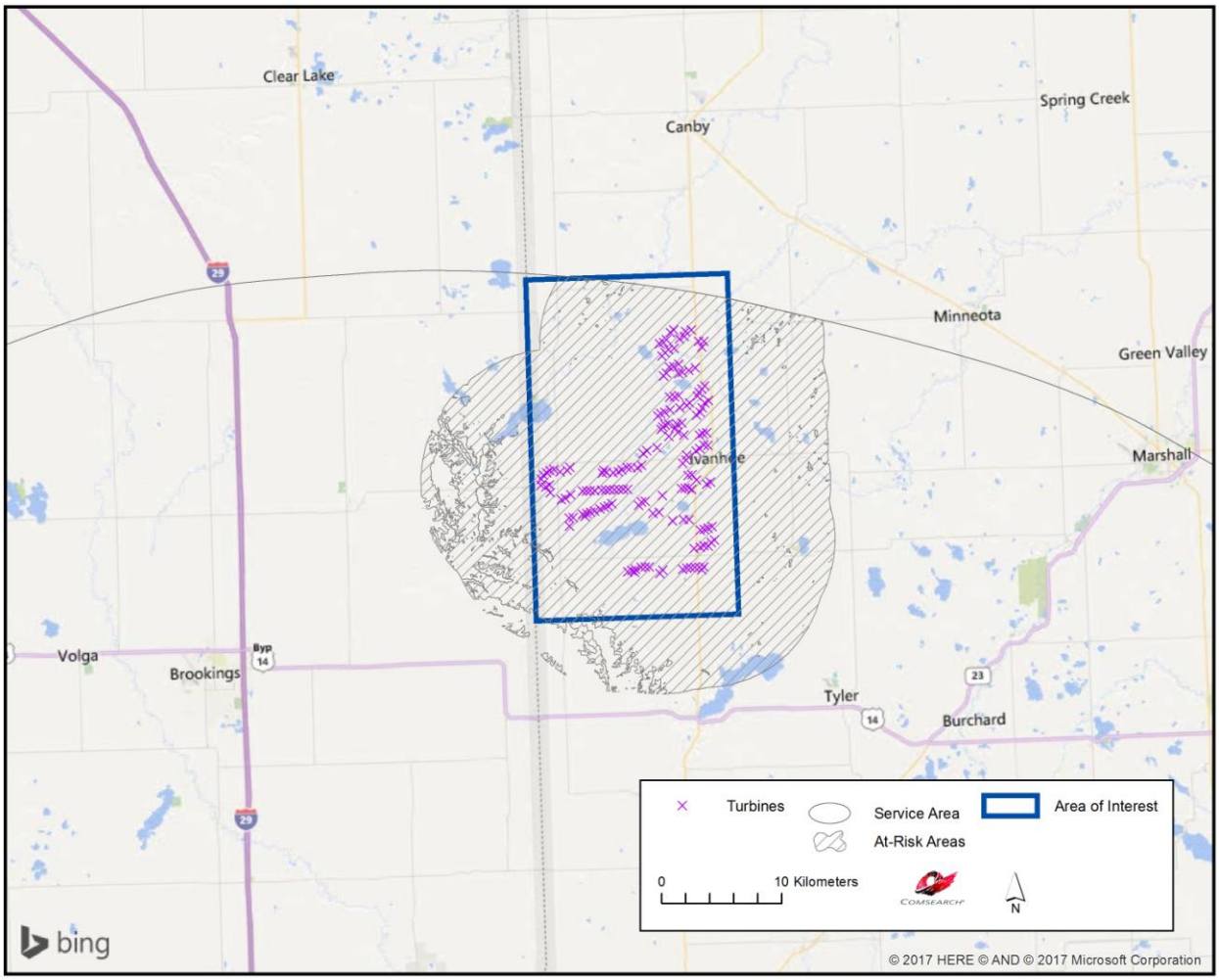


Figure 10: Areas Served by KSFY-TV Station Potentially Impacted by Signal Scattering

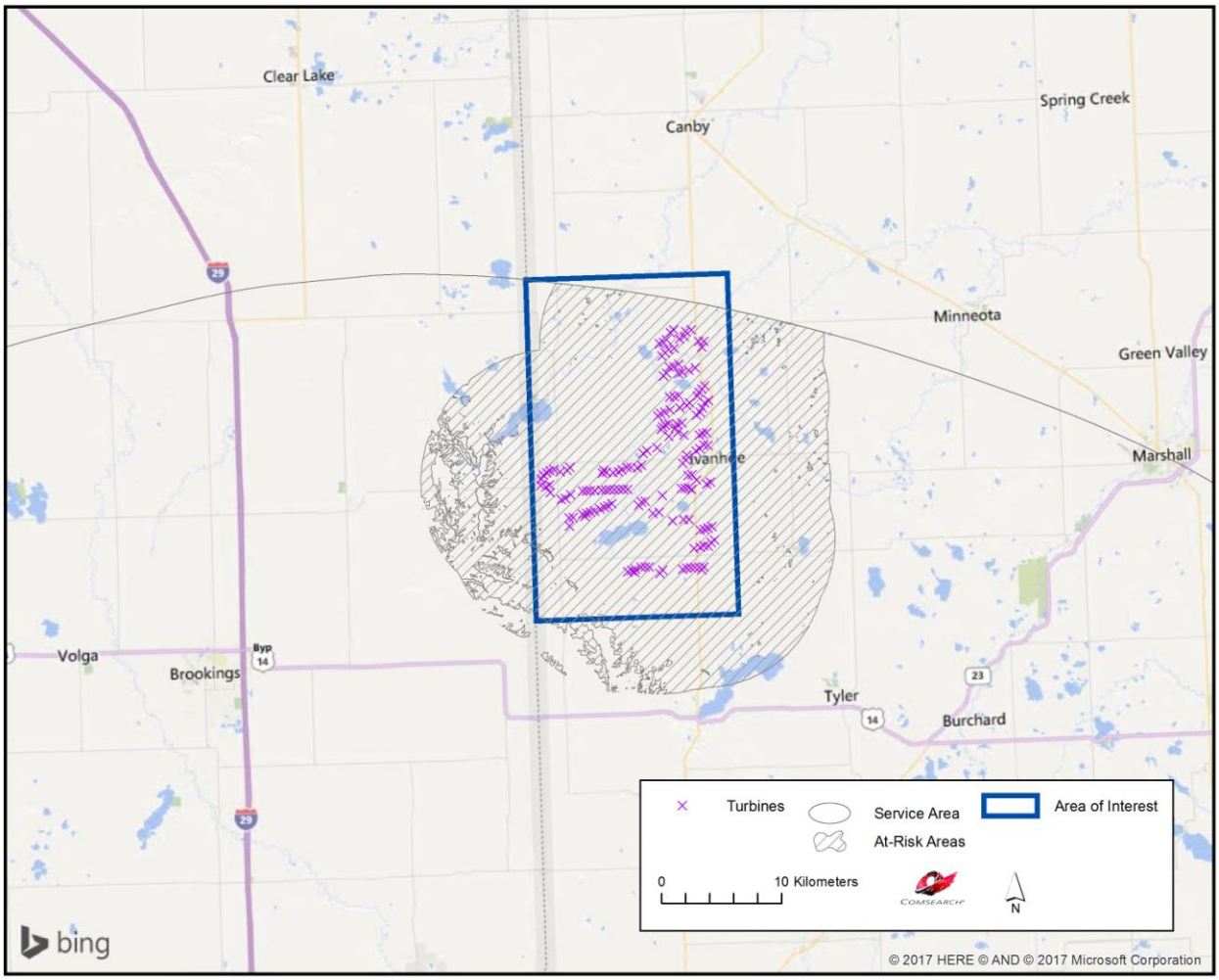


Figure 11: Areas Served by KDLT-TV Station Potentially Impacted by Signal Scattering

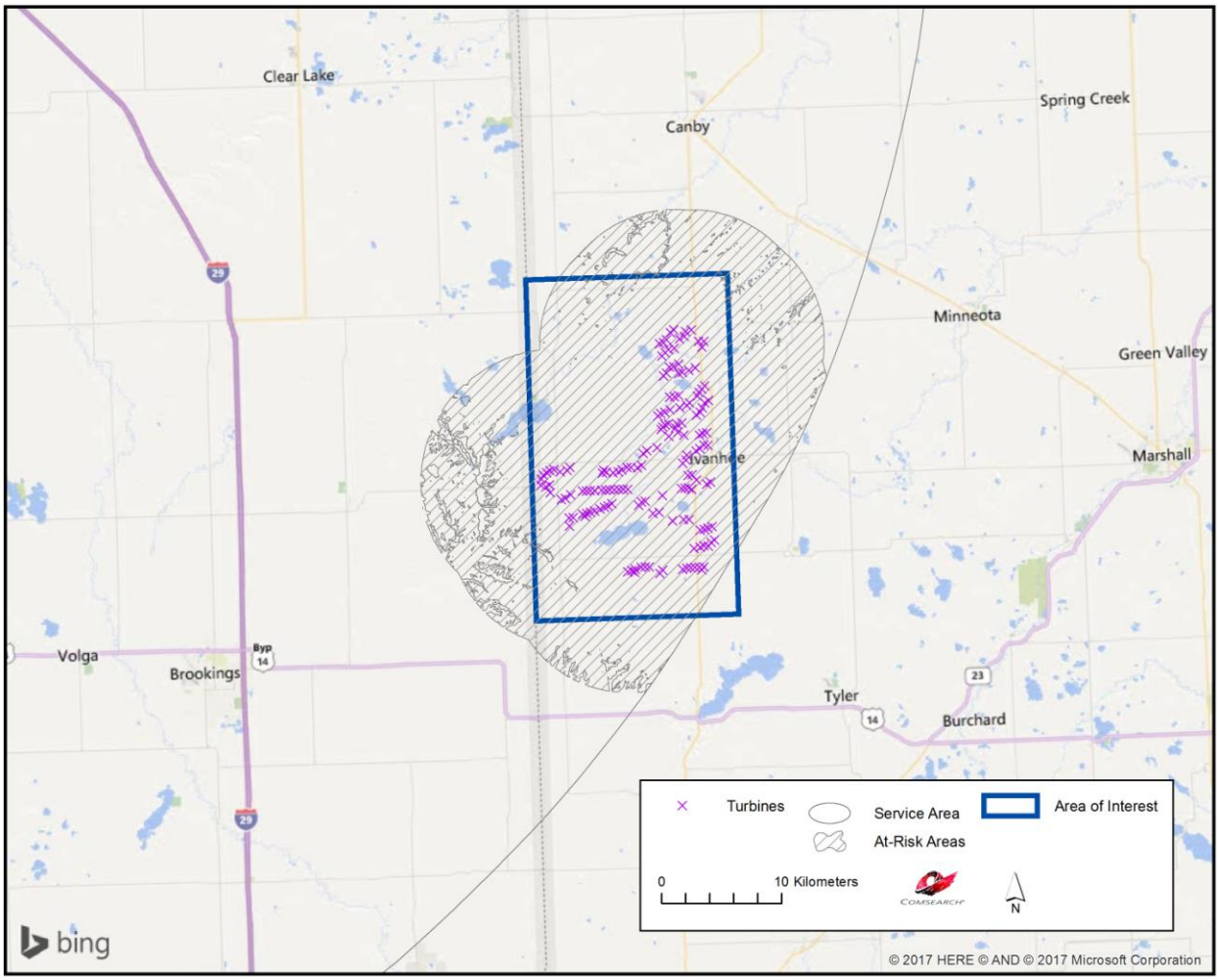


Figure 12: Areas Served by KDLO-TV Station Potentially Impacted by Signal Scattering

Demographic Analysis

This analysis is based on the 2010 United States Census Block data for population and households in the vicinity of the project area. Our findings indicate that the proposed wind turbines have the potential to partially or fully impact 858 census blocks.

In reviewing the census data, it was determined that the most meaningful analysis for interpreting at-risk television reception could be gleaned by examining household data for the impacted census blocks. It is households that typically comprise the viewing audience for a television broadcast entity and their numbers better represent actual viewership than local overall population or broadcast station area coverage. The 858 census blocks intersecting the impacted areas have a total household count of 1768. These households are clustered primarily in the towns of Hendricks, Ivanhoe, and Arco.

Table 4 below shows the estimated number of households served by each television station within their respective coverage contours. Based on the affected areas identified in the above figures, Comsearch then estimated the number of households potentially at risk of degraded OTA television service due to signal scattering and multipath interference. The results show that the station with the highest risk potential is K40FZ-D for which approximately 193 households or roughly 4.26% of its viewing audience could be affected. Since households can receive more than one OTA television channel, many that are potentially "at-risk" for one station in Table 4 could also be "at-risk" for another station.

Call Sign	Service Area (km^2)	Affected Area (km^2)	Number of Households Served[8]	Number of Potentially At-Risk Households[3]	Percent of Audience Affected
K40FZ-D	4455.51	321.38	4536	193	4.26%
KSMN	18677.22	331.18	29518	158	0.53%
KRWF	13081.36	310.08	10938	173	1.58%
KESD-TV	26235.08	970.92	18268	438	2.40%
KWCM-TV	34425.19	810.30	30689	401	1.31%
KELO-TV	47962.77	921.23	76494	424	0.55%
KSFY-TV	45644.55	862.70	72301	412	0.57%
KDLT-TV	46056.34	846.87	72148	410	0.57%
KDLO-TV	48954.11	852.95	24945	388	1.56%

Table 4: Percentage of Television Station At-Risk Household Coverage

There are two distinct consequences of multipath interference that must be considered in evaluating the overall impact to the identified areas. The first consequence is on the viewing audience and whether it would deprive coverage to those who are dependent on OTA television service. The second consequence is on the television stations themselves and how interference would affect their business profile due to the impacted areas.

In evaluating the business impact on the twelve stations whose coverage could be impacted by the wind turbines, the household estimates in Table 4 are adjusted to 25% of the actual census count data. This adjustment is based on market research which pertains to how the US population chooses to receive television service across the country. In determining how many of the households could be affected by the wind turbines, it is important to consider information about OTA television usage that was published in an article on July 2016. Released by an independent research company, GfK, the article reported that "17% of US TV households now rely on broadcast-only (a.k.a. "over-the-air" or OTA) reception." The study further stated that 25% of US households were without cable or satellite TV. Of the two figures, the higher percentage was used in estimating the household counts in Table 4 in order to include all households that do not rely on cable or direct broadcast satellite (DBS) providers for TV service.

[8] This number was derived by applying a factor of 25% to the household census data, which is meant to approximate the portion of households that do not subscribe to cable or satellite TV service. (source)

4. Recommendations

Comsearch performed a geographic and demographic analysis of the over-the-air television stations that service the communities in and around the Blazing Star II Wind Farm project area. The analysis examined the coverage contours for each of the operational television stations and determined the areas where coverage degradation or multipath interference could occur due to signal scattering from the planned wind turbines. These areas were plotted and shown in Section 3.

While OTA television service could be impacted by wind turbines in the form of multipath interference at the television receiver, modern digital television receivers have undergone significant design improvements to mitigate the effects of interference due to signal scattering. When used in combination with a high-gain directional antenna, the receiver further enhances the signal and thus becomes more robust against an environment with multipath interference. Therefore, where there is a potential for multipath interference due to the presence of wind turbines, Comsearch recommends the use of a high-gain directional antenna, preferably outdoors, and oriented towards the television tower location in order to mitigate the impact.

For each of the nine television stations listed in Table 4, Comsearch estimated that less than 4.3% of the served households could be impacted by the wind turbines. Potential degradation of coverage for this population could translate to loss of revenue for the respective stations since their normal revenue stream is based on advertising which, in turn, is based on the number of households reached. The impact on coverage, if it occurs after the project is built, could be mitigated with the installation of low-power translator stations, the design and planning of which is beyond the scope of this report. The objective of the translator station would be to re-broadcast an affected station's programming in the areas where interference issues could not be resolved by installing a high-performance outdoor antenna for the affected households.

Both cable service and direct broadcast satellite service will be unaffected by the presence of the wind turbine facility and may be offered to those residents who can show that their OTA television reception has been disrupted by the presence of the wind turbines after they are installed.

5. Contact

For questions or information regarding this TV Coverage Impact Study, please contact:

Contact person:	Denise Finney
Title:	Account Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5650
Fax:	703-726-5595
Email:	dfinney@comsearch.com
Web site:	www.comsearch.com

Appendix D – Agency Correspondence

Blazing Star Wind Farm 2, LLC provided project notification letters on February 8, 2017 to the following agencies and contacts. As example of this project notification follows.

Blazing Star 2- Minnesota PUC Agency Notification List			
Agency	**Name**	**Title**	**Address**
MN Dept of Agriculture – Ag Marketing and Development Division	Bob Patton	Supervisor	625 Robert Street North Saint Paul, MN 55155
MN Department of Employment and Economic Development	Kevin McKinnon	Deputy Commissioner	1st National Bank Building 322 Minnesota Street, Suite E-200 Saint Paul, MN 55101-1351
MN Department of Commerce – Energy Facility Permitting	Deborah Pile	Director	85 7th Place East, Suite 500 Saint Paul, MN 55101-2198
MN Department of Health	Paul Allwood	Assistant Commissioner	P.O. Box 64975 Saint Paul, MN 55164-0975
MN DNR	Jamie Schrenzel	Energy Project Planner	500 Lafayette Road Saint Paul, MN 55155-4025
MN DNR	Kevin Mixon	Regional Environmental Assessment Ecologist	261 Hwy 15 S. New Ulm, MN 56073
USFWS	Margaret Rheude		4101 American Boulevard East Bloomington, MN 55425
USFWS	Peter Fasbender	Field Office Supervisor	4101 East 80th Street Bloomington, MN 55425
MN DOT	Marilyn Remer	Utilities Engineer	395 John Ireland Blvd, MS 678 Saint Paul, MN 55155
MN Historical Society	Mary Ann Heidemann	Manager of Government Programs and Compliance	345 Kellogg Boulevard West Saint Paul, MN 55102
MN Dept of Public Safety	Attn: Commissioners		445 Minnesota Street, Suite 1000 Saint Paul, MN 55101
MPCA	Craig Affeldt		520 Lafayette Road N Saint Paul, MN 55155
MN Office of the State Archaeologist	Scott Anfinson	State Archaeologist	200 Tower Avenue Saint Paul, MN 55111

Blazing Star 2- Minnesota PUC Agency Notification List			
Agency	**Name**	**Title**	**Address**
South West Regional Development Commission	Jayme I. Trusty	Executive Director	2401 Broadway Avenue, Suite 1 Slayton, MN 56172
MN Historical Society	Tom Cinadr		345 Kellogg Boulevard West Saint Paul, MN 55102
USACE	Ryan Malterud	Environmental Protection Technician	180 5th Street East, Suite 700 Saint Paul, MN 55101-1678
Lincoln County Environmental Office	Robert Olsen	Administrator	221 North Wallace Ave P.O. Box 66 Ivanhoe, MN 56142
DOC – NTIA	Joyce Henry		jhenry@ntia.doc.gov
Marble Township	John Cornell	Chairman	3881 170th Avenue, Canby, MN 56220
Royal Township	Frank Bednarek	Supervisor	1918 330th Street, Ivanhoe, MN 56142
Hendricks Township	Robin Nuese	Clerk	3258 State Highway 271, Hendricks, MN 56136
Shaokatan Township	James Eidem	Clerk	1449 County Highway 16, Hendricks, MN 56136
Ash Lake Township	Gerald Lietz	Chairman	1969 260th Street, Ivanhoe, MN 56142
Diamond Lake Township	Matt Krog	Chairman	1867 180th Avenue, Lake Benton, MN 56149
Drammen Township	Mary Thooft	Clerk	1617 180th Street, Lake Benton, MN 56149

BLAZING STAR II
WIND FARM
Lincoln County, MN

February 8, 2017

Mr. Robert Olsen
Lincoln County Environmental Office
221 NORTH WALLACE AVE, P.O. BOX 66
IVANHOE, MN 56142

RE: Requesting Comments on Blazing Star II Wind Farm in Lincoln County, Minnesota

Dear Mr. Robert Olsen,

Blazing Star II Wind Farm, LLC ("Blazing Star II Wind Farm"), a wholly owned subsidiary of Geronimo Energy, LLC, is gathering information and requesting agency comments for a proposed wind energy project in Lincoln County, Minnesota.

Blazing Star II Wind Farm will be submitting a Site Permit Application for a Large Wind Energy Conversion System to the Minnesota Public Utilities Commission ("PUC").

The planned output for the Project is up to 200 megawatts of nameplate wind energy capacity. The Project's permanent facilities will include:

- wind turbines and related equipment;
- new gravel access roads and improvements to existing roads;
- underground electrical collection lines;
- an operations and maintenance ("O&M") building;
- a substation facility; and
- up to four permanent meteorological towers (up to 80 meters tall).

The Project's temporary facilities will include:

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

The turbine locations, access roads and electrical connections have not been finalized at this time. Table 1 provides the sections of land Blazing Star II Wind Farm is evaluating for siting the wind energy project.

BLAZING STAR II WIND FARM
Lincoln County, MN

Table 1: Sections within the Blazing Star II Wind Farm Project Boundary

State	County	Civil Township Name	Township	Range	Sections
MN	Lincoln	Marble	113	45	16, 21-22, 27-28, 31-35
MN	Lincoln	Royal	112	45	3-10, 16-22, 28-33
MN	Lincoln	Hendricks	112	46	1, 12-14, 23-27, 32-36
MN	Lincoln	Shaokatan	111	46	1-17, 20-21, 24, 34-36
MN	Lincoln	Shaokatan	111	47	1, 12
MN	Lincoln	Ash Lake	111	45	4-9, 16-22, 27-34
MN	Lincoln	Diamond Lake	110	45	3-6
MN	Lincoln	Drammen	110	46	1-2

To facilitate your review, we have enclosed a map of Blazing Star II Wind Farm's location and the associated project boundary.

We welcome any comments your agency may have at this time and throughout the permit application process. Any written agency comments provided in response to this letter will be incorporated into the PUC's review process.

If you require further information or have questions regarding this matter, please contact me at 952-988-9000 or at patrick@geronimoenergy.com.

Sincerely,

Patrick Smith
Director of Environmental Planning

Enclosure:
Blazing Star II Location Map

Blazing II Star Location Map

BLAZING STAR II WIND FARM
Lincoln County, MN

Blazing Star II Project Boundary
Municipality
Townships
MN Sections

0 0.5 1 2
Miles

44.451375, 96.333383

Minnesota
South Dakota
ASTORIA
Hendricks
Ivanhoe
Arco
Lincoln County
Minnesota

GERONIMO ENERGY

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Document Path: G:\GISData\Projects\Blazing Star II\Projects\BZ2_General_Map_AgencyLetter.mxd

kcbakke Date: 2/8/2017

DEPARTMENT OF NATURAL RESOURCES

Division of Ecological & Water Resources
21371 Highway 15 South
New Ulm, MN 56073

March 22, 2017

Patrick Smith
Geronimo Energy
7650 Edinborough Way, Suite 725
Edina, MN 55435

Subject: Blazing Star II Large Wind Energy Conversion System
MNDNR Preliminary Review
Lincoln County, MN

Dear Mr. Smith:

The Minnesota Department of Natural Resources (MNDNR) appreciates the opportunity to review and comment on the proposed Blazing Star II Large Wind Energy Conversion System. Please review the "DNR Guidance for Commercial Wind Energy Projects" and "Avian and Bat Survey Protocols For Wind Energy Projects" for our standard commercial wind project recommendations. The guidance and survey protocol documents can be located at the following link: (http://www.dnr.state.mn.us/eco/ereview/additional_resources.html).

The MNDNR Guidance For Commercial Wind Energy Projects should be reviewed and considered throughout project development. The following specific sections are known to pertain to this project area: Rare Species and Native Plant Communities, Native Prairie, Public Conservation and Recreation Lands, Properties in Government Programs or With Conservation Easements, and Lakes, Wetlands, Streams, and Rivers.

Issues concerning rare features should be identified and resolved prior to submitting the Site Application to the Public Utilities Commission (PUC). To receive information regarding rare features and species in the vicinity of the proposed project, submit a completed Natural Heritage Information System (NHIS) data request form (http://files.dnr.state.mn.us/eco/nhnrp/nhis_data_request.pdf). The Natural Heritage review will identify known occurrences of rare plants, animals, and native plant communities in the vicinity of the project boundary. This information will be useful in planning a wind project and should be requested early in the planning process. Please contact the Natural Heritage Review Coordinator at 651-259-5109 for more information on the NHIS review process.

The Bossuyt, Pothole, Ten Sloughs, Christine, Legacy, Expectation, Ivanhoe, Blue Wing, Anderson Lake, Shaokatan, Ash Lake, Chain-O-Sloughs, Herschberger, Muskrat Junction, Emerald, Weeks Lake, Iron Horse, and Horse Slough Wildlife Management Areas (WMA) are within or adjacent to the project boundary with several of them containing multiple parcels. The MNDNR recommends that no direct impacts occur to these public recreational lands from turbine construction, transmission lines, substations, or road networks associated with the project. It is the MNDNR's responsibility to seek avoidance, minimization, and mitigation for potential impacts to Minnesota Recreation System Units (Minnesota Statutes, chapter 86A). The wind resource of State lands is protected from encroachment through the wind access buffer of 5 rotor diameters (prevailing wind direction) and 3 rotor diameters (non-prevailing wind direction) that has been established by the PUC to protect non-

participating landowners wind rights. The MNDNR is in the process of acquiring additional Wildlife Management Areas within the project boundary and discussions will need to occur concerning how to avoid and maintain the wind access buffer.

The MNDNR has identified a portion of the project area that may have higher bird and bat use (map attached). The Avoidance Area contains a significant amount of habitat associated with Reinvest In Minnesota easements, Wildlife Management Areas, idle pasture, and numerous lakes, wetlands, and streams. The boundary of the identified Avoidance Area is drawn to indicate general areas of higher wildlife activity and they are not intended to be exact. Turbines should not be located within the avoidance area. When the turbine layout is available our agency will review the layout and provide additional recommendations for siting turbines.

During development of the turbine layout it is recommended that 10 alternate turbine locations be included. The need for a high number of alternate turbines is due to the high amount of wildlife habitat contained within the project boundary and the increased likelihood of turbine siting issues on this project. The alternate turbine locations provide an opportunity to avoid or minimize potential impacts to natural resources and to work around other issues that arise during project development.

The MNDNR recommends that scientifically rigorous fatality monitoring be conducted for this project. The Avian and Bat Survey Protocols referenced above should be reviewed in order to develop a specific fatality monitoring plan. The fatality monitoring plan should be included in the Avian and Bat Protection Plan as it will be a key component to assess project impacts. As a high risk site, the MNDNR recommends a minimum of 2 years of fatality monitoring using scientifically valid protocols. The high risk level is due to the significant amount of public land managed to increase wildlife populations, and the lakes, streams, wetlands, and grassland found throughout the project site. Additional years of fatality monitoring may also be warranted if fatalities are high in the first 2 years of monitoring.

The PUC required fatality monitoring report should include not only the estimated bat fatalities per MW, but also a facility wide bat fatality estimate on a yearly basis and for the permitted lifespan of the project. Understanding the facility wide and lifespan bat fatalities provides a more robust picture of the estimated cumulative bat fatalities.

The MNDNR recommends that a draft wildlife survey proposal be developed for review that includes all of the avian and bat data collection that will be needed for the project. Specifically note that robust (greater effort than usual) bat acoustic data will be needed due to the high amount of wildlife habitat in the project area. The project area should be surveyed to determine if any colonial nesting colonies exist within or immediately adjacent to the project boundary. In particular, Anderson Lake Wildlife Management Area contained a colonial nesting site for double crested cormorants and great blue herons in past years.

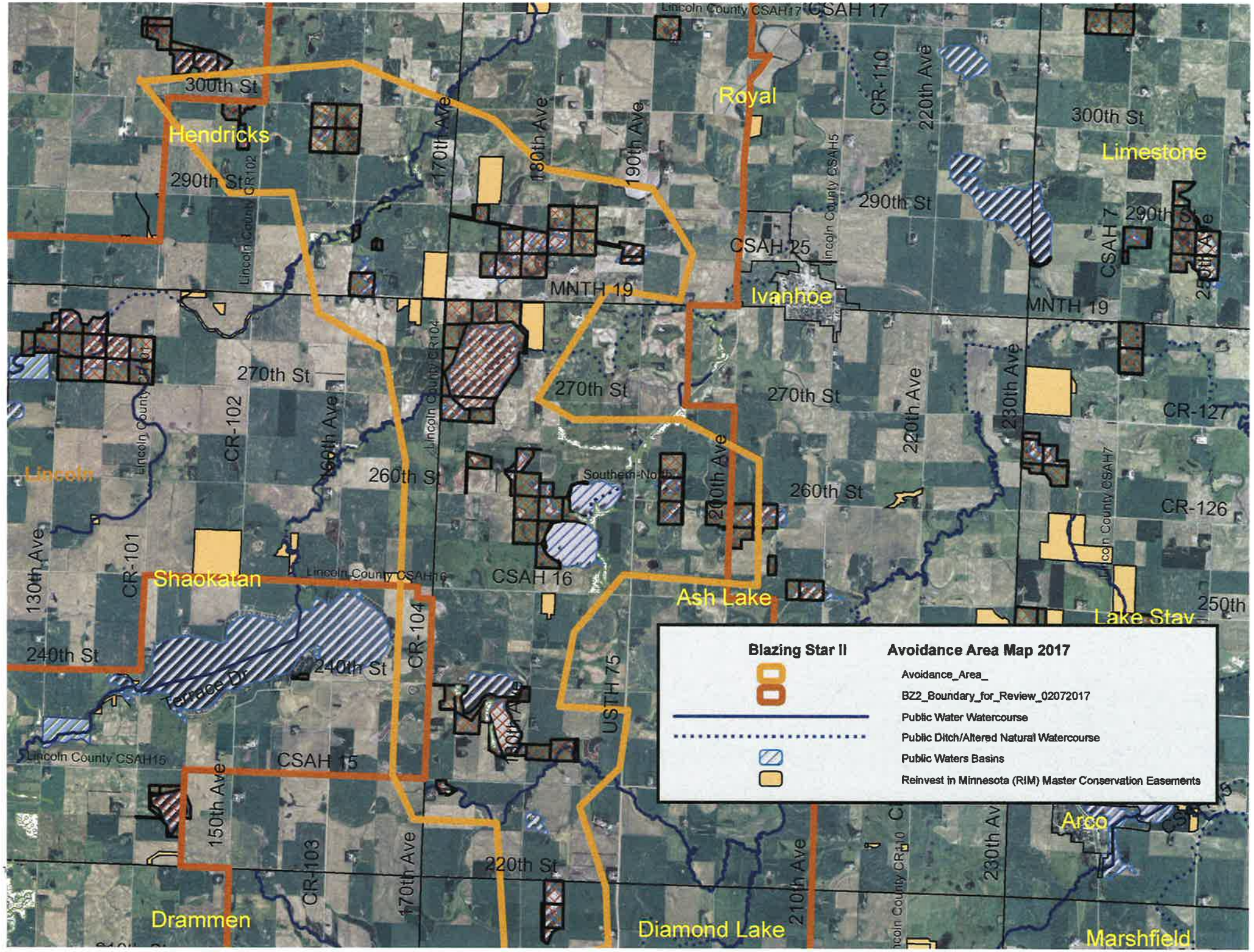
Overall, large portions of the project area are not suitable for a commercial wind project due to the potential conflicts with birds and bats. The numerous Wildlife Management Areas, Reinvest In Minnesota easements, lakes, wetlands, streams, and forested groves create a complex of habitat that can create significant problems for siting turbines.

The MNDNR looks forward to working in a positive and collaborative manner on this project to ensure that sustainable energy sources are developed while protecting Minnesota's natural resources. Please contact me directly at (507) 359-6073 if you have any questions about this letter.

Sincerely,

Kevin Mixon
Regional Environmental Assessment Ecologist
Division of Ecological and Water Resources

Ec: Cynthia Warzecha, Environmental Review
Lisa Joyal, Endangered Species Review Coordinator
Jim Sehl, EWR Assistant Supervisor
Wendy Krueger, Area Wildlife Supervisor
Amber Knutson, Assistant Area Wildlife Manager
Phil Nasby, Parks and Trails
Margaret Rheude, USFWS
Richard Davis, Department of Commerce-EERA
DNR R4 REAT
ERDB#20170328


Blazing Star II
Avoidance Area Map 2017
Avoidance_Area_
BZ2_Boundary_for_Review_02072017
Public Water Watercourse
Public Ditch/Altered Natural Watercourse
Public Waters Basins
Reinvest in Minnesota (RIM) Master Conservation Easements
Hendricks
Royal
Limestone
Ivanhoe
Lincoln
Shaokatan
Ash Lake
Lake Stay
Arco
Drammen
Diamond Lake
Marshfield
Southern-North
CSAH 17
CSAH 25
CSAH 16
CSAH 15
MNTH 19
USTH 75
300th St
290th St
270th St
260th St
240th St
220th St
250th
CR-102
CR-101
CR-104
CR-103
CR-110
CR-127
CR-126
130th Ave
150th Ave
160th Ave
170th Ave
180th Ave
190th Ave
200th Ave
210th Ave
220th Ave
230th Ave
Lincoln County CSAH17
Lincoln County CSAH5
Lincoln County CSAH7
Lincoln County CSAH6
Lincoln County CSAH15
Lincoln County CR102
Lincoln County CR104
Lincoln County CR110
Terrace Dr

Minnesota Historical Society

Using the Power of History to Transform Lives
PRESERVING › SHARING › CONNECTING

MINNESOTA HISTORIC PRESERVATION OFFICE

March 7, 2017

Patrick Smith
Director of Environmental Planning
Blazing Star Wind Farm
7650 Edinborough Way, Suite 725
Edina, MN 55435

RE: Blazing Star II Wind Farm
Lincoln County
MnHPO Number: 2017-1108

Dear Mr. Smith:

Thank you for the opportunity to review and comment on the above project. Information received on 10 February 2017 has been reviewed pursuant to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

Due to the nature and location of the proposed project, we recommend that a qualified archaeologist prepare a Phase 1A archaeological assessment for this project. This assessment should include a Phase I survey strategy for any areas where survey is needed. If a Phase I archaeological survey is recommended, this survey should be completed. The survey must meet the requirements of the Secretary of the Interior's Standards for Identification and Evaluation, and should include an evaluation of National Register eligibility for any properties that are identified. For a list of consultants who have expressed an interest in undertaking such surveys, please visit the website **preservationdirectory.mnhs.org**, and select "Archaeologists" in the "Search by Specialties" box.

We will reconsider the need for survey if the project area can be documented as previously surveyed or disturbed. Any previous survey work must meet contemporary standards. **Note:** plowed areas and right-of-way are not automatically considered disturbed. Archaeological sites can remain intact beneath the plow zone and in undisturbed portions of the right-of-way.

If you have any questions regarding our review of this project, please contact Kelly Gragg-Johnson, Review and Compliance Specialist, at (651)259-3455.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers, Manager
Government Programs and Compliance

Appendix E – Blazing Star Wind Farm 2: Site Characterization Study (Tier 1/Tier II Study)

Site Characterization Study – Tier 1 / Tier 2

Blazing Star II Wind Project

Lincoln County, Minnesota

Prepared for:

Blazing Star II Wind Farm, LLC

7650 Edinborough Way, Suite 725
Edina, Minnesota 55425

Prepared by:

Western EcoSystems Technology, Inc.

7575 Golden Valley Rd., Suite 350
Minneapolis, MN 55427

June 2017

TABLE OF CONTENTS

List of Figures

INTRODUCTION

Blazing Star II Wind Farm, LLC is considering the development of the Blazing Star II Wind Farm (Project) in Lincoln County, Minnesota. Based on a request from Blazing Star II Wind Farm, LLC, Western Ecosystems Technology, Inc. (WEST) has prepared a Tier 1/Tier 2 Site Characterization Study (SCS) for the potential Project. The principal objective of this SCS is to review and summarize potential wildlife issues consistent with the US Fish and Wildlife (USFWS) guidance, including the Land-Based Wind Energy Guidelines (WEG) Tier 1/Tier 2 site characterization, the Eagle Conservation Plan Guidance (ECPG) Stage 1 site assessment, and the Indiana Bat Range-Wide Summer Survey Guidelines (which also includes recommendations relevant to northern long-eared bats) Phase 1 initial project screening.

PROJECT AREA

The Project boundary currently encompasses approximately 48,652 acres and is located in southwestern Minnesota in Lincoln County, east of the South Dakota border (Figure 1).

METHODS

The primary purpose of Tier 1 and Tier 2 analyses as described within the USFWS land-based wind-energy guidelines include: 1) to identify regions where wind energy development poses significant risks to species of concern or their habitats, including the fragmentation of large-scale habitats and threats to regional populations of federal- or state-listed species; 2) to "screen" a landscape or set of multiple potential sites to avoid those with the highest habitat values; and 3) to begin to determine if a single identified potential site poses serious risk to species of concern or their habitats. This report summarizes potential biological resources associated with a single site: the Blazing Star II Wind Farm.

A desktop review of the following data sources was completed to determine if the Project poses significant risks to species of concern or their habitats:

1. Published or available literature and data regarding wind-energy impacts to wildlife, with an emphasis on projects in Minnesota.
2. The Minnesota Natural Heritage Information System, via a data request.
3. Available location information for wetlands and protected ground water sources from the National Wetlands Inventory and Minnesota state databases.
4. Maps of topography, land use and land cover.
5. Sensitive plant distribution available from the USFWS and Minnesota Department of Natural Resource (MNDNR).
6. Known bird migration routes available from the USFWS.
7. Threatened or endangered species distribution from the USFWS and MNDNR.

8. Bat Distribution and Locations of Hibernacula from the MNDNR, Bat Conservation International (BCI), and the USFWS.
9. Locations of critical habitat protected by the endangered species act from the USFWS.
10. Audubon Important Bird Area (IBA) Databases.
11. State or federally protected nature preserves, including the Minnesota Sites of Biodiversity Significance database and Minnesota Native Plant Communities database.
12. Lands protected by The Nature Conservancy (TNC).
13. eBird data on bald and golden eagle observations in the area.
14. TNC and American Wind Wildlife Institute's Wind and Wildlife Landscape Assessment Tool.
15. The USFWS Information for Planning and Conservation (IPaC) tool.

A site visit occurred on June 27, 2017, and preliminary information from Tier 3 surveys which have begun at the Project has also been used to inform this analysis.

CRITICAL ISSUES

Land Use / Land Cover

The town of Ivanhoe is located less than a mile east of the Project. The Project is in the Northern Glaciated Plains level III ecoregion and the Prairie Coteau (46k) Level IV ecoregion (USEPA 2015). The Northern Glaciated Plains ecoregion is flat to gently rolling landscape of glacial drift. The region is transitional between tallgrass and shortgrass prairie and high concentrations of temporary and seasonal wetlands offer suitable habitat for waterfowl nesting and migration. The Prairie Coteau is generally a higher elevation plateau with poorly defined drainage. Many lakes and a mix of row crops and pasture are present in this region and the Project itself (Table 1; Figure 2).

According to 2011 U.S. Geological Survey (USGS) National Land Cover Database (NLCD), land cover within the Project is primarily a mosaic of cultivated crops (65.7%), herbaceous grassland (11%), and hay/pasture (10.5%). Together these three land cover types account for approximately 87% of the Project area (Table 1, Figure 2). Other substantial land cover types within the Project include developed open space, mostly in the form of roads, which accounts for approximately 5.2% of the Project, emergent herbaceous wetlands (4.5%), and open water (2.5%). The remaining land cover types within the Project (deciduous forest, woody wetlands, shrub/scrub, and barren land) each comprise less than 1% of the Project (Table 1, Figure 2).

Table 1. Land use/cover types present within the Blazing Star II Wind Farm.

Land Use/Cover	Project Acres	% Total
Cultivated Crops	31,960.1	65.7%
Herbaceous	5,339.7	11.0%
Hay/Pasture	5,089.0	10.5%
Developed - Classes Merged	2,538.9	5.2%
Emergent Herbaceous Wetlands	2,201.0	4.5%
Open Water	1,215.5	2.5%
Deciduous Forest	280.2	0.6%
Woody Wetlands	20.0	0.0%
Shrub/Scrub	5.6	0.0%
Barren Land	2.4	0.0%
Total	**48,652.5**	**100**

Data: USGS NLCD 2006

Topography

The region is characterized by flat to rolling topography with an elevation range from 465 to 576 meters (1,526 to 1,890 feet) above sea level. The southwest portion of the project is higher in elevation and slopes towards lower elevations associated with stream valleys in the northern and eastern portions of the Project (Figure 3).

Wetlands and Riparian Areas

Formal wetland delineations within the Project have not been completed. However, based on the National Wetland Inventory (NWI) data from the USFWS, there are approximately 6,826 total acres of wetlands within the Project (14% of the Project area; Table 1), about two times the acreage of the NLCD estimate of emergent wetlands plus open water land cover types.

Based on information available from the NWI, wetland resources within the Project appear to be typical of Minnesota agricultural landscapes in this part of the state. Water features in the vicinity of the Project include freshwater emergent wetland, lakes, freshwater ponds, and freshwater forested/shrub wetlands (Table 2, Figure 4). In particular, site visits indicate that some of the areas that are mapped by the NWI as freshwater emergent wetlands by the NWI are in cultivated fields and do not contain wetland vegetation, although the soils and hydrology may be present; it is also possible that these features may be drained by tiles and therefore would not be considered wetlands. A wetland delineation is therefore recommended. The National Hydrography Database (NHD) and Minnesota Public Waters Inventory (PWI) show several streams flow through the Project including the South Branch and Norther Branch of the Yellow Medicine River; PWI Lakes including Perch Lake and Ash Lake are also within the Project boundary. The Water Permit Programs Unit of the Minnesota Department of Natural Resources (MN DNR) oversees the administration of the PWI program and any impacts to or crossings of PWI require permits or licenses from the MN DNR.

Table 1. National Wetlands Inventory (NWI) mapped wetlands within the Blazing Star II Wind Farm.

Land Use/Cover	Project Acres	% Total
Freshwater Emergent Wetland	5,236.5	76.7%
Freshwater Forested/Shrub Wetland	125.3	1.8%
Freshwater Pond	228.7	3.4%
Lake	1,049.8	15.4%
Riverine	185.2	2.7%
Total	**6,825.5**	**100%**

Protected and Sensitive Areas

Protected Areas Database of the United States

Based on the USGS Protected Areas of the US Database (PADUS v1.3) and the National Conservation Easement Database (NCED 2015) there are several protected areas and conservation easements within the Project. These include Minnesota Wildlife Management Areas (WMAs), USFWS-managed Waterfowl Production Areas (WPAs); MN DNR designated native plant communities, Minnesota Biological Survey-identified Sites of Biodiversity Significance, and Reinvest in Minnesota (RIM) conservation easements (Figure 5, Figure 6).

The Minnesota Department of Natural Resources Guidance for Commercial Wind Energy Projects contains information on MN DNR-regulated and MN DNR-managed resources that may be impacted by wind energy development, including recommended and potential setbacks for wind turbine placement near these resources (MN DNR 2011).

Federal and State Protected Species

To determine which state or federally listed endangered, threatened, proposed, or candidate species may occur in Lincoln County, Minnesota, WEST consulted the USFWS and MN DNR county distribution lists. The AWWI LAT, eBird database, natureserve.org database, and data from the North American Breeding Bird Survey were also consulted for evidence of sensitive bird species near the Project and habitat descriptions. Table 3 shows species listed as endangered, threatened or protected under the Endangered Species Act (ESA;1973) and the Bald and Golden Eagle Protection Act (BGEPA; 1940) with ranges that overlap the Project based on MN DNR and USFWS county distribution lists. To date, WEST has not received data from the Minnesota Natural Heritage Information System for this Project; once information on recorded occurrences of listed and rare species has been obtained, additional updates to this section will be provided.

Table 2. State and Federally listed endangered and threatened species with records of occurrence or the potential to occur in Lincoln County, Minnesota.

Common Name	Status	Habitat
Mammals		
northern long-eared bat *Myotis septentrionalis*	FT	Mature forest interior and riparian areas. May roost in old buildings. Typically avoid open habitats. Hibernate in caves. Project area may provide suitable summer habitat

Common Name	Status	Habitat
		for this species. Northern long-eared bats may also migrate through the Project area.
Birds		
burrowing owl *Athene cunicularia*	SE	Open, grazed pastures or native, mixed-grass prairies populated by burrowing mammals. American badgers and Richardson's ground squirrels are thought to be the primary nest excavators for this species in Minnesota. The Project may contain suitable habitat for this species.
Henslow's sparrow *Ammodramus henslowii*	SE	Prefer natural grasslands over 100 acres and old fields with stalks for singing perches and a thick litter layer. The Project may contain suitable habitat for this species.
loggerhead shrike *Lanius ludovicianus*	ST	Upland grasslands and sometimes agricultural areas with short-grass vegetation and perching sites such as small trees, hedgerows, and shrubs. Occur in both native and non-native grasslands. The Project may contain suitable habitat for this species.
bald eagle *Haliaeetus leucocephalus*	BGEPA	Found in a variety of habitats that provide suitable nest sites close to open water. Some potential suitable habitat is present within the Project, but eagles are more likely to utilize more forested areas around large lakes and prominent rivers.
golden eagle *Aquila chrysaetos*	BGEPA	Most common in the western half of North America where they are found in a wide range of habitats. Unlikely transient species in the Project.
Reptiles		
Blanding's turtle *Emydoidea blandingii*	ST	Wetland complexes and nearby sandy uplands are required. Calm, shallow waters with rich aquatic vegetation are preferred. They are adaptable in Minnesota and use meandering streams and rivers, fens, prairie marshes, backwaters, and oxbows in the southwestern quarter of the state. Females often nest in agricultural fields. The Project may contain suitable habitat for this species.
Fish		
Topeka shiner *Notropis topeka*	FE, SC	Slow moving, small to mid-size prairie streams with sand, gravel, or rubble bottoms within the Missouri River watershed. Prefer pool and oxbow areas outside main river channels. Critical Habitat has been designated in southern Lincoln County and the Project may contain suitable habitat for this species; however, the Project is in the Minnesota River watershed and therefore the species is not anticipated to occur in this portion of Lincoln County.
paddlefish *Polyodon spathula*	ST	Open waters of large rivers and river lakes, oxbow lakes, and backwaters. Paddlefish require waters rich in zooplankton for feeding and free-flowing rivers with gravel bars inundated in spring for spawning. The Project may contain suitable habitat for this species.

Common Name	Status	Habitat
Insects		
Dakota skipper *Hesperia docatae*	FT, ST	Native dry-mesic to dry prairie with mid-height grasses such as little bluestem, prairie dropseed, and side-oats grama grass. The Project may contain suitable habitat for this species.
Ottoe skipper *Hesperia ottoe*	ST	Native dry-mesic to dry prairie with mid-height grasses such as little bluestem, prairie dropseed, and side-oats grama. This includes prairies on deep sands, steep bedrock-controlled slopes, and slopes and hills in unsorted glacial till. The Project may contain suitable habitat for this species.
Mussels		
rock pocketbook *Arcidens confragosus*	SE	Medium to large rivers in fine substrates such as silt or sand in slow current areas. The Project may contain suitable habitat for this species.
yellow sandshell *Lampsilis teres*	SE	Large rivers in fine sediments, but may also occur in coarse substrates and slow or moving current. The Project may contain suitable habitat for this species.
elktoe *Alasmidonta marginata*	ST	Medium to large rivers in sand or gravel substrates in areas with fast current. The Project may contain suitable habitat for this species.
ellipse *Venustaconcha ellipsiformis*	ST	Occurs primarily in headwater reaches of rivers in gravel riffles and silty areas along stream banks. The Project may contain suitable habitat for this species.
monkeyface *Quadrula metanevra*	ST	Prefer stable substrates in large rivers at depths of approximately 6 feet. The Project may contain suitable habitat for this species.
mucket *Actinonaias ligamentina*	ST	Medium to large rivers in sand and gravel substrates. The Project may contain suitable habitat for this species.
pistolgrip *Tritogonia verrucosa*	ST	Most often in larger rivers in areas with moderate current and gravel substrates. The Project may contain suitable habitat for this species.
round pigtoe *Pleurobema sintoxia*	ST	Medium to large rivers but occasionally in smaller rivers. Prefers fast current dominated by coarse sand and gravel substrates. The Project may contain suitable habitat for this species.
salamander mussel *Simsonaias ambigua*	ST	Occurs only under flat rocks or under ledges of rock walls where it's glochidial host, the mudpuppy salamander, lives. The Project may contain suitable habitat for this species.
Plants		
black disk lichen *Buellia nigra*	SE	Generally a prairie species. Non-calcareous rock in exposed sunny areas, sometimes near the edge of hardwood forests. In Minnesota, found exclusively in the southern and western areas of the state. The Project may contain suitable habitat for this species.
hair-like beak-rush *Rhynchospora capillacea*	ST	Calcareous fens at the margins of calcareous fen pools and marl flats where competition is minimal. May also be found in spring fens. The Project may contain suitable

Common Name	Status	Habitat
		habitat for this species.
short-pointed umbrella-sedge *Cyperus acuminatus*	ST	Edges of shallow rock pools and in the muddy margins of ponds and lakes. The Project may contain suitable habitat for this species.
Sullivant's milkweed *Asclepias sullivantii*	ST	Restricted to undisturbed mesic tallgrass prairies in Minnesota. Frequently occurs with other declining prairie species such as tuberous Indian-plantain and wild quinine. The Project may contain suitable habitat for this species.
yellow prairie violet *Viola nuttallii*	ST	Found on slopes and summits of dry prairie areas. Prefers well-drained, loose, exposed soil where competition is minimal. The Project may contain suitable habitat for this species.

FE=federal endangered; FT=federal threatened; FC=Federal Candidate; SE=state endangered; ST=state threatened; SC = state species of concern; BGEPA=Bald and Golden Eagle Protection Act.

The mosaic of land cover types present within the Project may support some of the species in Table 3. The Project contains substantial areas of cultivated crops, herbaceous grassland, hay/pasture, developed open space, freshwater emergent wetlands, and open water. Forested areas are relatively scarce within the Project. There are several areas within the Project designated as native plant communities or sites of biodiversity significance by the MN DNR (Figure 6).

The Minnesota Biological Survey (MBS) is an effort by the MN DNR that "systematically collects, interprets, and delivers baseline data on the distribution and ecology of rare plants, rare animals, native plant communities, and functional landscapes needed to guide decision making." The survey has led to the development of geospatial databases that represent the highest quality native plant communities remaining in surveyed counties, and sites of biodiversity significance within Minnesota that can help with decision making when planning development and conservation efforts. Biodiversity significance ranks include outstanding, high, moderate, and below. Sites with a rank of "outstanding" contain the rarest species and outstanding examples of the rarest native plant communities and/or the largest, most ecologically intact or functional landscapes. Sites with a rank of "high" contain very good quality occurrences of the rarest species, high-quality native plant communities or important functional landscapes. Sites with a rank of "moderate" contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes. Sites ranked "below" lack occurrences of rare species or do not meet MBS standards for other rankings.

Within the Project boundary, 7,362 acres have been identified by the MBS as various levels of Sites of Biodiversity. Of these, 4,075 acres (8.3% of Project boundary) are ranked as "below," and 3,287 acres (6.8% of Project boundary) are ranked as "moderate;" there are no sites of "high" or "outstanding" biodiversity significance in the Project boundary. There are also 430 acres of MBS-mapped native plant communities in the Project boundary, all of which are associated with sites identified as moderate biodiversity. Of the identified native plant communities, 359 acres are mapped as dry hill prairie, 35 acres are mapped as prairie meadow, 17 acres are mapped as basswood-bur oak forest, 17 acres are mapped as dry sand-gravel prairie, 5 acres are mapped as mesic prairie, 3 acres are

mapped as wet prairie, and less than 1 acre is mapped as spikerush-bur reed marsh. As development continues, WEST recommends coordination with MN DNR to seek advice from department personnel on survey recommendations and/or permit requirements related to listed species, native plant communities, and areas of biodiversity significance.

Federally Listed Species

Northern Long-eared Bats

Although the majority of the Project area is composed of pasture, cultivated cropland, and herbaceous lands, there is potential for the forested areas in and near the Project to provide suitable roosting and foraging habitat for bat species, including the federally listed threatened NLEB. However, the vast majority of the Project area does not contain suitable summer habitat for the NLEB and forested areas within the Project are isolated patches that are relatively small in size (Figure 7).

On January 14, 2016 the USFWS posted the final Endangered Species Act 4(d) rule for NLEB in the Federal Register. This rule largely establishes an exemption for development and operation of wind energy facilities from needing to obtain any take coverage for NLEB (unless the project would directly impact a known hibernation or maternity roost site). Still, the NLEB is a federally listed threatened species, and a detailed species overview is provided below in the event that NLEB becomes protected as endangered or the 4(d) rule is modified during the operational life of the project.

NLEB are a forest dependent species, generally relying on forest features for both foraging and roosting during the summer months (USFWS 2013; USFWS 2007). In particular, NLEB appear to be a forest interior species that require adequate canopy closure for both roost and foraging habitat (Lausen 2009). Additionally, riparian areas are considered critical resource areas for many species of bats because they support higher concentrations of prey, provide drinking areas, and act as unobstructed commuting corridors (Grindal et al. 1999). While NLEB are associated with forest habitats, they also occur in agricultural settings where forest habitats have been highly fragmented.

During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (USFWS 2007; USFWS 2013). Males and non-reproductive females may also roost in cooler places, like caves and mines. NLEB seem opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices and they have also been found, rarely, roosting in structures like barns and sheds. The NLEB is expected to be closely tied to intact forested habitats; for example, Henderson and Broders (2008) found that NLEB did not travel more than 255 feet (ft; 78 meters) from the edge of intact forest structure. During the winter, NLEB hibernate in caves or occasionally abandoned mines.

The period between the summer maternity season and the winter hibernation season is referred to as “fall swarming”. The fall migration is likely between mid-August and mid-October. During this period, NLEB will migrate to hibernacula and congregate in the area around caves and mines; generally this swarming behavior is located within 5 miles of the hibernaculum (USFWS 2014). Little is known about NLEB roost selection during this period; however, Lowe (2012) documented NLEB roosting in both coniferous and deciduous trees and stumps as far away as three miles from the swarming site. The potential risk to NLEB and other bats during the spring and fall is expanded as bats migrate across the

landscape from summer foraging and roosting habitats to suitable hibernacula. During this migration period, habitat associations are not as strong and bats tend to exhibit an increased risk of turbine collision as they move in a more broad front fashion from summer foraging areas to hibernacula. Overall, NLEB is not considered a long-distance migrant and typically will only travel 40-50 miles between summer maternity habitats and winter hibernation sites.

WEST conducted a desktop assessment of potential NLEB habitat within the Project. As NLEB have similar habitat requirements as Indiana bats, the approach used in this habitat evaluation follows recommendations for habitat assessments included in the USFWS's Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (USFWS 2011). The USFWS Guidance (USFWS 2011) defines suitable summer habitat for NLEB as any forest (e.g., deciduous, coniferous, mixed) or forested landscape feature (e.g., woody wetlands, forested riparian areas, shelterbelts) and recommend sampling at least two detector locations for every 123 acre (ac; 0.50 square kilometers [km2]) site of suitable habitat within a non-linear project area for at least four detector nights. Potential foraging or roosting habitat within the Project boundary is fairly limited, with relatively few areas where shelterbelts and larger forested patches (>15 ac) are separated by less than 1,000 ft (305 m); this connected habitat totaled approximately 273 acres (0.6% of the Project area).

The general lack of forested areas likely to function as suitable habitat for NLEB within the Project suggests that it is not likely to present risk to NLEB during the summer maternity period. However, the Project may pose some risk to NLEB as they migrate across the landscape from summer foraging and roosting habitats to swarming areas near hibernacula. Siting turbines 1,000 ft outside of potential foraging areas is likely to significantly reduce this risk (Figure 7).

Dakota Skipper

The Dakota skipper is a small northern prairie endemic butterfly that lives in high-quality mixed and tallgrass native prairie. The Dakota skipper is completely dependent upon the survival of its native prairie habitat and there is no evidence to date that reconstructed prairie provides suitable habitat. In Minnesota, the Dakota skipper seems to prefer native dry-mesic to dry prairie where mid-height grasses, such as little bluestem, prairie dropseed, and side-oats grama are a major component of the vegetation. The Dakota skipper has a single annual generation. Adults emerge from pupae during a 2-3 week period around the summer solstice. Larvae feed on several grass species in their habitat. Adult life expectancy in the wild is likely a few days to a week. An area of approximately 550 acres about 1.25 miles east of the Project has been designated as critical habitat for this species; two additional areas of critical habitat between four and six miles west and northwest of the Project have been designated in Brookings County, South Dakota (Figure 8). The closer critical habitat area in Minnesota is also a designated Minnesota native plant community and site of outstanding biodiversity significance. Dakota skippers may also occur in other native grasslands within the Project.

Topeka Shiner

The federally endangered Topeka shiner (*Notropis topeka*) is a small minnow less than 3 inches in total length. This species is restricted to small prairie streams tributary to the Missouri River and inhabits less than 10% of its historic range. Populations in Minnesota appear stable, but populations in Iowa, Nebraska, Kansas, and Missouri declined severely due to water contamination and are absent

from 80% of their historic sites. The species was listed in 1998 and critical habitat was established in June 2004. No critical habitat for this species is present within the Project. The closest designated critical habitat for this species is in southwest Lincoln County along Medary Creek and one if its tributaries approximately 2.5 miles south of the Project (Figure 8). However, almost all of the Project is in the Minnesota River watershed, not the Missouri River watershed and therefore this species would not be anticipated to occur in waterbodies within the majority of the Project boundary. If infrastructure is proposed in the Missouri River watershed in the very southwestern corners of the Project (Figure 8), further coordination with the USFWS and MN DNR should occur in order to determine appropriate construction methods to avoid and minimize impacts to stream habitat.

State-listed Species

Habitat for several of the state-listed species in Table 3 is present in the Project area. State-listed threatened or endangered species that may occur within the Project include three birds, one reptile, one fish, two insects, nine mussels, and five plants. The potential for avian migration and a closer examination of suitable habitat for listed birds is discussed in the General Avian Migration section below. Many of the state-listed species in Lincoln County are aquatic or native prairie species or plants. The site visit that occurred on June 27, 2017 indicated that in general most of the habitat mapped as herbaceous or pasture in the Project area are relatively low quality grasslands dominated by invasive species and would not be expected to provide suitable habitat for state-listed species. Some of the larger wetland complexes may have relatively diverse wetland communities, but many of the wetlands in the Project have been negatively affected by adjacent agricultural practices; many of the emergent wetlands mapped by the NWI are located in cultivated fields. Proper siting of turbines and infrastructure which avoids impacts to streams, jurisdictional wetlands, and native plant communities should avoid or minimize disturbance to listed plants, aquatic species, and the sensitive aquatic habitats required by many of these species.

Blanding's Turtle

The Blanding's turtle is a state-listed threatened species with a characteristic domed upper shell and bright yellow chin and throat. Wetland complexes and adjacent sandy uplands are necessary to support populations of this species, and suitable habitat may be present within the Project. Lincoln County is at the northwestern extent of the species range in the United States. Calm, shallow waters and wetlands with rich aquatic vegetation are preferred, but the species appears adaptable in Minnesota, utilizing a wide variety of wetland types and riverine habitats. In southwestern Minnesota, meandering streams and rivers, fens, prairie marshes, backwaters, and oxbows are important aquatic habitats. Adjacent upland agricultural lands may also provide suitable habitat and female Blanding's turtles often nest in agricultural fields. The Project may provide suitable habitat for this species.

Ottoe Skipper

The Ottoe skipper is a state-listed threatened butterfly with similar life history characteristics and habitat preferences to the Dakota skipper. In southwestern Minnesota, females often lay eggs on the central disk of narrow-leaved purple coneflowers (*Echinacea angustifolia*). Efforts to avoid and minimize impacts to the Dakota skipper will similarly avoid and minimize impacts to the Ottoe skipper.

Eagles and Other Raptors

Eagle Occurrence

Eagles may occur within the Project area throughout the year. The Project area lies within the Mississippi and Central Flyways which are two of the four major migration corridors in North America. The Project is located on the periphery of these migration corridors and migrating birds may use the lakes and wetlands in and around the Project as stopover habitat. Additionally, the Project is within the Prairie Pothole ecoregion which contains an abundance of native grassland and wetland habitats suitable for migratory birds. The upland areas of the Project contain small areas of remnant native prairie and large blocks of pasture and grassland which are important to grassland breeding birds and nesting waterfowl. There are few wooded areas within the Project that would be likely to support raptor nests, and more suitable nesting habitat is present outside the Project. No dramatic topographic features such as rim and bluff edges that may increase raptor use and migration are present within the Project. The Upper Minnesota River Valley IBA is a known raptor migration corridor approximately 35 miles northeast of the Project.

A small population of golden eagles winter in southeast Minnesota, but golden eagles are rare occurrences in the vicinity of the Project. The closest observation of a golden eagle recorded by eBird in the vicinity of the Project was recorded near the town of Marshall in Lyon County in November 2003 (eBird 2017), approximately 16.5 miles east of the Project. This data suggests that golden eagles are most likely to occur within the Project as rare passing migrants.

Bald eagles are a more common occurrence in the vicinity of the Project. There are multiple lakes within and adjacent to the Project that may provide suitable nesting and wintering habitat for bald eagles. WEST has documented active bald eagle nests in Lincoln County in areas within two miles of the Project boundary, and despite the relative scarcity of forests within the Project, bald eagles may nest and breed in the general area. Bald eagles may also occur within the Project during spring and fall migrations, likely moving through the area in a broad-front fashion. The eBird database shows several bald eagle observations in Lincoln County, Minnesota in 2017. Observations of bald eagles near the Project in 2017 include one observation at the northern shore of Lake Shaokatan just outside of the Project boundary (in the same location as a bald eagle nest that WEST documented in 2016 and 2017) as well as four sightings within the southern portion of the Project boundary: two sightings in Herschberger WMA and two sightings in the Ash Lake WMA (eBird 2017).

The eBird database is housed and managed by the Cornell Laboratory of Ornithology and is currently the largest compendium of geospatial data on birds in the world, receiving over 3 million records per month for North America, and providing an unparalleled resource for the analysis of bird distributional patterns over time and space for most of North America (Sullivan et al. 2009). Data is gathered by birdwatchers that also use the database to track their own personal history of bird observations, and it is quality controlled by regional editors who review and evaluate unusual records on an individual basis. The utility of the eBird database for analyzing bird occurrence patterns within a given region is purely a function of the extent of eBird data submission within the region, and coverage is a function of birdwatcher activity. eBird was created in 2002, and although it is possible for users to submit older historical records, the vast majority of records within this database are from 2008 to the present, due to the recent rise in usage of this database.

Bald Eagle Nesting and Seasonal Occurrence

In Minnesota, bald eagles have historically been most abundant during late fall and early spring, when eagles are migrating through the state. Some areas of the state host resident populations as well, and the breeding population of bald eagles has been increasing steadily in the last twenty years, including in the southwest portion of the state where the Project is located. Bald eagles prefer nesting, roosting, and foraging in areas with mature trees near permanent water bodies in undisturbed areas with abundant prey species such as fish and waterfowl (Swenson et al. 1986, Mojica et al. 2008). Aerial eagle nest surveys conducted by WEST have documented multiple active bald eagle nests within 10 miles of the Project boundary, although no active bald eagle nests have been documented within the Project itself (WEST 2016a and 2016b). Though Minnesota has experienced an increase in the number of nesting bald eagles over the past twenty years, challenges and threats to bald eagles remain. Major threats to bald eagles include loss or alteration of nesting and roosting habitat, exposure to poisons and environmental contaminants (e.g. lead, pesticides, pollution), electrocution and collision with power lines, and collision with wind turbines (Kochert and Steenhof 2002). Potential impacts to bald eagles from wind energy development and operations include collision with wind turbines and associated transmission lines as well as disturbance of nests, roosting sites, and foraging areas.

A review of all years of bald eagle year-round data in the eBird database for Lincoln, Lyon, Murray, Pipestone, and Yellow Medicine Counties indicates a strongly seasonal occurrence pattern, with bald eagle abundance peaking during the early spring (March and April). (eBird 2017). It should be noted that eBird data is a citizen-science database and is comprised of reported observations collected without a systematic sampling structure. These data should be interpreted with caution as observation locations are often skewed toward birding hotspots and looking at all historical data in one dataset may not reflect recent seasonal trends.

Bald Eagle and Raptor Migration

The Project is located on gently rolling cultivated cropland, herbaceous grassland, and mixed pasture lands. Streams and open water are present, but the Project is largely lacking in forested areas. The Project area lacks defined topographic edges and does not contain features that are likely to concentrate migrating raptors.

Bald eagle migration patterns depend primarily on the age of the bird (immature or adult), location of the breeding site, breeding site climate, and food availability (Buehler 2000). Bald eagle migration is not as regular as with other migratory birds, as movements are often opportunistic, somewhat unpredictable, and widely dispersed in time (Buehler 2000). Bald eagles typically do not migrate in kettles or flocks, but concentrations of migrants may occur at communal feeding and roost sites (Buehler 2000). Fall migration occurs during August through January. In the Great Lakes region and adjacent areas in Canada, bald eagles often migrate south along major river systems like the Mississippi and Minnesota Rivers in search of food (Buehler et al. 1991). In the spring, bald eagles may return to their breeding grounds as soon as the weather improves and food is available, again using major river valleys as migration corridors. The spring migratory period is generally considered to occur from January to March. Migration occurs during the day when thermals provide for opportunities to soar with limited energetic expense.

Eagles may pass through the Project in a broad-front fashion during migration, especially if there are food sources such as carrion available. Little information is available regarding the characteristics of stopover habitat used during migration. It is likely that the suitability of stopover habitat is most related to food availability rather than vegetative composition or structural characteristics. Stopover sites are usually areas with consistent fish-kills, concentrations of fish and waterfowl, or the presence of large mammals as carrion (McClelland et al. 1996). Roosts that most commonly see repeated use as stopover sites consist of clumps of mature deciduous trees in riparian areas protected from human disturbance and proximate to foraging opportunities. Locations within the Project that may serve as stopover sites for eagles are limited to the protected areas (WMAs) and tree-lined shores of lakes with foraging opportunities. Pasture land may attract bald eagles if carrion or small game is present.

Bald Eagle Seasonal Concentration Areas

The Project does not contain areas that are likely to concentrate large numbers of migrating bald eagles or other raptors. The WMA's, lakes, and ponds within the Project may provide habitat and foraging opportunities that would attract eagles during migration or may be used for foraging by resident eagles; however these are small areas with relatively few trees and would not be expected to concentrate large numbers of eagles. The majority of the Project is composed of cultivated cropland and grassland with very little deciduous forest (<1% of the Project area). While there is likely to be increased bald eagle use associated with forested lakeshore and riparian habitats, bald eagle use throughout the rest of the site will likely be much lower. Ephemeral foraging opportunities in the form of livestock carcasses and road kill may temporarily attract eagles to the more agricultural areas within the Project, especially during the winter.

Bald Eagle Physical Landscape Features

Physical features of the landscape that may attract or concentrate eagles are limited within the Project. The general topography within the Project is flat or gently sloping within the central, western and southern portions and undulating with gentle to moderate slopes along the northern and eastern sides that give way to streams and other drainages along Mud Creek. It is likely that bald eagles will migrate through the Project in a broad front fashion. The closest major known migration corridor for bald eagles is the Minnesota River which is approximately 35 miles northeast of the Project. The Project lacks prominent north/south ridges or valleys that would be likely to funnel migrants through Project (Figure 3). Trees, shrubs, and open water sources within the project may provide some stopover habitat for migrating bald eagles, especially in and around WMAs. Additional wetlands, forested areas, and open water are present in the surrounding landscape and may attract eagles to the region. However, these features are less abundant within the Project area.

Stage 1 Eagle Conservation Plan Guidance Questions

The ECPG (USFWS 2013) suggest specific questions that should be considered to help place a prospective project site into an appropriate risk category. These questions are answered below based on the information compiled during the Stage 1 Initial Site Assessment.

1. *Does existing or historical information indicate that eagles or eagle habitat may be present within the geographic region under development consideration?*

Yes, eagles and eagle habitat are present within the geographic region under development consideration. The WMAs and forested lakeshores within the Project may provide suitable eagle habitat. Initial results of studies at the Project (raptor nest survey and avian/eagle use surveys) do indicate that bald eagles occur in the Project. Further assessment is recommended.

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

There is some potentially valuable habitat for eagles within or directly adjacent to the Project, but relatively higher eagle use areas can likely be avoided during construction and operation of the Project. Land use within the project is predominantly cultivated cropland, herbaceous areas, and pasture. Initial results of studies at the Project (raptor nest survey and avian/eagle use surveys) do indicate that bald eagles occur in the Project. Further assessment is recommended.

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

There are no known important use areas or migration concentration sites within the Project. Initial results of studies at the Project (raptor nest survey and avian/eagle use surveys) do indicate that bald eagles occur in the Project. Further assessment is recommended.

4. *Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration?*

The WMAs and lakes within the site may provide habitat that supports prey for eagles. These resources comprise a relatively small percentage of the total Project area; the Project boundary also excludes some of the larger open water lakes in the vicinity.

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

Bald eagles have the potential to occur in the Project during all seasons. The areas at highest risk of eagle occurrence within the Project are the small lakes, ponds, and WMAs/WPAs, as well as areas within proximity of active nests. Avoiding or minimizing turbine siting in proximity to these features will reduce the potential for significant adverse impacts to eagles.

General Avian Migration

General avian migration through the Project is likely to occur in a broad-front fashion. Migrating birds passing through the Project area may use the forested areas, grasslands, riparian corridors and wetlands as stopover habitat.

Important Bird Areas

The closest IBA to the Project is the Prairie Coteau Complex State IBA, which overlaps the southwestern portion of the Project; another unit is approximately two miles south of the Project (Figure 9). This IBA focuses on prairie, grassland and marsh birds and hosts a number of species of conservation concern. Some of these birds include: Henslow's sparrow, burrowing owl and chestnut-collared longspur (state-listed endangered); horned grebe, Wilson's phalarope and loggerhead shrike (state-listed threatened); and marbled godwit, Franklin's gull, Forster's tern, short-eared owl, and

Nelson's sparrow (state species of special concern). In total, 251 species have been observed here including 71 designated as species of greatest conservation need.

Two additional IBAs, the Lac Qui Parle – Big Stone IBA and the Upper Minnesota River Valley IBA, are approximately 37 miles north and 35 miles northeast of the Project, respectively. These global priority IBAs are comprised of a mix of high quality habitat that offers suitable nesting and stopover sites for many birds along the Minnesota River valley. The La Qui Parle –Big Stone IBA contains some of the highest quality tallgrass prairie and large waterbird nesting habitat in the Midwest, attracting many grassland and waterbird species. The Minnesota River Valley IBA runs along the Minnesota River and is a major migration route for eagles and other raptors (Figure 8).

USGS Breeding Bird Survey

The USGS North American BBS is a collaborative effort between the USGS Patuxent Wildlife Research Center and Environment Canada's Canadian Wildlife Service. The objective of the survey is to monitor the status and trends of North American bird populations via a standardized protocol collected by participants along thousands of randomly established roadside routes throughout the continent. The closest BBS route to the Project is the Tyler route (Figure 9). The Tyler Route is approximately 4 miles east of the Project and was monitored 17 times between 1966 and 2016. A total of 83 species have been observed over that time period, including five raptors and one owl (red-tailed hawk [*Buteo jamaicensis*], bald eagle [*Haliaeetus leucocephalus*] Swainson's hawk [*Buteo swainsoni*], northern harrier [*Circus cyaneus*], American kestrel [*Falco sparverius*], and great-horned owl [*Bubo virginianus*]; Pardieck 2017). The most common species recorded were red-winged blackbird (*Agelaius phoeniceus*), common grackle (*Quiscalus quiscula*), western meadowlark (*Sturnella neglecta*), and cliff swallow (*Petrochelidon pyrrhonota*).

USFWS Birds of Conservation Concern

Although not listed under the ESA, many species of bird have been identified by the USFWS as Birds of Conservation Concern (BCC; USFWS 2008). These are "species, subspecies, and populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973" (USFWS 2008). Virtually all birds listed as BCC are protected under the Migratory Bird Treaty Act (MBTA 1918), and eagle species are protected by the BGEPA (1940). The Project is in the Prairie Potholes Bird Conservation Region (BCR 11), which includes 39 BCC species (USFWS 2008). The USFWS lists 27 species as birds of conservation concern within this region (USFWS 2008). The mosaic of habitat and land cover types present within the Project has the potential to support several of these species. According to the 1966-2016 USGS North American BBS data, seven of the 27 BCC species for this region have been recorded along the Tyler route that runs into the four miles east of the Project. These species include American bittern (*Botaurus lentiginosus*), bald eagle, Swainson's hawk, black tern (*Chlidonias niger*), black-billed cuckoo (*Coccyzus erythropthalmus*), red-headed woodpecker (*Melanerpes erythrocephalus*), and dickcissel (*Spiza americana*). Additionally, a number of these species may migrate through, or overwinter in, the Project area, although the extent cannot be predicted.

Bats

Eight species of bats could potentially occur at the Project; three are listed by the MN DNR as species of special concern, including the federally threatened NLEB (Table 4). The evening bat was not previously known to occur in Minnesota but was documented in July 2016 by the MN DNR in Arden Hills, near Minneapolis, Minnesota. Evening bats have been regularly expanding their range including recent expansions within South Dakota, New York, Nebraska, Michigan, Kansas, and Texas (Mulnzer 2008). Based on the desktop habitat review, the Project has less than 1% coverage of woodland habitat for tree-roosting bats, with the majority of habitat is associated with isolated woodlots and shelterbelts, and located along semi-forested corridors of the North and South Branches of the Yellow Medicine River. Also, the presence of wetlands, ponds, and cultivated cropland may attract bats for foraging and drinking opportunities. There is potential for spring, summer, and fall use at the Project for these seven bat species. There are no known large bat hibernacula in Lincoln County, Minnesota. Tier 3 studies can provide more information on use levels and seasonal patterns as well as species composition within the Project.

Table 4. Bat species with potential to occur within the Blazing Star II Wind Farm (Harvey et al. 1999, Bat Conservation International [BCI] 2015).

Common Name	Scientific Name
eastern red bat	*Lasiurus borealis*
evening bat	*Nycticeius humeralis*
little brown bat[1]	*Myotis lucifugus*
northern long-eared bat[1, 2]	*Myotis septentrionalis*
tri-colored bat[1]	*Perimyotis subflavus*
big brown bat	*Eptesicus fuscus*
silver-haired bat	*Lasionycteris noctivagans*
hoary bat	*Lasiurus cinereus*

[2] federally threatened species (USFWS 2016)

Tier 1 and Tier 2 Questions

As described in the Final Land-based Wind Energy Guidelines (USFWS 2012), Tier 1 studies help to identify potential issues that may need to be addressed before further actions can be taken with the development or operations of a Project. The objective of the Tier 1 & 2 study is to assist the developer in further identifying a potential wind site by providing a preliminary evaluation or screening of public data from federal, state, and tribal entities and offering early guidance about the sensitivity of the site in regards to flora and fauna. The following discussion provides answers to the Tier 1 and 2 questions for the Blazing Star II Project.

1. Are there species of concern, or habitat for that species, present in the proposed Project area?

There are several areas designated by the Minnesota Biological Survey as native plant communities within the Project which may provide suitable habitat for listed species such as the Dakota skipper and Ottoe skipper. Some of these native plant communities overlap areas designated as sites of moderate biodiversity significance by the MN DNR. These areas, along with freshwater emergent wetlands, perennial streams, and open water bodies may provide suitable habitat for some of the species listed in Table 3.

2. *Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information?*

There are several protected areas within the Project including several state WMAs, WPAs and privately owned conservation areas (Figure 5).

3. *Are there plant communities of concern present or likely to be present at the site?*

There are several native plant communities and sites of moderate biodiversity significance designated by the MN DNR within the Project (Figure 6). Within the Project boundary, 7,362 acres have been identified by the MBS as various levels of Sites of Biodiversity. Of these, 4,075 acres (8.3% of Project boundary) are ranked as "below," and 3,287 acres (6.8% of Project boundary) are ranked as "moderate;" there are no sites of "high" or "outstanding" biodiversity significance in the Project boundary. There are also 430 acres of MBS-mapped native plant communities in the Project boundary, all of which are associated with sites identified as moderate biodiversity. Of the identified native plant communities, 359 acres are mapped as dry hill prairie, 35 acres are mapped as prairie meadow, 17 acres are mapped as basswood-bur oak forest, 17 acres are mapped as dry sand-gravel prairie, 5 acres are mapped as mesic prairie, 3 acres are mapped as wet prairie, and less than 1 acre is mapped as spikerush-bur reed marsh. Proper siting of turbines and infrastructure to avoid these areas, particularly the moderate biodiversity sites, should minimize the potential impacts to plant communities of concern.

4. *Are there known critical areas of wildlife congregation in the proposed Project area?*

There is some potential for species of wildlife to congregate within the Project area based on publicly available data, specifically within the state wildlife management areas present within the project or in and around lakes and other open waterbodies during peaks in avian migration through the area. The site visit and initial studies conducted to date have identified one great blue heron rookery and one cormorant roosting spot in the Project area.

5. *Are there large areas of intact habitat with the potential for fragmentation, with respect to species of habitat fragmentation concern needing large contiguous blocks of habitat?*

A large portion of the Project area is highly fragmented already and a mosaic of cultivated cropland, herbaceous areas, pasture, open water and wetlands comprise the majority of the Project area. NLCD data and aerial imagery indicates that there are relatively large areas of intact mixed herbaceous grasslands and pasture/hay within the Project. The relatively large areas of contiguous grasslands and pastures may be suitable for some sensitive species such as the Henslow's sparrow which require large intact areas of grassland. However, the site visit indicated that most of the grasslands within the Project area are relatively small and fragmented, and of low quality.

6. *Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?*

Additional data from field studies would be necessary to adequately address potential presence of species of concern. The Project occurs within the known range of the NLEB, and occurrence is

possible within the forested areas of the Project during the summer months as well as more generally during early fall migration throughout the area. Bald and golden eagles may also occur within the Project.Initial studies indicate that there are bald eagle nests outside of, but within two miles of, the Project area; and bald eagles may occur as nesting pairs or as passing migrants within the Project boundary. Golden eagles are much less common in this area and are expected to occur as uncommon migrants passing through in a broad-front fashion. Additionally, species that utilize prairie, wetland and grassland areas may find suitable habitat in the larger blocks of herbaceous grassland, wetland complexes and pasture that are present within the Project.

7. *Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above?*

Based on available information the potential for significant adverse impacts to species of concern from development of the Project is relatively low. There are no critical habitat areas within the Project and the landscape and habitat features present within the Project are similar to those in the surrounding landscape. Habitats within the Project are already largely fragmented.

DISCUSSION

The Project is located in Lincoln County in southwestern Minnesota at elevations between 465 to 576 meters (1,526 to 1,890 feet) above sea level. Land cover within the Project consists of a mosaic of cultivated cropland, herbaceous grasslands, hay and pasture, developed open areas, wetlands and open water. Perennial streams are present within the Project including stream reaches of the North and South Branches of the Yellow Medicine River; open water lakes including Perch Lake and Ash Lake are also within the Project boundary. Forested areas are relatively scarce within the Project and riparian areas are largely lacking intact vegetation, although some wooded stretches occur adjacent to (but mostly outside) of the northeastern portion of the Project. Several areas within the Project are designated as native plant communities or sites of moderate biodiversity significance by the MN DNR.

This mix of landcover types within the Project may provide suitable habitat for several federally listed and state listed species. Critical habitat for the Dakota skipper has been designated approximately 1.25 miles east of the Project, two additional areas of critical habitat occur between four and six miles west/northwest of the Project. Several Minnesota native plant communities and sites of moderate biodiversity significance are present within the Project and impacts to these areas should be avoided and minimized to the extent possible. The Project does not contain any areas mapped as high or outstanding biodiversity significance.

There is some potential for the NLEB to occur within the Project, and similar to other wind energy projects in this species' range, development within the Project area may impact NLEB. However, given the relative scarcity of forested areas within the Project, the spring migration to foraging areas (mid-March to mid-May) and the fall migration and swarming period (mid-August to mid-October) near hibernacula are the times when NLEB are most likely to be present within the Project. If NLEB occur in the Project during the summer months, they will likely occur within or nearby (within 1,000 ft) larger patches of forested habitats (USFWS 2011). Desktop analysis shows that potential summer roosting and foraging areas are generally absent from the project, although some suitable foraging and

roosting habitat does occur (approximately 273 acres, or 0.6% of the Project area). Further consultation with the USFWS regarding risk and additional assessments for NLEB are recommended.

Similar to other wind-energy project in the Midwest region, bird and bat species will likely utilize the Project area. Available information indicates that raptors and eagles may occur within the project area. WEST has documented WEST has documented active bald eagle nests in Lincoln County in areas within two miles of the Project boundary, and despite the relative scarcity of forests within the Project, bald eagles may nest and breed in the area. Results available from initial surveys conducted at the Project indicate that there are bald eagle nests within two miles of the Project, and individual eagles have been observed within the Project boundary. Golden eagles are not common in this area and are expected to occur in the Project only as rare migrants.

The larger areas of herbaceous grassland and pasture within the Project may support state listed grassland bird species such as the burrowing owl, Henslow's sparrow, and loggerhead shrike. The southwestern portion of the Project overlaps part of a unit of the Prairie Coteau Complex State IBA and another unit is approximately two miles south of the Project; this IBA complex focuses on prairie, grassland and marsh birds. The June 27, 2017 site visit indicated that in general the grassland habitats within the Project (particularly those outside of state or federal management land) are fragmented and relatively low quality, with invasive species dominating. Additional Tier 3 studies are recommended to help to further assess risk. Consultation with the USFWS and MN DNR regarding the type and extent of additional surveys is recommended.

The Project contains some wetland habitats (desktop sources indicate that between 7 to 14% of the Project area is wetlands or open water, based on the NLCD and NWI databases, respectively) and multiple stream features. WEST recommends that field delineation be conducted to confirm the location and boundaries of jurisdictional wetlands and waters within the Project in the vicinity of proposed construction impacts in order to avoid and minimize impacts. In particular, the state often recommends setbacks from larger, deeper wetlands, especially PWI. A field assessment to determine if suitable habitat is present for sensitive fish and mollusk species is also recommended if impacts to waterways are anticipated. The closest designated critical habitat for the federally endangered Topeka shiner species is approximately 2.5 miles south of the Project associated with Medary Creek. However, almost all of the Project is in the Minnesota River watershed, not the Missouri River watershed and therefore this species would not be anticipated to occur in waterbodies within the majority of the Project boundary. If infrastructure is proposed in the Missouri River watershed in the very southwestern corners of the Project, further coordination with the USFWS and MN DNR should occur in order to determine appropriate construction methods to avoid and minimize impacts to stream habitat.

The Project contains several areas of state and federally owned land. WPAs, WMAs, and private conservation easements are scattered throughout the Project area. Minnesota statutes require setbacks from these areas to help avoid and minimize risk to wildlife and maintain their conservation and recreational value. Additionally, the state requires that any native prairie (grassland that has not previously been tilled, regardless of quality) be avoided and if avoidance is not possible, a prairie mitigation plan must be developed and approved by the MN DNR. WEST therefore recommends that a field visit occur to provide more detailed mapping on native prairie.

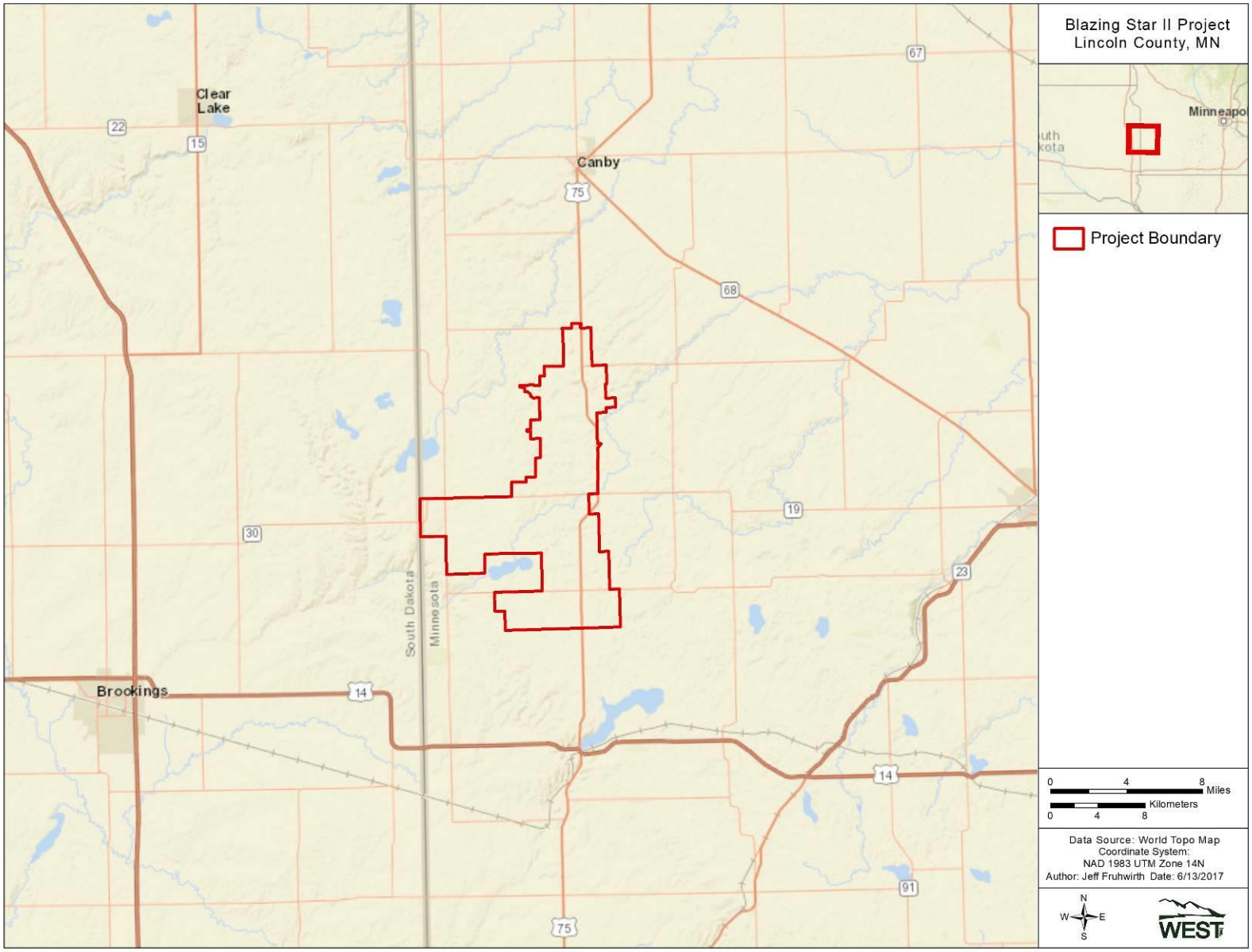


Figure 1. Location of the Blazing Star II Wind Farm in Lincoln County, Minnesota.

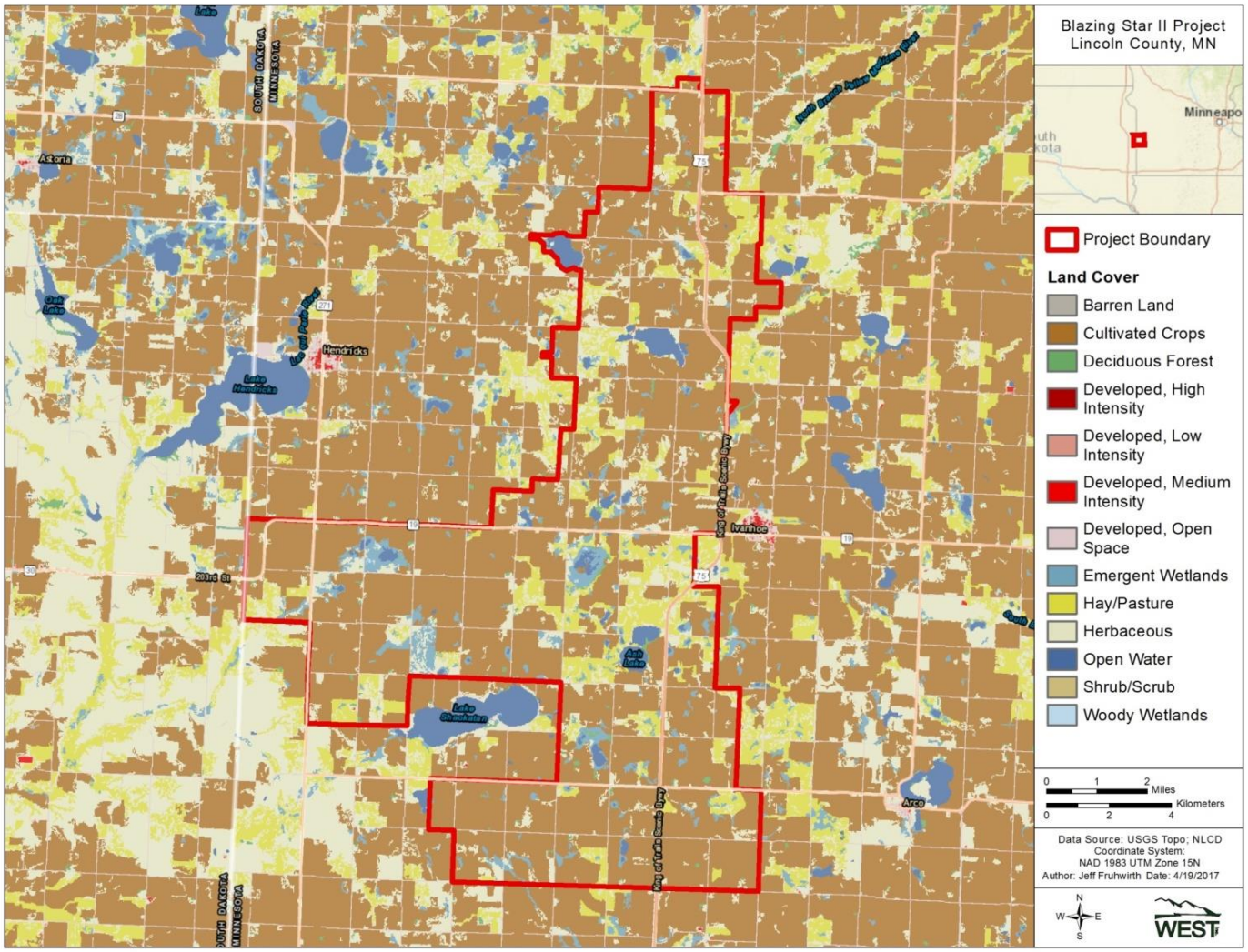


Figure 2. Land cover types and coverage within Blazing Star II Wind Farm project boundary, along with surrounding cover types in southwestern Minnesota.

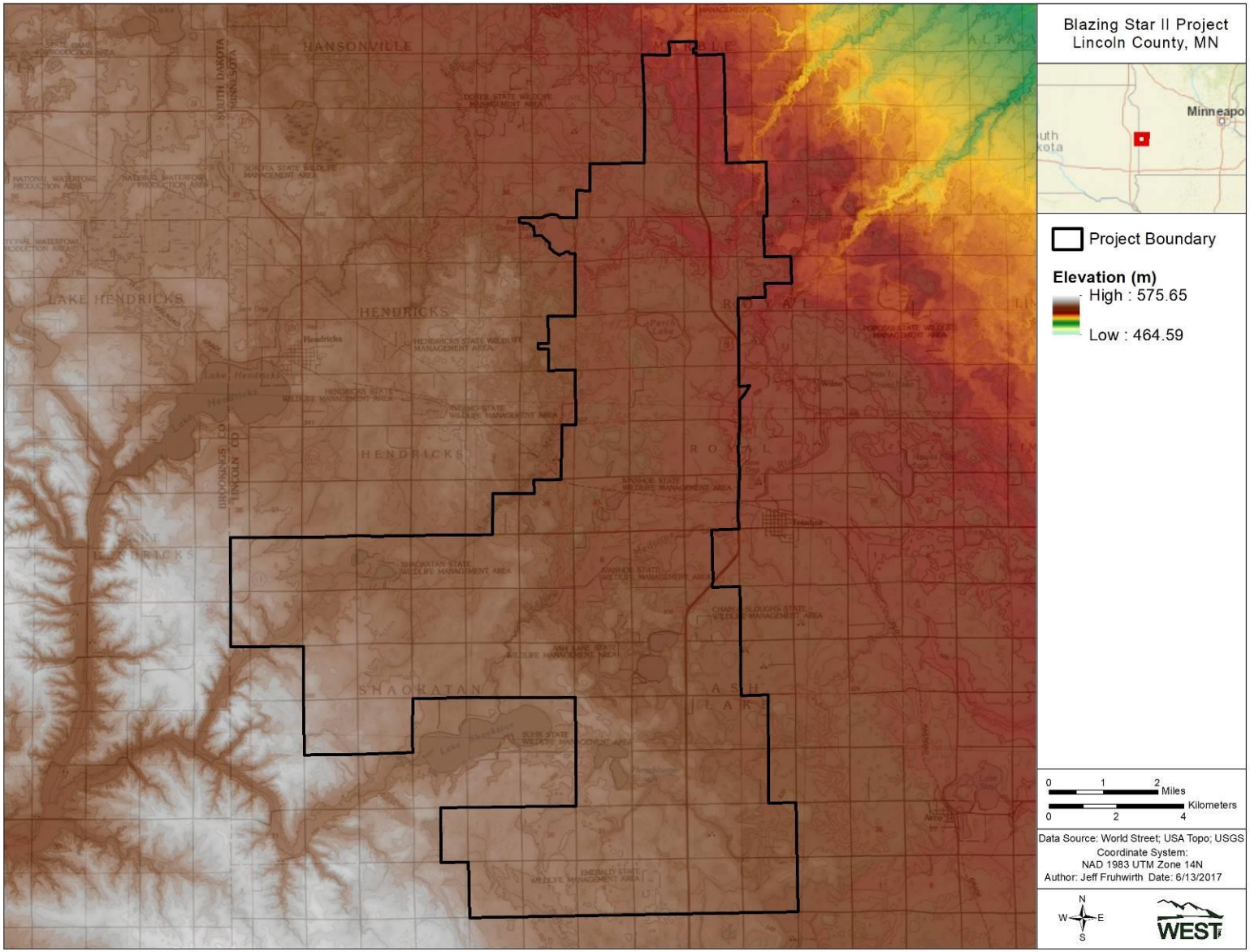


Figure 3. Elevation gradients within the Blazing Star II Wind Farm project boundary, Minnesota.

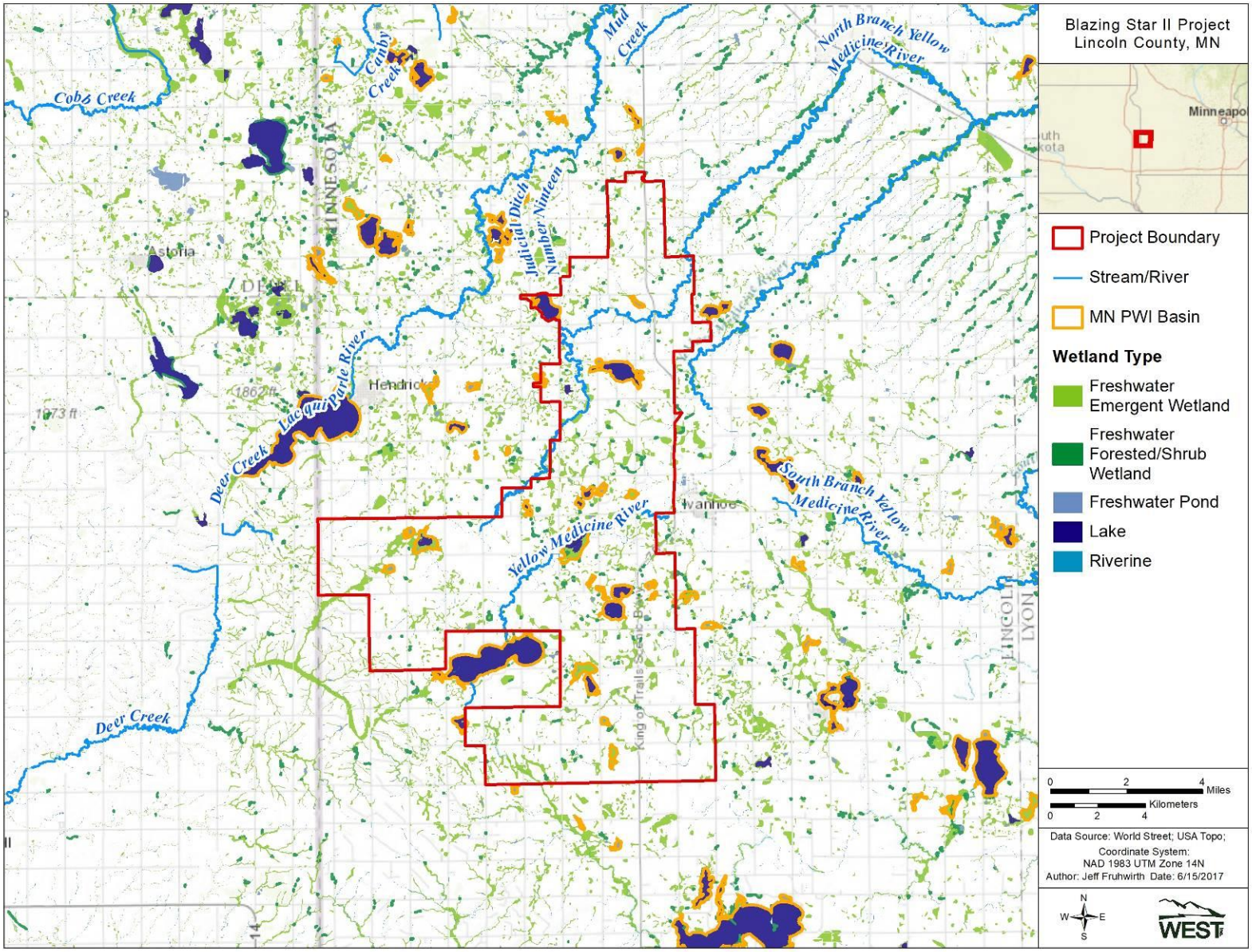


Figure 4. Surface waters within the Blazing Star II Wind Farm, Minnesota.

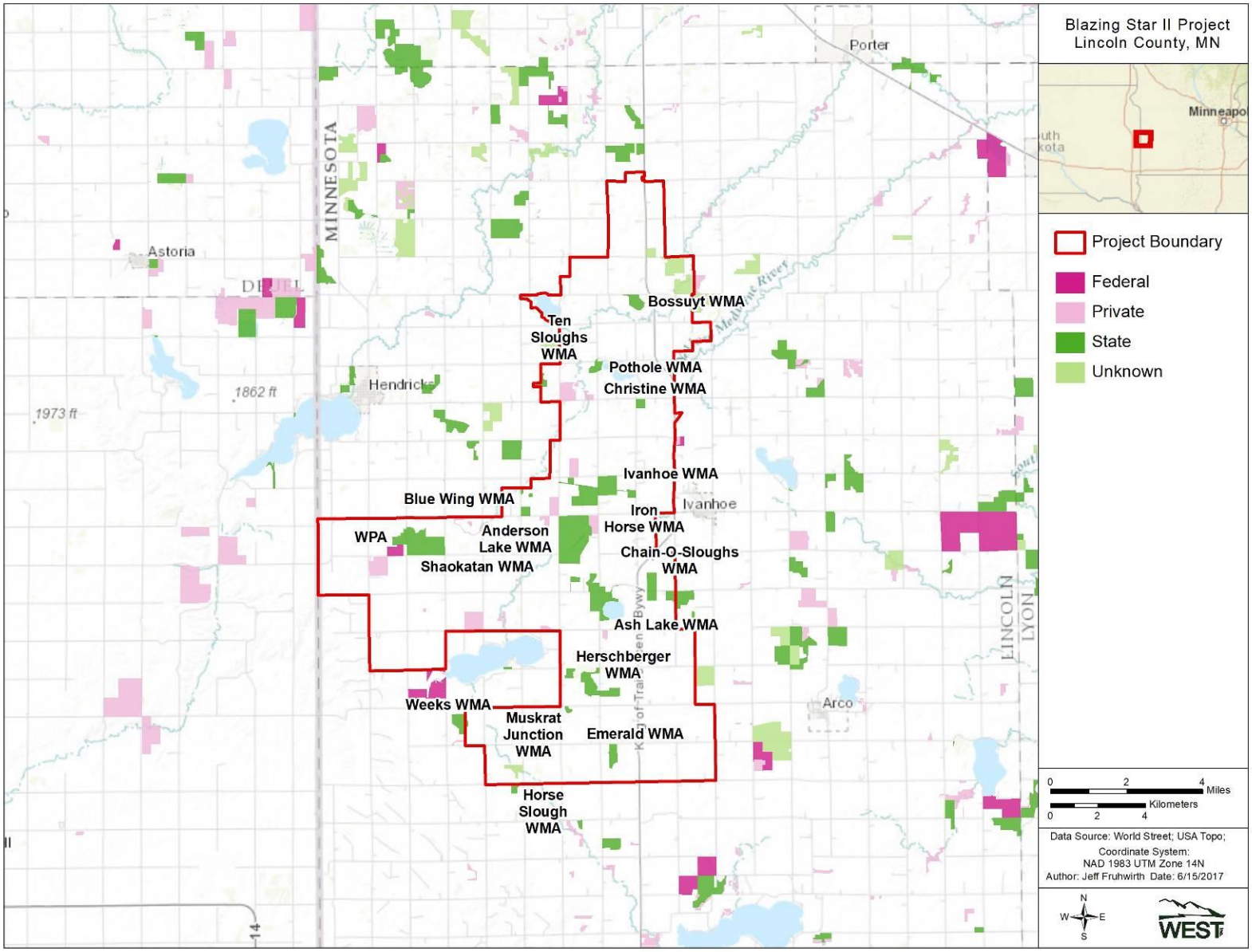


Figure 5. Protected lands in the vicinity of the Blazing Star II Wind Farm, Minnesota.

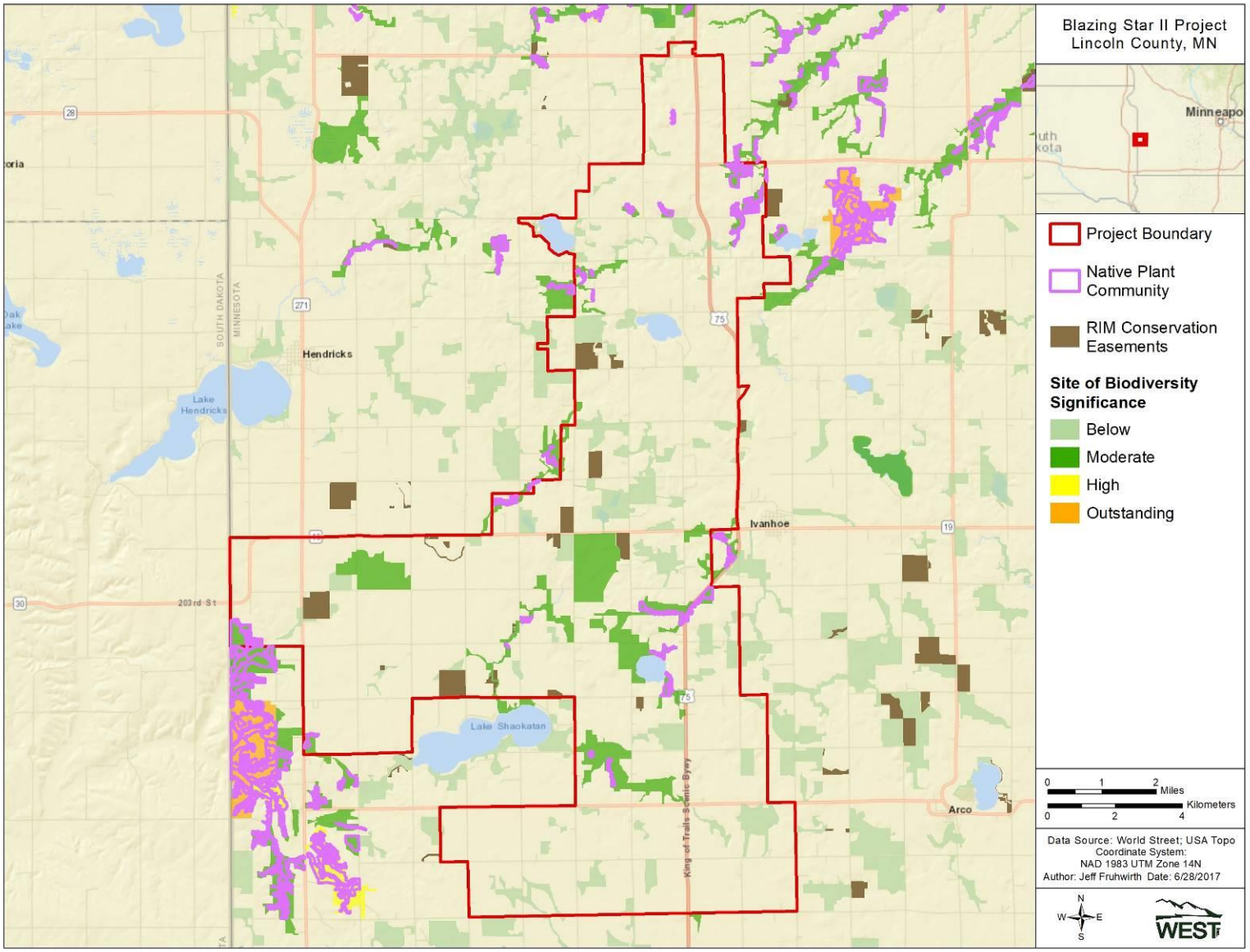


Figure 6. Minnesota Sites of Biodiversity Significance and Native Plant Communities at the Blazing Star II Wind Farm, Minnesota.

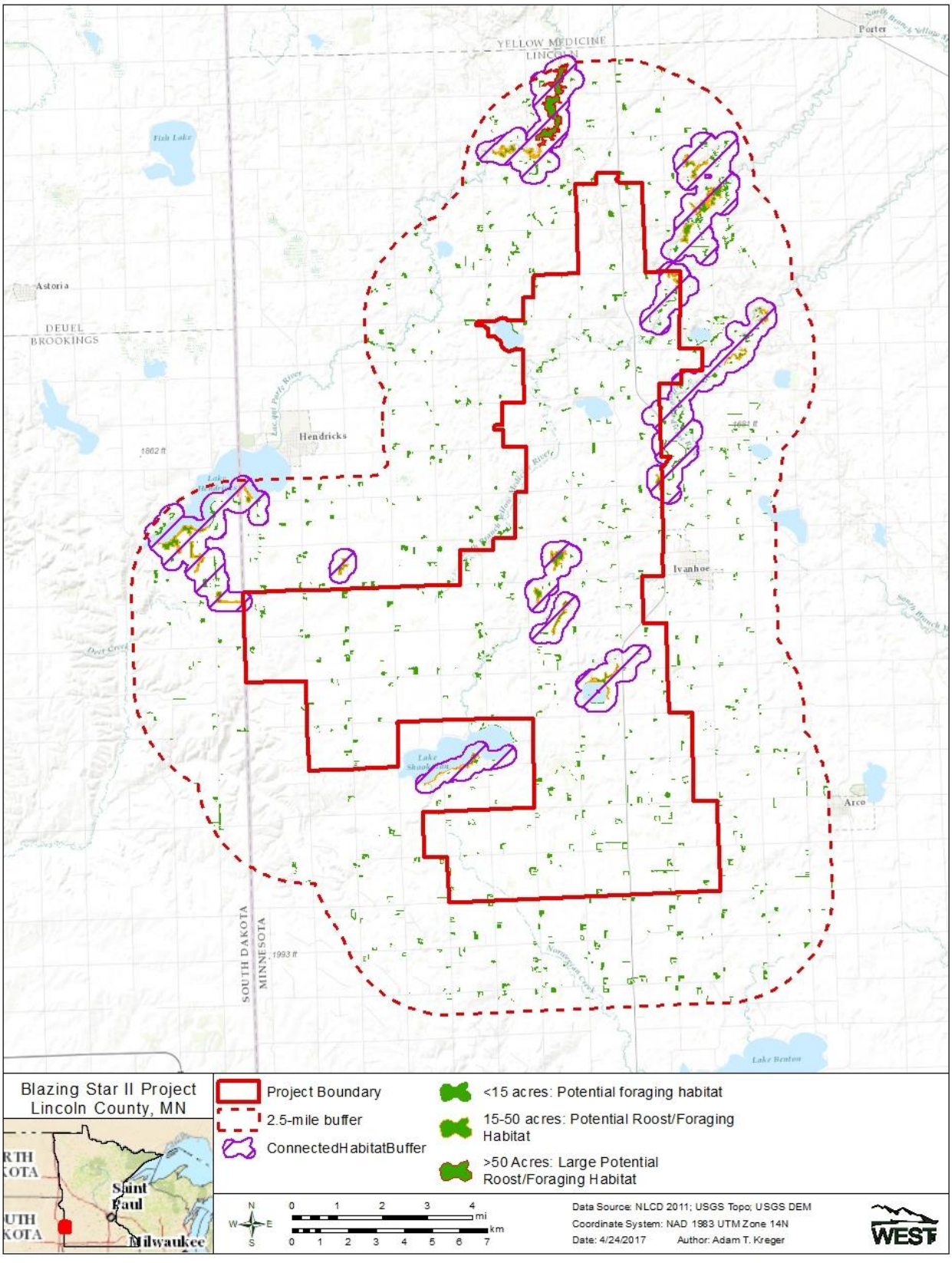


Figure 7. Potential suitable habitat and foraging range of northern long-eared bats in the vicinity of the Blazing Star II Wind Farm in Lincoln County, Minnesota.

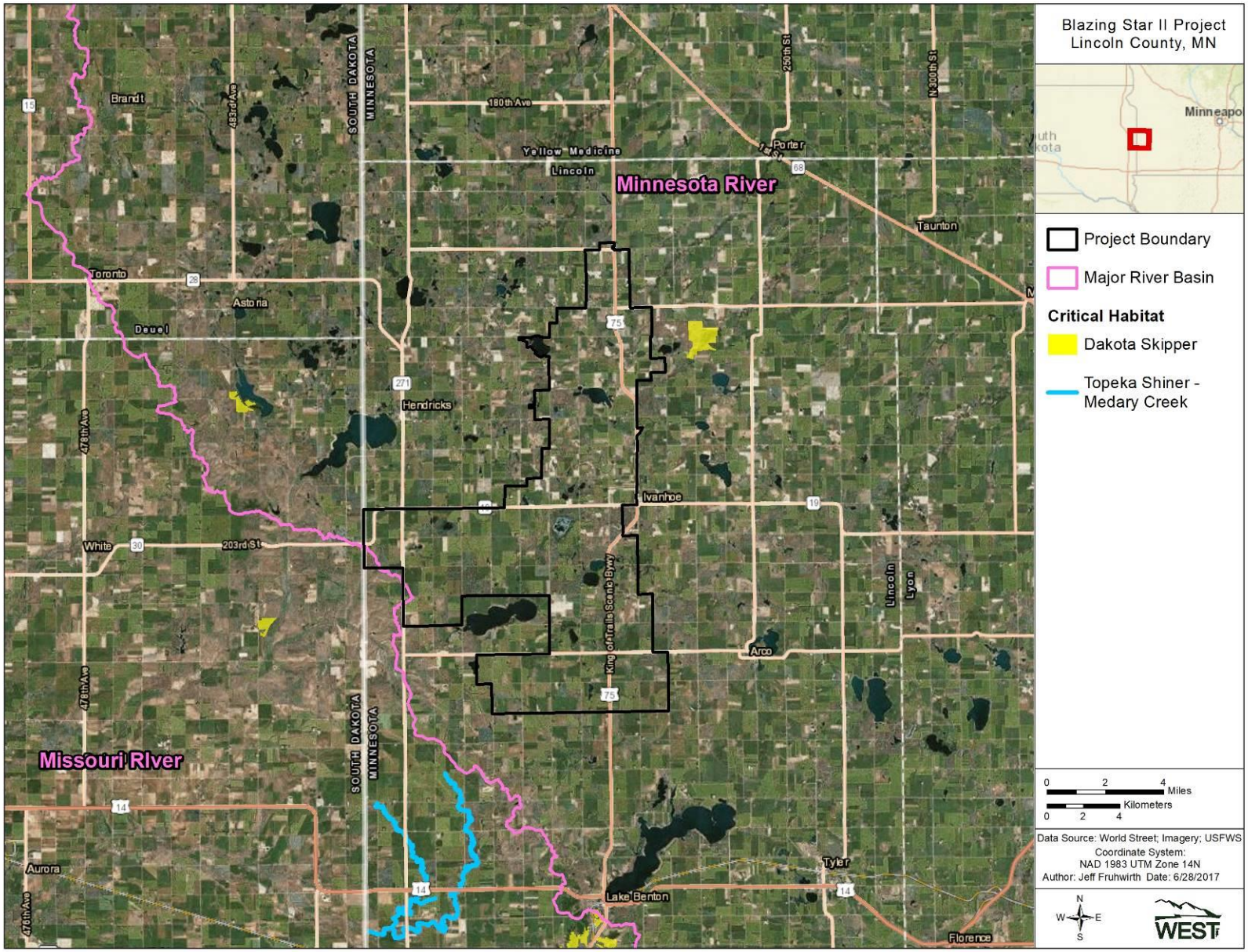


Figure 8. Critical habitat areas near the Blazing Star II Wind Farm, Minnesota.

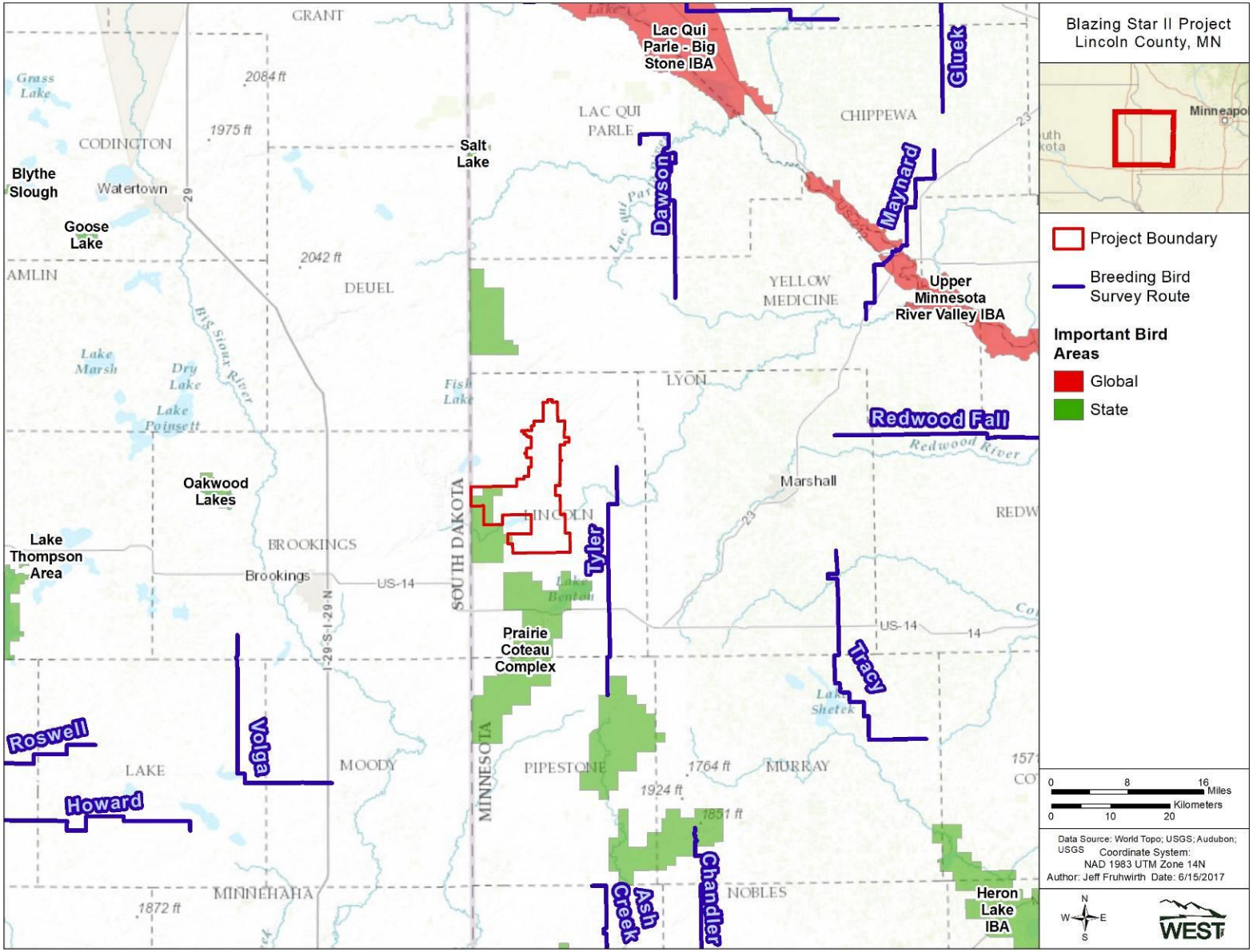


Figure 9. USGS Breeding Bird Survey Routes and Audubon Important Bird Areas near the Blazing Star II Wind Farm , Minnesota.

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