

# Wind Power GeoPlanner™

## Land Mobile and Emergency Services Report

Thunder Spirit Wind



Prepared on Behalf of  
Thunder Spirit Wind,  
LLC

June 2, 2014





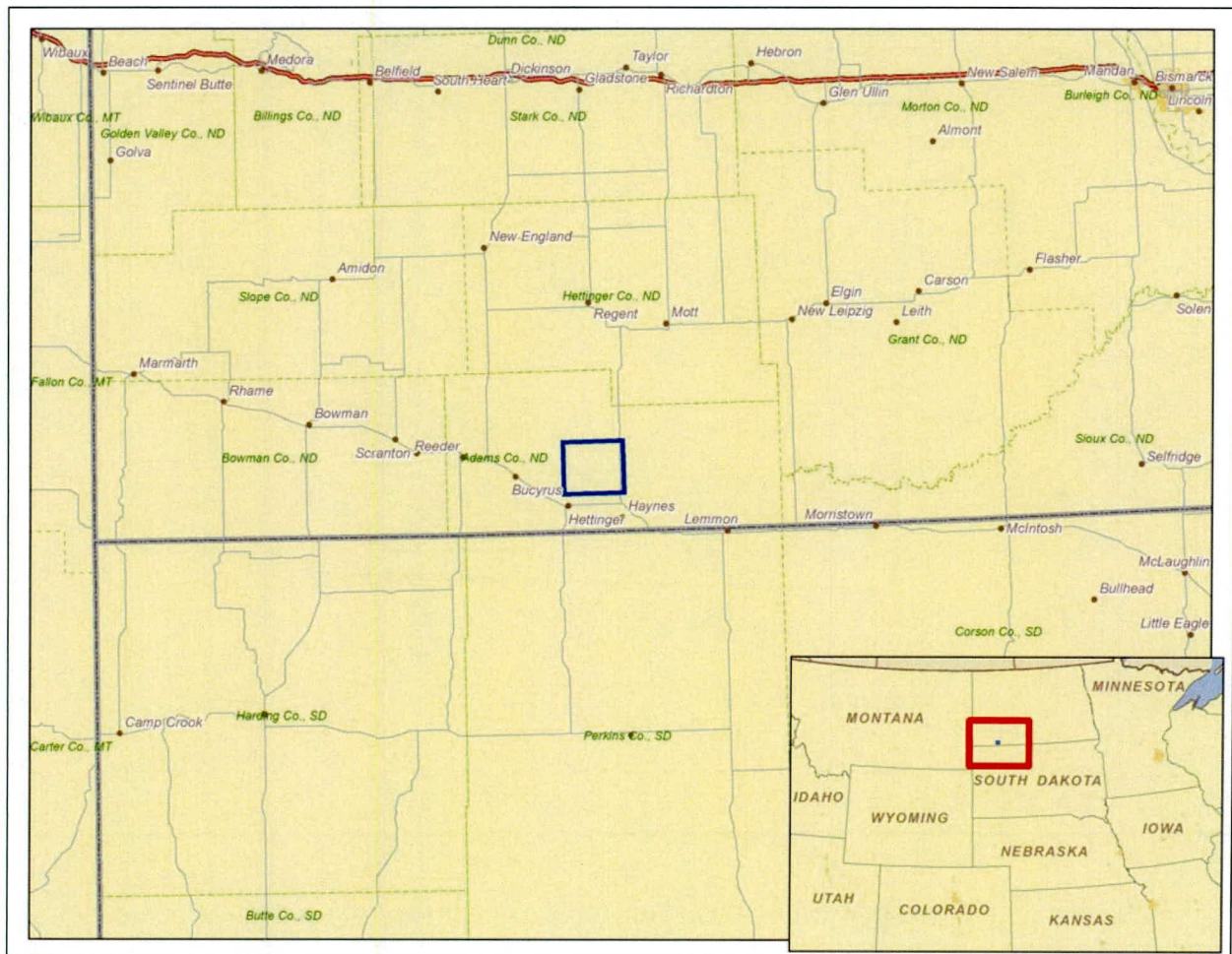
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## 1. Introduction

An assessment of the emergency services in the Thunder Spirit Wind 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 Adams County, North Dakota, appears below.

This study was performed on behalf of Thunder Spirit Wind, LLC.



## 2. Summary of Results

Our land mobile and emergency services incumbent data<sup>1</sup> 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. The site-based licenses were imported into GIS software and geographically mapped within 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 provided in a data table. A depiction of the fixed-site licenses in and around the project area appears in Figure 1, below.

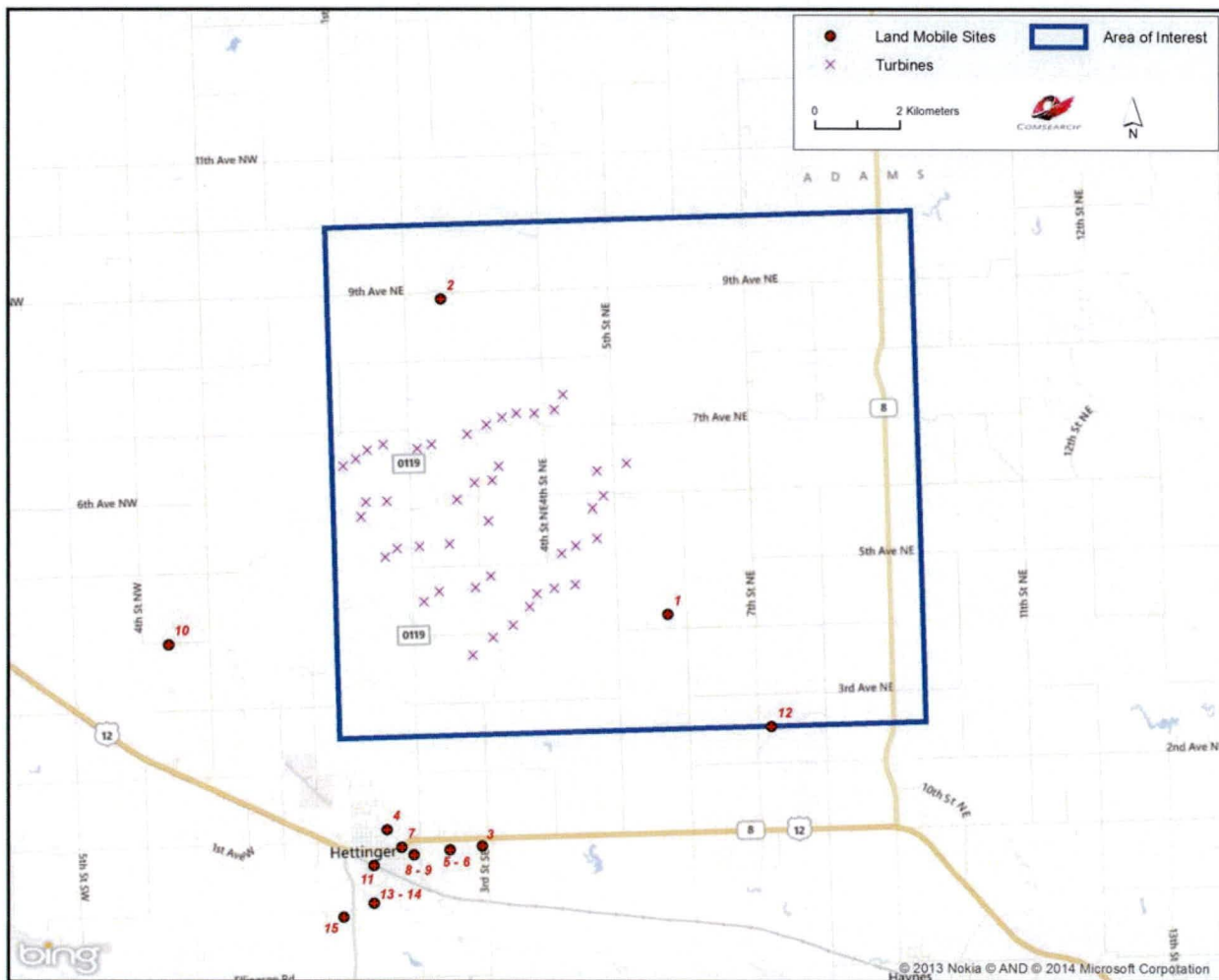


Figure 1: Land Mobile & Emergency Service Sites near the Project Area of Interest

<sup>1</sup> 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](http://www.comsearch.com/files/data_license.pdf)

### Site-Based Licenses

Figure 1 identifies fifteen site-based licenses near the project area of interest. Some of these sites are licensed to first responder entities that provide critical public safety and emergency communications to the Thunder Spirit Wind project area. Specific information about these sites is provided in Table 1, including location coordinates, frequency band, antenna height above ground level, and licensee name.

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
1	WQPQ617	450-470	Christman, Jordan	16.8	46.049444	-102.544417	2.30
2	KXU669	150-174	Erickson, Bruce G	24.0	46.117500	-102.610722	3.14
3	WNQB944	450-470	Weaver, John A	15.0	46.001389	-102.602944	4.51
4	KZO413	150-174	West River Regional Medical Center	24.0	46.005556	-102.631833	4.58
5	WPWW658	800/900	Consolidated Telecom	62.0	46.000833	-102.612778	4.62
6	WQCA298	800/900	Consolidated Telecom	62.0	46.000833	-102.612778	4.62
7	WQKY798	450-470	Western Horizon Living Center	-	46.001667	-102.627500	4.83
8	KNFS826	150-174	Adams, County of	21.0	46.000000	-102.623778	4.91
9	WNNM520	150-174	Adams, County of	15.0	46.000000	-102.623778	4.91
10	WQAT234	150-174	Arndorfer Farms	19.0	46.046111	-102.696833	5.46
11	WQOF534	150-174	BNSF Railway Co.	3.0	45.998056	-102.636111	5.48
12	WQCF492	150-174	Miller, Henry	13.0	46.025000	-102.513889	5.71
13	WNPDP751	150-174	BNSF Railway Co.	25.0	45.990000	-102.636278	6.29
14	WNPDP751	150-174	BNSF Railway Co.	30.0	45.990000	-102.636278	6.29
15	KDS866	150-174	Clark, Cecil R	18.0	45.987222	-102.645722	6.89

Table 1: Summary of Land Mobile & Emergency Service Sites near the Project Area of Interest

### Area-Wide Licenses

The regional area-wide licenses are compiled from FCC data sources and identified for each county in the wind project area. The Thunder Spirit Wind project is located in Adams County, North Dakota, part of Public Safety Region #32, which contains all of the counties in North Dakota. The regional public safety operation is overseen by the entity listed below.

**Mike Lynk**

*Chair*

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The chairperson for Region #32 is a representative for all public safety entities in the region 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, nine licenses were found for the State of North Dakota and one for the County of Adams (see Table 2). These area-wide licenses are designated for mobile use only.

ID	Frequency Band (MHz)	Licensee	Area of Operation
1	150-174	Adams, County of	Countywide: Adams
2	25-50	American National Red Cross	Statewide: ND
3	150-174	Metro Area Ambulance Service, Inc.	Statewide: ND
4	450-470, 2450-2500	Minot Police Department	Statewide: ND
5	150-174	National Ski Patrol System, Inc.	Statewide: ND
6	0-10, 150-174, 450-470	North Dakota, State of	Statewide: ND
7	150-174	North Dakota Department of Health	Statewide: ND
8	150-174, 4940-4990	North Dakota Department of Transportation	Statewide: ND
9	150-174, 450-470	North Dakota Division of State Radio Communications	Statewide: ND
10	450-470	North Dakota EMS Association	Statewide: ND

*Table 2: Summary of 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 Adams County in Table 3, below.

Mobile Phone Carrier	County	State	Service <sup>2</sup>
AT&T	Adams	ND	AWS / CELL / PCS
BEK Communications	Adams	ND	PCS
Reservation Telephone Cooperative	Adams	ND	AWS
Sprint Nextel	Adams	ND	PCS
T-Mobile	Adams	ND	AWS / PCS
Verizon	Adams	ND	AWS / CELL / PCS

*Table 3: Mobile Phone Carriers in the 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 Thunder Spirit Wind 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, and 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

<sup>2</sup> AWS: Advanced Wireless Service at 1.7/2.1 GHz  
CELL: Cellular Service at 800 MHz  
PCS: Personal Communication Service at 1.9 GHz



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 & Mitigation Measures**

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 Emergency Services Report, please contact:

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Company:	Comsearch
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# Wind Power GeoPlanner™

## Microwave Study

Thunder Spirit Wind



Prepared on Behalf of  
Thunder Spirit Wind,  
LLC

May 29, 2014



**COMSEARCH**  
A CommScope Company



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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:** Thunder Spirit Wind

**County:** Adams

**State:** North Dakota

**Number of Turbines:** 43

**Blade Diameter:** 100 meters

**Hub Height:** 80 meters

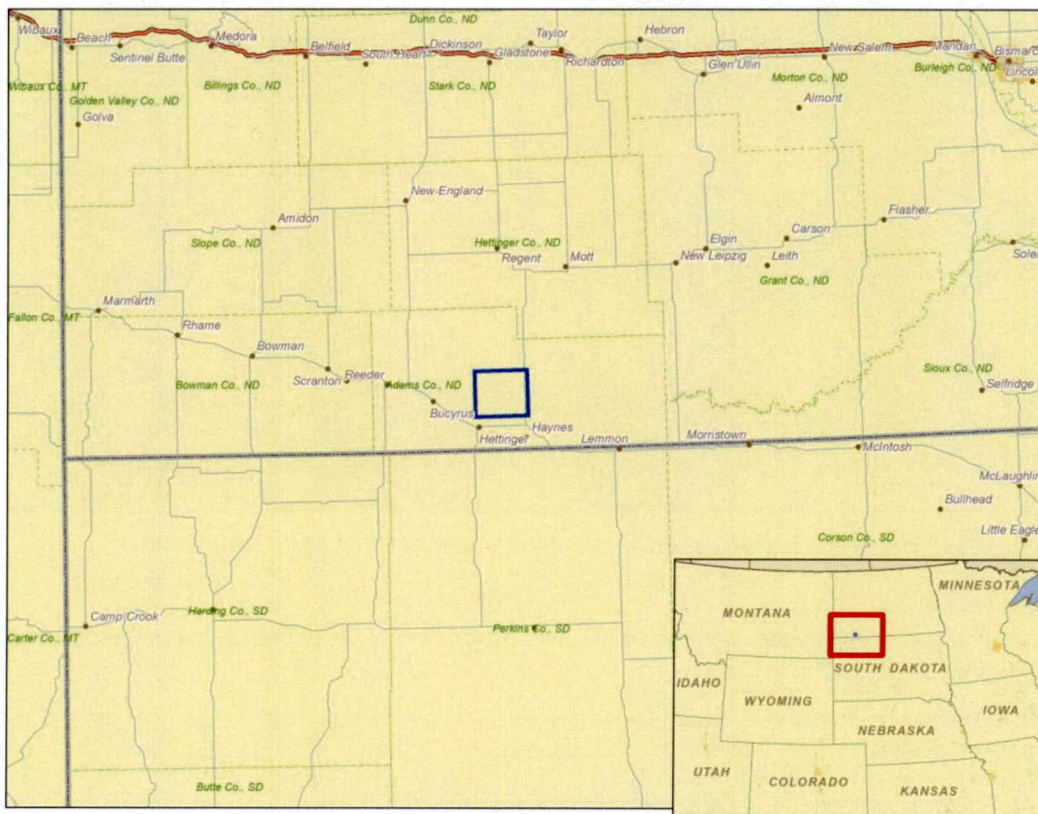


Figure 1: Area of Interest

### 3. Microwave Study Result

#### 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<sup>1</sup>. We determined all microwave paths that intersect the area of interest<sup>2</sup>. The area of interest encompasses the planned turbine locations. In this case, Comsearch identified no microwave paths that intersect the project area<sup>3</sup>.

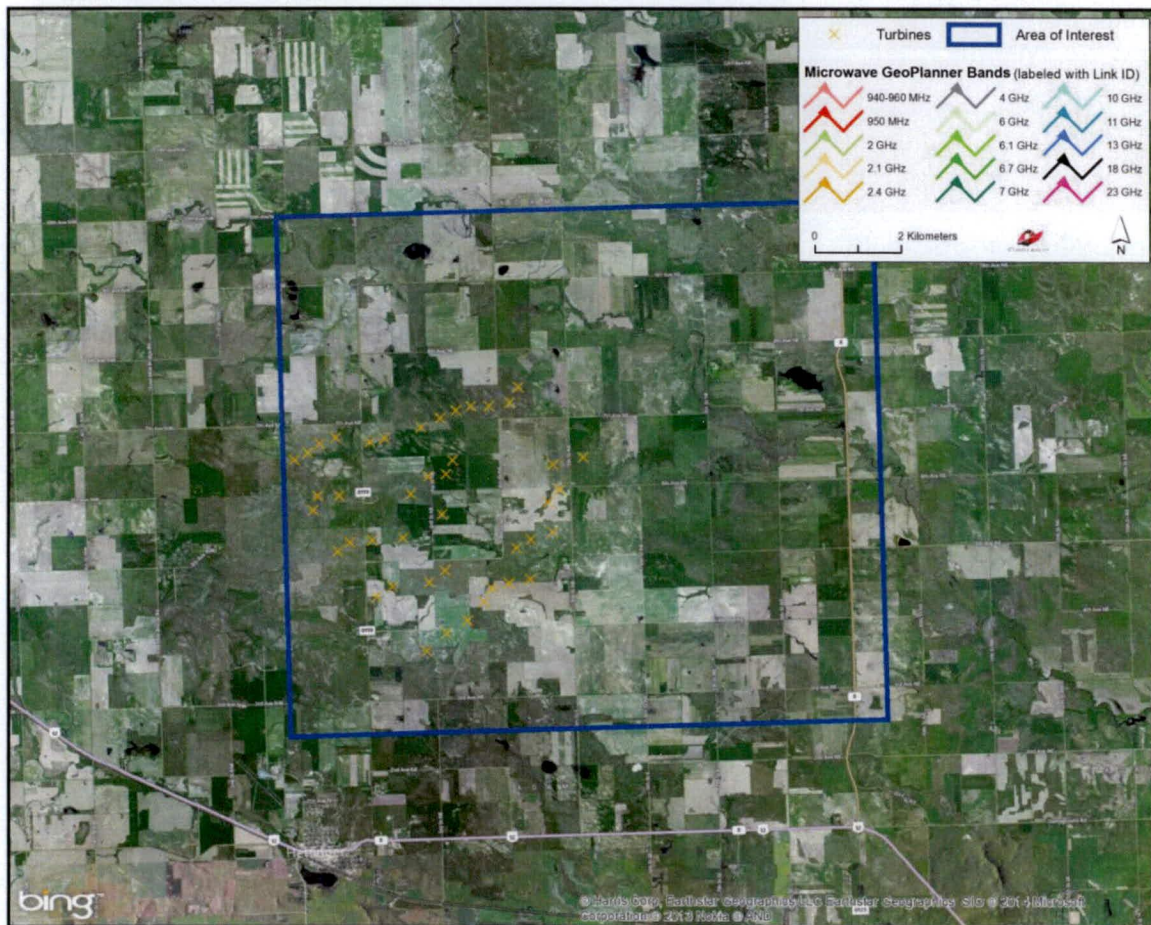


Figure 2: Microwave Paths that Intersect the Area of Interest

<sup>1</sup> Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

<sup>2</sup> 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.

<sup>3</sup> 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](http://www.comsearch.com/files/data_license.pdf).

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## Discussion of Potential Obstructions

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines Obstructions
0	0	43	0

For this project, 43 turbines were considered in the analysis, each with a blade diameter of 100 meters and turbine hub height of 80 meters. Since there were no microwave paths in the area of interest, none of the proposed turbines will cause obstructions.

## 4. Contact

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

Contact person: Denise Finney  
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# Wind Power GeoPlanner™

## Off-Air TV Analysis

Thunder Spirit Wind



Prepared on Behalf of  
Thunder Spirit Wind,  
LLC

June 2, 2014



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# 1. Introduction

In this report, Comsearch analyzed the off-air television stations whose service could potentially be affected by the proposed Thunder Spirit Wind project in Adams County, North Dakota. Off-air stations are television broadcasters that transmit signals that can be received directly on a television receiver from terrestrially located broadcast facilities. Comsearch examined the coverage of the off-air TV stations and the communities in the area that could potentially have degraded television reception because of the location of the proposed wind energy projects.

# 2. Summary of Results

The proposed wind energy project area and local communities are depicted in Figure 1, below.

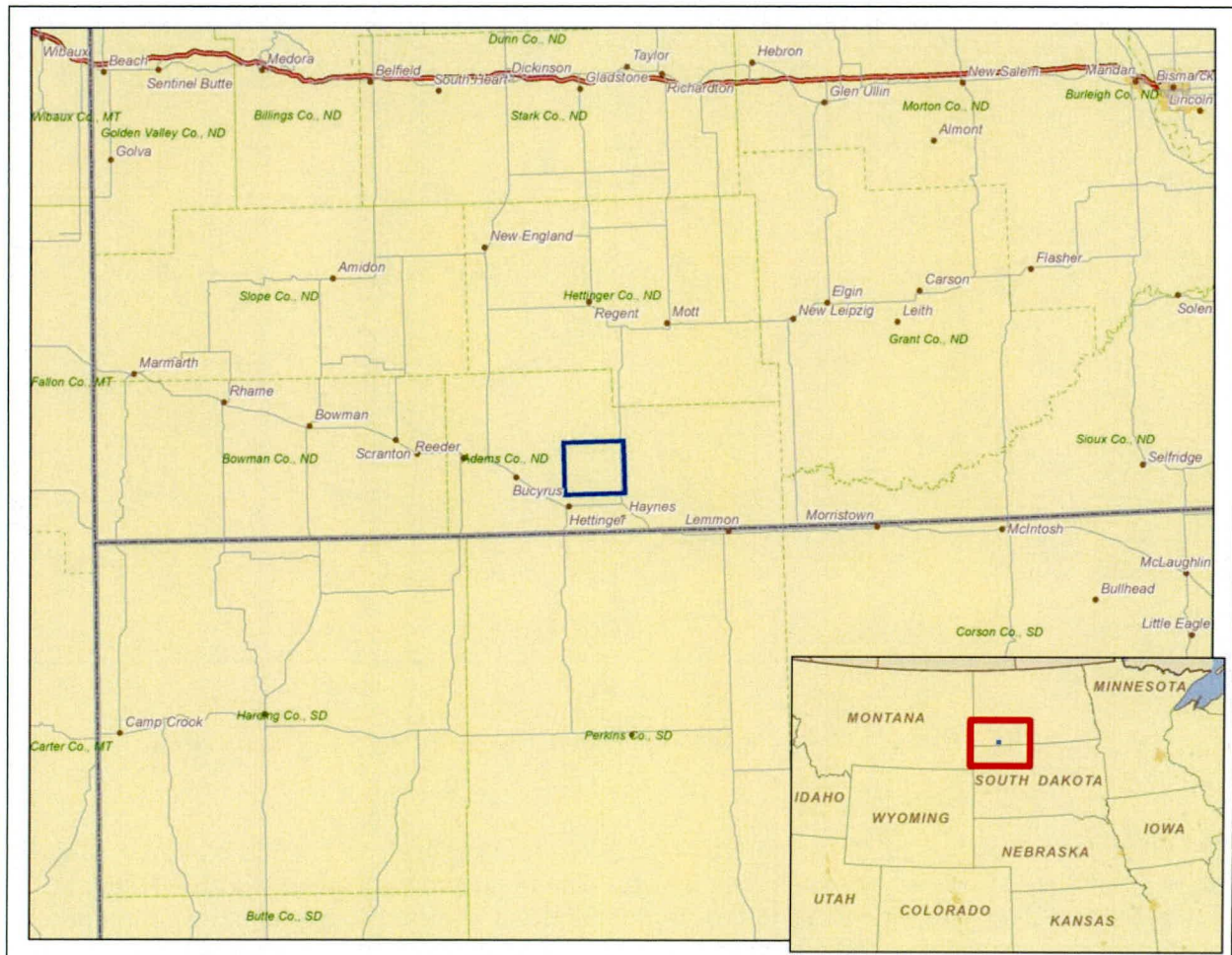


Figure 1: Wind Farm Project Area and Local Communities

To begin the analysis, Comsearch compiled all off-air television stations<sup>1</sup> within 150 kilometers of the project area of interest (AOI). Appendix A contains a tabular summary of these stations. A plot depicting their locations appears in Figure 2, below.

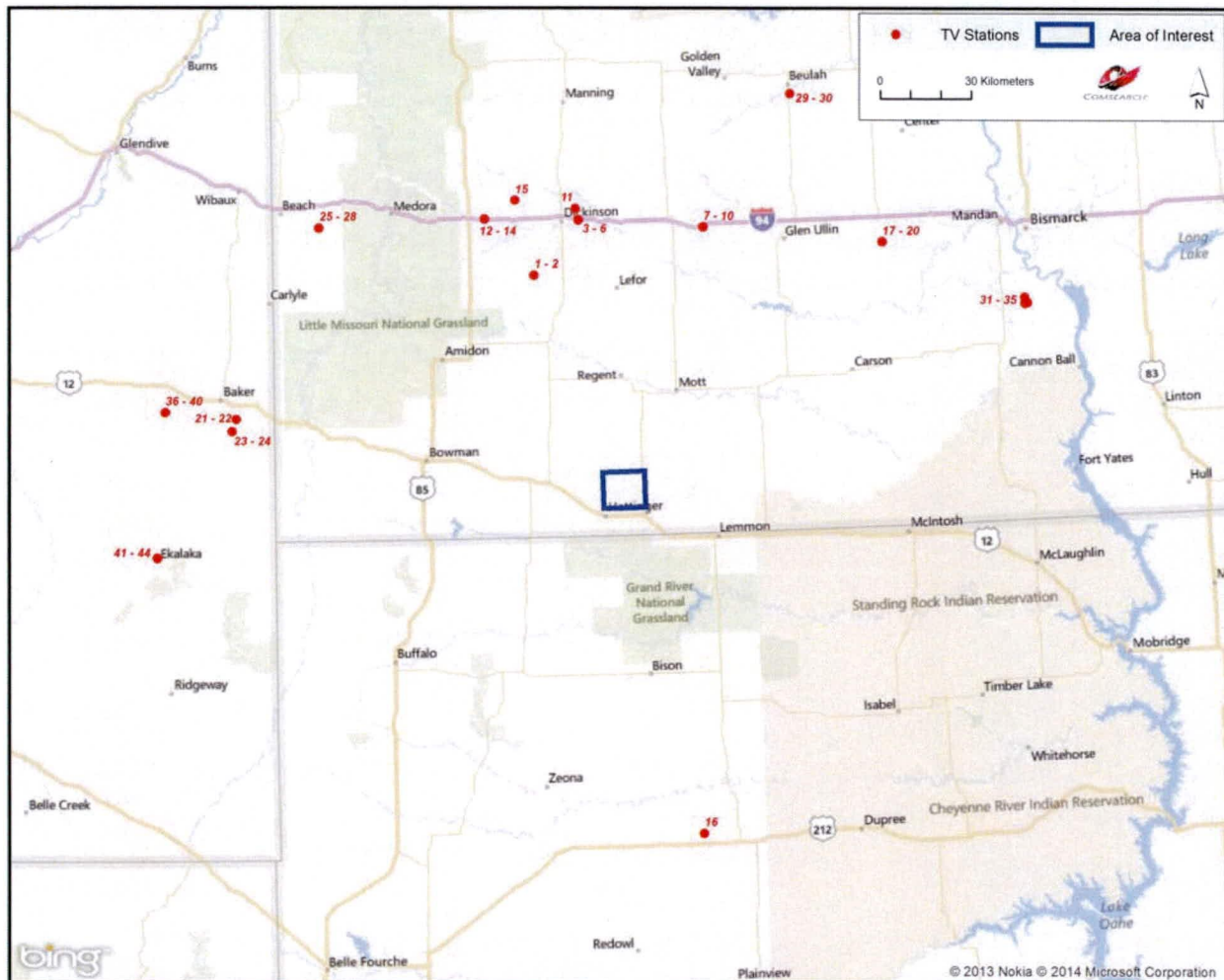


Figure 2: Plot of Off-Air TV Stations within 150 Kilometers of Project Area

TV stations at a distance of 75 kilometers or less are the most likely to provide off-air coverage to the project area and neighboring communities. These stations are listed in Table 1, below, and a plot depicting these locations is provided in Figure 3. There are a total of two database records for stations within approximately 75 kilometers of the wind energy project. These

<sup>1</sup> 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 TV station's FCC license and governed by Comsearch's data license notification and agreement located at [http://www.comsearch.com/files/data\\_license.pdf](http://www.comsearch.com/files/data_license.pdf).

represent full-power digital stations KDSE and KXMA-TV, both of which are licensed and operational.

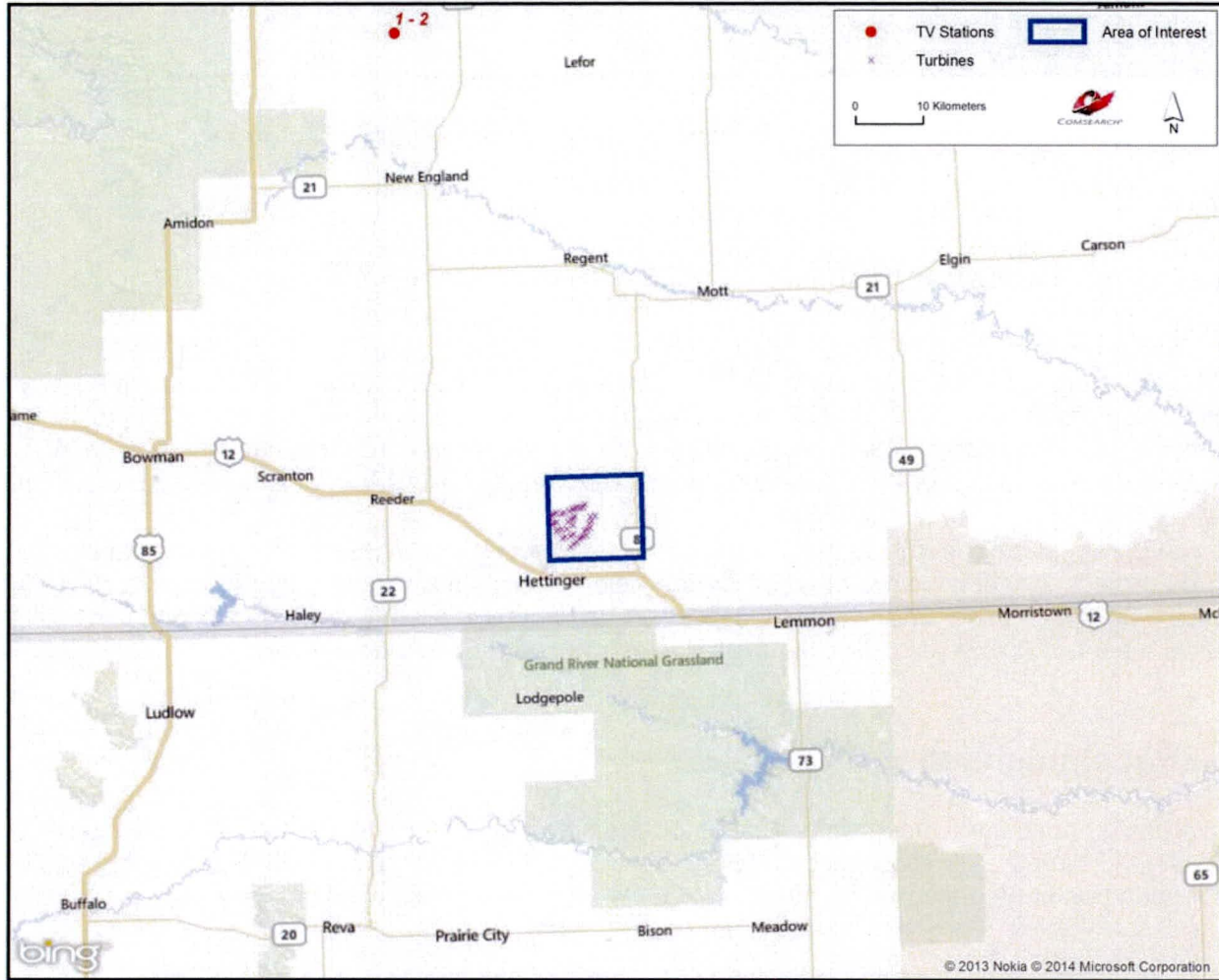


Figure 3: Plot of Off-Air TV Stations within 75 Kilometers of Project Area

ID	Call Sign	Status	Service <sup>2</sup>	Channel	Latitude (NAD27)	Longitude (NAD27)	Distance to Nearest Turbine (km)
1	KDSE	LIC	DT	9	46.726389	-102.91583	74.41
2	KXMA-TV	LIC	DT	19	46.726389	-102.91583	74.41

*Table 1: Off-Air TV Stations within 75 Kilometers of Project Area*

### 3. Impact Assessment

The two full-power digital stations may have their reception disrupted in and around the Thunder Spirit Wind project area, primarily in locations on the opposite side of the project area, relative to the station antennas. Communities and homes directly to the south and east of the project may have degraded reception of stations KDSE and KXMA-TV, which broadcast from northwest of the project area, after the wind turbines are installed.

However, based on the low number of full-power TV channels available in the immediate vicinity of the project area, it is unlikely that off-air television stations are the primary mode of television service for the local communities. TV cable service, where available, and direct broadcast satellite service (DBS) are more likely the dominant modes of service delivery.

### 4. Recommendations

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 off-air TV reception has been disrupted by the presence of the wind turbines after they are installed.

<sup>2</sup> Definitions of U.S. service and status codes:  
DT – Digital television broadcast station  
LIC – Licensed and operational station



## **5. Contact**

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Web site:	<a href="http://www.comsearch.com">www.comsearch.com</a>

## 6. Appendix A

ID	Call Sign	Status	Service <sup>3</sup>	Channel	Latitude (NAD27)	Longitude (NAD27)	Distance to Nearest Turbine (km)
1	KDSE	LIC	DT	9	46.726389	-102.91583	74.41
2	KXMA-TV	LIC	DT	19	46.726389	-102.91583	74.41
3	K14ON-D	CP	LD	14	46.884694	-102.71727	88.31
4	K17KN-D	CP	LD	17	46.884694	-102.71727	88.31
5	K26KW-D	CP	LD	26	46.884694	-102.71727	88.31
6	K39LK-D	CP	LD	39	46.884694	-102.71727	88.31
7	K24KA-D	CP	LD	24	46.853028	-102.17769	89.44
8	K27KZ-D	CP	LD	27	46.853028	-102.17769	89.44
9	K33LM-D	CP	LD	33	46.853028	-102.17769	89.44
10	K49LY-D	CP	LD	49	46.853028	-102.17769	89.44
11	KNDX-LD	LIC	LD	38	46.918889	-102.72972	92.21
12	K22KG-D	CP	LD	22	46.894333	-103.12363	97.42
13	K31LR-D	CP	LD	31	46.894333	-103.12363	97.42
14	K46MQ-D	CP	LD	46	46.894333	-103.12363	97.42
15	KQCD-TV	LIC	DT	7	46.948056	-102.99027	99.65
16	KPSD-TV	LIC	DT	13	45.053889	-102.26305	113.00
17	K29KA-D	CP	LD	29	46.788250	-101.40777	118.09
18	K36LL-D	CP	LD	36	46.788250	-101.40777	118.09
19	K42KI-D	CP	LD	42	46.788250	-101.40777	118.09
20	K47NG-D	CP	LD	47	46.788250	-101.40777	118.09
21	K04IH-D	LIC	LD	4	46.312500	-104.20694	123.51
22	K27LT-D	LIC	LD	27	46.312500	-104.20694	123.51
23	K08IP-D	LIC	LD	8	46.275000	-104.22500	124.13
24	K13OW-D	LIC	LD	13	46.275000	-104.22500	124.13
25	K16JP-D	CP	LD	16	46.877167	-103.84038	127.58
26	K25MC-D	CP	LD	25	46.877167	-103.84038	127.58
27	K34LU-D	CP	LD	34	46.877167	-103.84038	127.58
28	K48MZ-D	CP	LD	48	46.877167	-103.84038	127.58

<sup>3</sup> Definitions of service and status codes :

TV – Analog television broadcast station

DT – Digital television broadcast station

DS – Digital special temporary authority (STA)

LP – Low power analog television broadcast station

LD – Low power digital television broadcast station

CA – Class A analog television broadcast station

DC – Class A digital television broadcast station

TX – Translator station

LIC – Licensed and operational station

CP – Construction permit granted

CP MOD – Modification of construction permit

APP – Application for construction permit, not yet operational

STA – Special transmit authorization, usually granted by FCC for temporary operation



ID	Call Sign	Status	Service <sup>3</sup>	Channel	Latitude (NAD27)	Longitude (NAD27)	Distance to Nearest Turbine (km)
29	DK07EZ	LIC	TX	7	47.236389	-101.77916	140.56
30	DK09EZ	LIC	TX	9	47.236389	-101.77916	140.56
31	KBMY	LIC	DT	17	46.587500	-100.80555	145.99
32	KXMB-TV	LIC	DT	12	46.589722	-100.80555	146.08
33	KBME-TV	LIC	DT	22	46.589722	-100.80055	146.44
34	KFYR-TV	LIC	DT	31	46.605556	-100.80611	146.71
35	KNDX	LIC	DT	26	46.589722	-100.79416	146.89
36	K03HD-D	LIC	LD	3	46.334722	-104.51250	147.09
37	K09IV-D	LIC	LD	9	46.334722	-104.51250	147.09
38	K13WT-D	LIC	LD	13	46.334722	-104.51250	147.09
39	K17OB-D	LIC	LD	17	46.334722	-104.51250	147.09
40	K24DD-D	LIC	LD	24	46.334722	-104.51250	147.09
41	K07EQ-D	LIC	LD	7	45.901250	-104.54991	149.23
42	K09BE-D	LIC	LD	9	45.901250	-104.54991	149.23
43	K13LN-D	LIC	LD	13	45.901250	-104.54991	149.23
44	K23DJ-D	LIC	LD	23	45.901389	-104.55000	149.23

Table A: Off-Air TV Stations within 150 Kilometers of Project Area