

# **Appendix E**

## **Telecommunications Reports**

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# Wind Power GeoPlanner™

## Communication Tower Study

Rose Creek Wind



Prepared on Behalf of  
Rose Creek Wind, LLC

February 16, 2021



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## **1. Introduction**

This Communication Tower Study was performed for the Rose Creek Wind project in Mower County, Minnesota to identify the tower structures as well as FCC-licensed communication antennas that exist in 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<sup>1</sup> 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.

One tower structure and ten communication antennas were identified within the Rose Creek Wind project area using the data sources described in our methodology above. The structure found was registered with the FCC, which contains five of the ten 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<sup>2</sup>.

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

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<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 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).

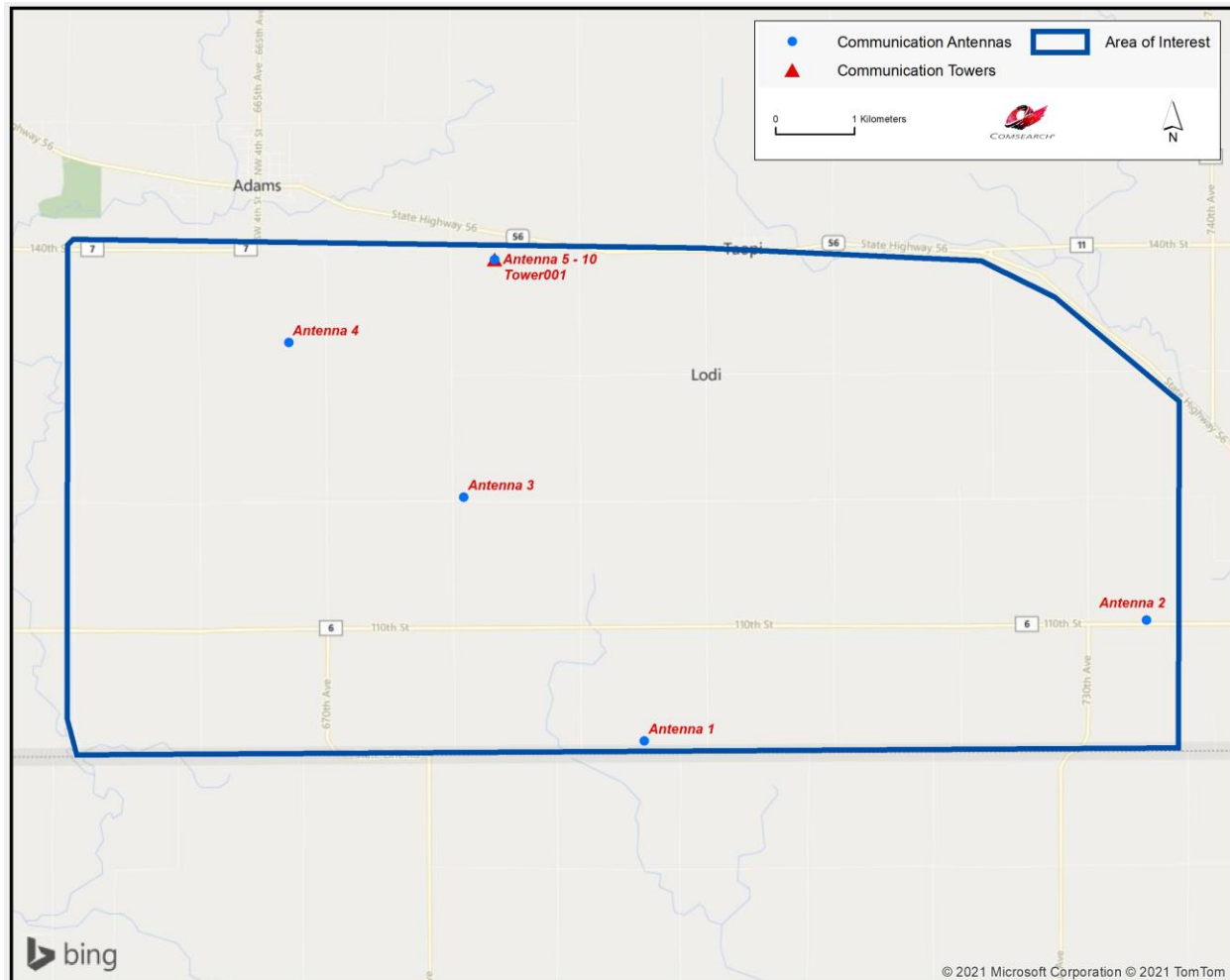
<sup>2</sup> Please note that this report analyzes all known operators on the towers from data sources available to Comsearch. Unidentified operators may exist on the towers due to unlicensed or federal government systems, mobile phone operators with proprietary locations, erroneous data on the FCC license,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

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
Tower001	1221624	Dairyland Power Cooperative	79.2	43.556917	-92.682139

*Table 1: Summary of Tower Structures*

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
1		WPCQ731	Land Mobile	SCHAEFER, MARK	37.0	43.501639	-92.658806
2		WNIV229	Land Mobile	ROE, RUSSELL:ROE, MILO:ROE, RICK:ROE, BRIAN DBA ROE FARMS	23.0	43.515250	-92.579611
3		WNVR429	Land Mobile	FASBENDER, DON:FASBENDER, MARK DBA FASBENDER FARMS	17.0	43.529694	-92.687139
4		WNLJ839	Land Mobile	MR SAM COMMUNICATIONS	46.0	43.547472	-92.714639
5	Tower001	WEG335	Microwave	Interstate Power and Light Company	57 - 77.72	43.556917	-92.682139
6	Tower001	WQKD951	Microwave	Dairyland Power Cooperative	45.7/48.8	43.556917	-92.682139
7	Tower001	WQVQ480	Microwave	INTERSTATE POWER AND LIGHT COMPANY	6.1	43.556917	-92.682139
8	Tower001	WPBI318	Land Mobile	Interstate Power and Light Company	79.0	43.556917	-92.682139
9	Tower001	WQVQ480	Microwave	INTERSTATE POWER AND LIGHT COMPANY	73.5	43.556917	-92.682139
10	Tower001	KNNS253	Land Mobile	DAIRYLAND POWER COOPERATIVE	59.0	43.556917	-92.682139

*Table 2: Summary of Communication Antennas*



*Figure 1: Communication Towers and Antennas within 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 360°, 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 one tower structure and ten communication antennas within the project area. They are used for microwave and land mobile services in the area.





## **5. Contact Us**

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

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	<a href="mailto:dmeyer@comsearch.com">dmeyer@comsearch.com</a>
Web site:	<a href="http://www.comsearch.com">www.comsearch.com</a>

# Wind Power GeoPlanner™

## Microwave Study

Rose Creek Wind, LLC



Prepared on Behalf of  
Rose Creek Wind, LLC

February 16, 2021





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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:** Rose Creek Wind, LLC

**County:** Mower

**State:** Minnesota

**Number of Turbines:** TBD

**Blade Diameter:** 140 meters

**Hub Height:** 134 meters

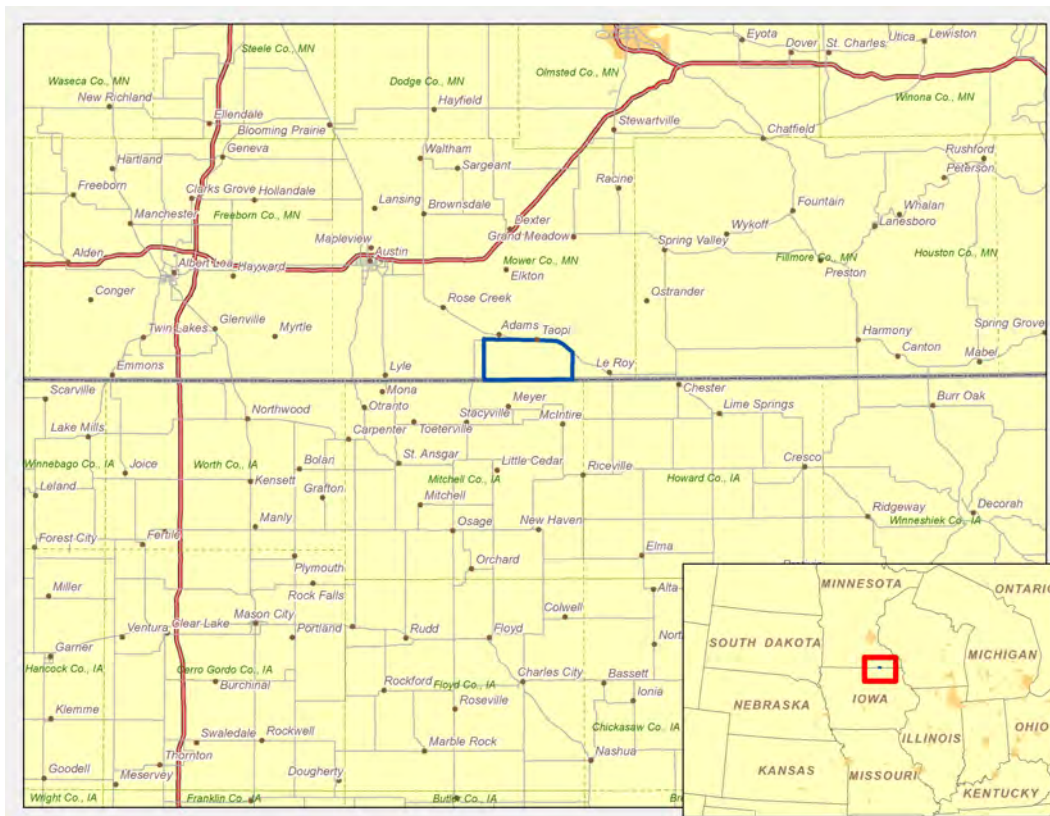


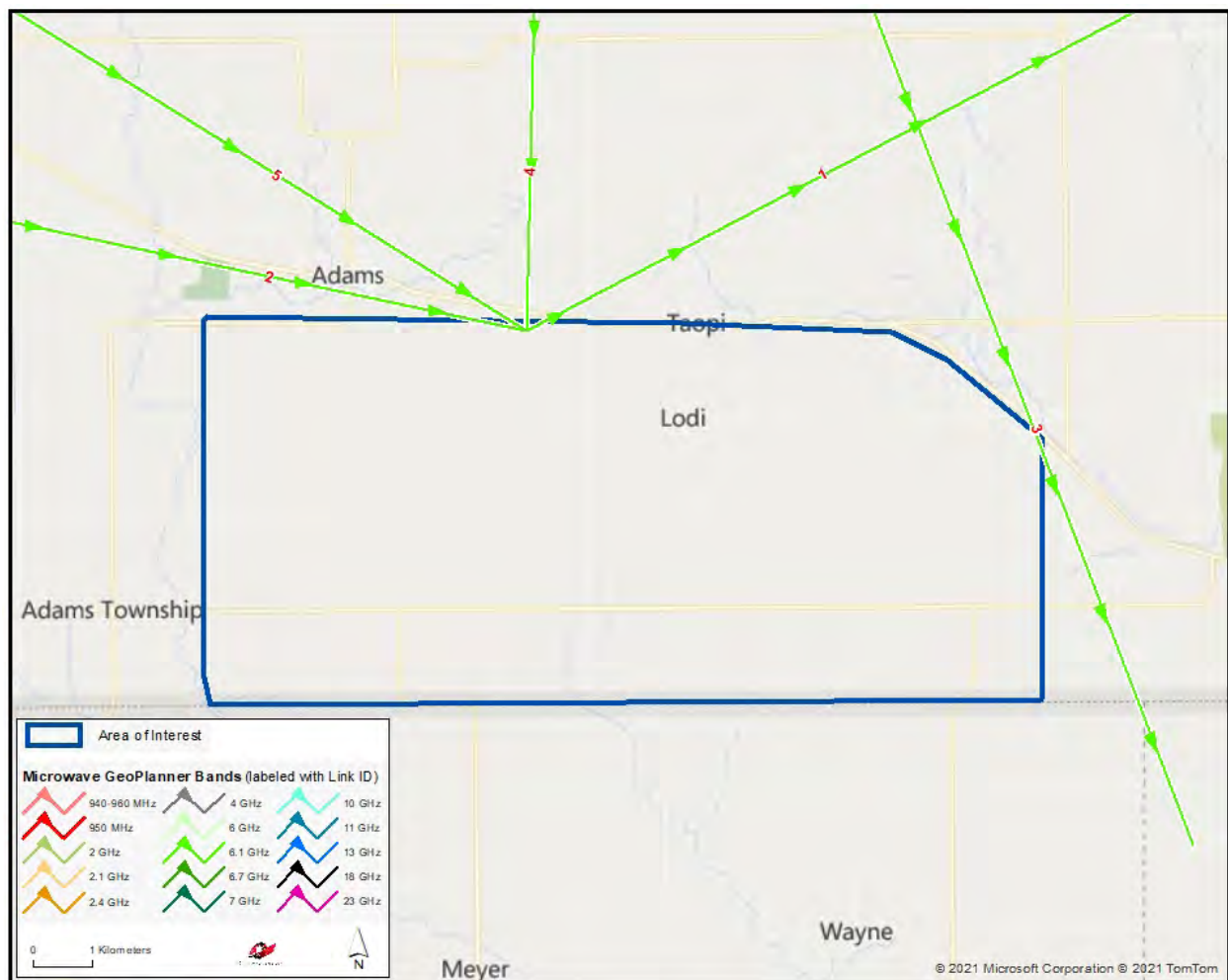
Figure 1: Area of Interest



### 3. 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<sup>1</sup>. First, we determined all microwave paths that intersect the area of interest<sup>2</sup> 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**

<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.

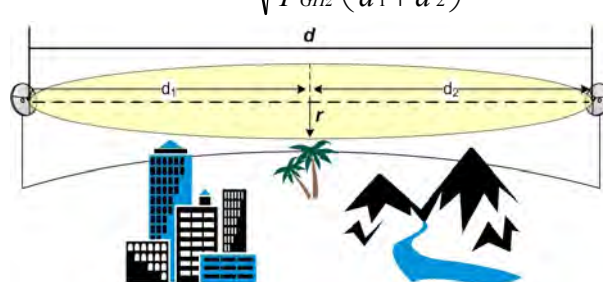
<sup>2</sup> We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Licensed	WEG335	WEG334	6.1 GHz	29.74	Richard Grace
2	Licensed	WEG336	WEG335	6.1 GHz	48.42	Richard Grace
3	Licensed	WPRR543	WPRR544	6.1 GHz	30.23	Kerry Groetsch
4	Licensed	WPRR543	WQKD951	6.1 GHz	19.55	Kerry Groetsch
5	Licensed	WQRX918	WQKD951	6.1 GHz	29.57	Kerry Groetsch

**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)

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

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


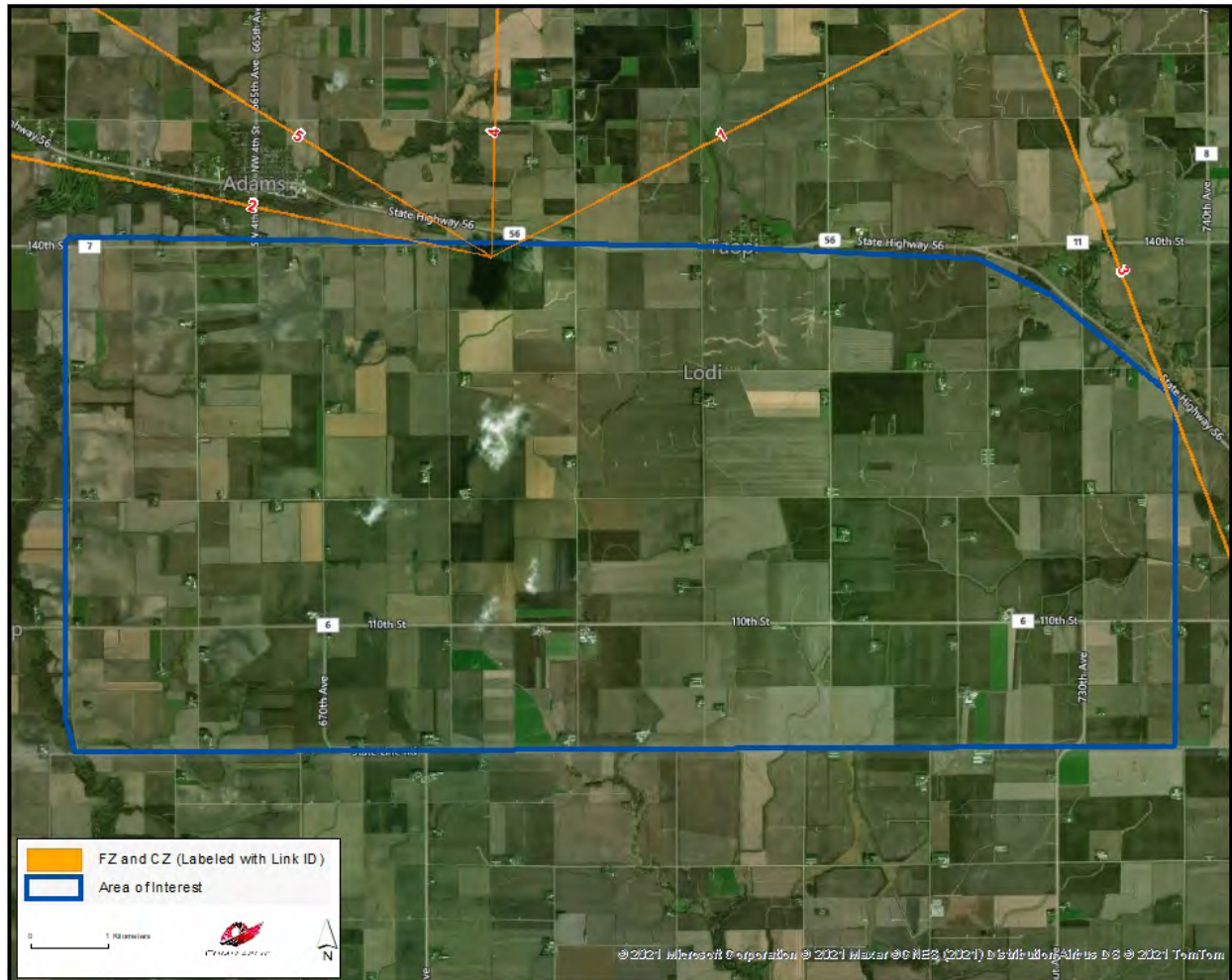
Where,

- r = Fresnel Zone radius at a specific point in the microwave path, meters
- n = Fresnel Zone number, 1
- $F_{\text{GHz}}$  = 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

The calculated Fresnel Zone shows the narrow area of signal swath and is calculated for each microwave path in the project area. In general, this is the area where the planned wind turbines should be avoided, if possible. Likewise, Comsearch recommends that an area directly in front of each microwave antenna should be avoided. This corresponds to the Consultation Zone which measures 1 kilometer along the main beam of the antenna and 24 ft (7.3 meters) wide. A depiction of the individual Fresnel and Consultation Zones is shown in Figure 3, and is also included in the shapefiles<sup>3,4</sup>.

<sup>3</sup> The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 15 projected coordinate system.

<sup>4</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).



*Figure 3: Fresnel and Consultation Zones in the Area of Interest*

## Discussion of Potential Obstructions

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting Fresnel Zones
5	N/A	N/A	N/A

For this project, turbine locations were not provided; thus we could not determine if any potential obstructions exist between the planned wind turbines and the incumbent microwave paths. If the latitude and longitude values for turbine locations are provided, Comsearch can identify where a potential conflict might exist.

## 4. Conclusion

Our study identified five microwave paths intersecting the Rose Creek Wind Project area. The Fresnel and Consultation Zones for these microwave paths were calculated and mapped. We recommend that all turbines be sited in locations that will not encroach on these exclusion zones.

## 5. Contact

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

Contact person: David Meyer  
Title: Senior Manager  
Company: Comsearch  
Address: 19700 Janelia Farm Blvd., Ashburn, VA 20147  
Telephone: 703-726-5656  
Fax: 703-726-5595  
Email: [dmeyer@comsearch.com](mailto:dmeyer@comsearch.com)  
Web site: [www.comsearch.com](http://www.comsearch.com)



# Wind Power GeoPlanner™

## AM and FM Radio Report

Rose Creek Wind, LLC



Prepared on Behalf of  
Rose Creek Wind, LLC

February 18, 2021





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## 1. Introduction

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Rose Creek Wind project in Mower County, Minnesota.

## 2. Summary of Results

### AM Radio Analysis

Comsearch found four database records<sup>1</sup> for AM stations within approximately 30 kilometers of the project, as shown in Table 1 and Figure 1. These records represent two stations, KAUS and KQAQ. KAUS, which broadcasts out of Austin, Minnesota, to the northwest of the project area of interest (AOI) is the closest station at a distance of 20.71 km.

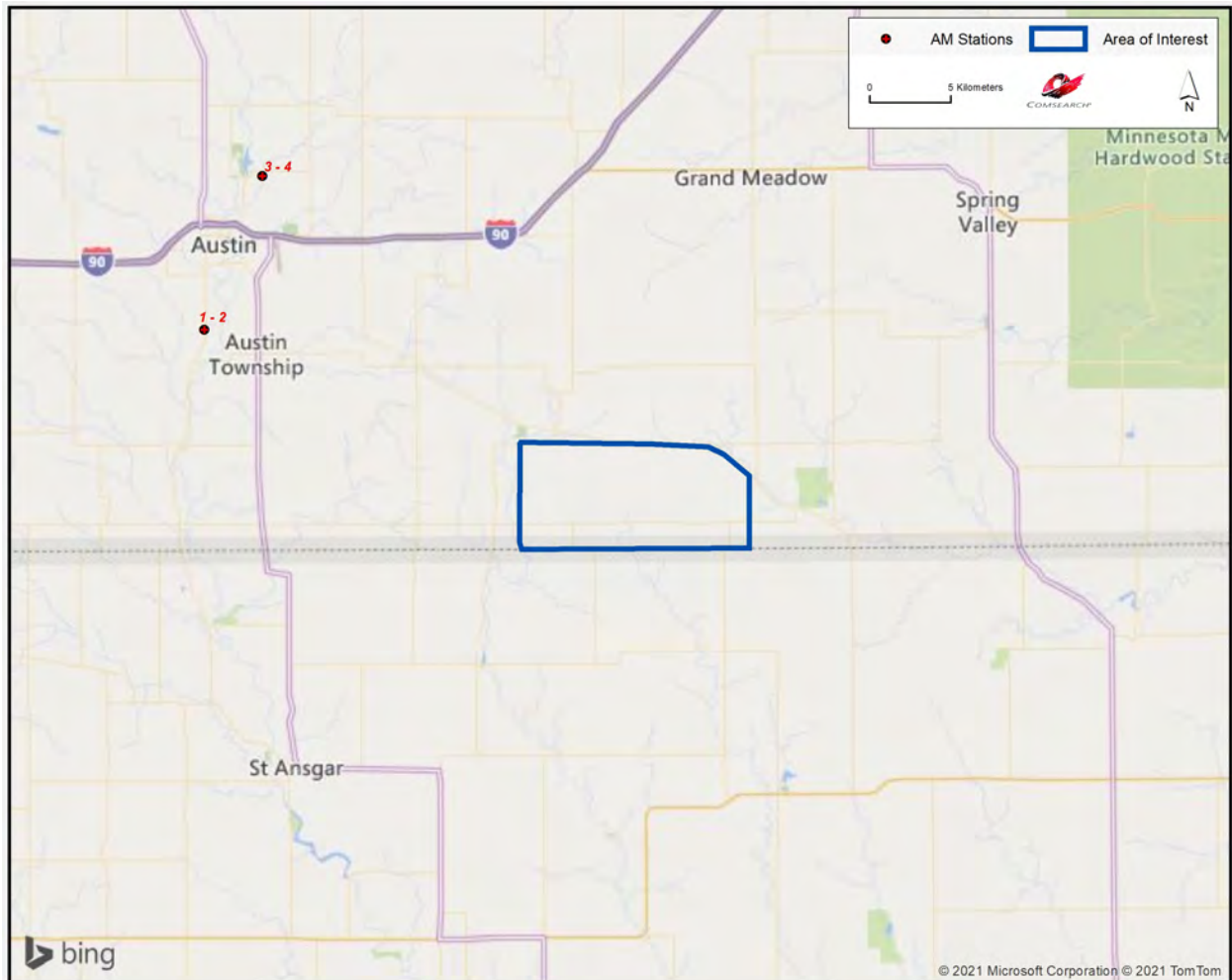
ID	Call Sign	Status <sup>2</sup>	Frequency (kHz)	Transmit ERP <sup>3</sup> (kW)	Operation Time	Latitude (NAD 83)	Longitude (NAD 83)	Distance to AOI (km)
1	KAUS	LIC	1480	1.0	Daytime	43.622185	-92.990749	20.71
2	KAUS	LIC	1480	1.0	Nighttime	43.622185	-92.990749	20.71
3	KQAQ	LIC	970	5.0	Daytime	43.707463	-92.946024	22.89
4	KQAQ	LIC	970	0.5	Nighttime	43.707463	-92.946024	22.89

*Table 1: AM Radio Stations within 30 Kilometers of Project Area*

<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 AM/FM 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).

<sup>2</sup> LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

<sup>3</sup> ERP = Transmit Effective Radiated Power.



*Figure 1: AM Radio Stations within 30 Kilometers of Project Area*

## FM Radio Analysis

Comsearch determined that there were ten database records for FM stations within a 30-kilometer radius of the Rose Creek Wind project, as shown in Table 2 and Figure 2. Nine of these stations are currently licensed and operating, three of which are translator stations that broadcast with limited range.

The closest FM station, KFNL-FM, is located 9.46 km to the north of the project AOI.

ID	Call Sign	Status <sup>4</sup>	Service <sup>5</sup>	Frequency (MHz)	Transmit ERP <sup>6</sup> (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to AOI (km)
1	KFNL-FM	LIC	FM	104.3	10.0	43.643306	-92.647389	9.46
2	KVCS	LIC	FM	89.1	12.0	43.642750	-92.526556	11.42
3	KROC-FM	LIC	FM	106.9	100.0	43.570806	-92.427111	12.36
4	KYBA	LIC	FM	105.3	50.0	43.673000	-92.698500	12.69
5	KJCY	LIC	FM	95.5	6.0	43.364417	-92.851306	17.24
6	K277AD	LIC	FX	103.3	0.1	43.670222	-92.977111	22.15
7	K280EF	LIC	FX	103.9	0.009	43.670222	-92.977111	22.15
8	KMSK	LIC	FM	91.3	0.135	43.677444	-93.001278	24.22
9	K232FY	CP	FX	94.3	0.25	43.788000	-92.908222	28.47
10	KSMA-FM	LIC	FM	98.7	25.0	43.364694	-93.048250	28.57

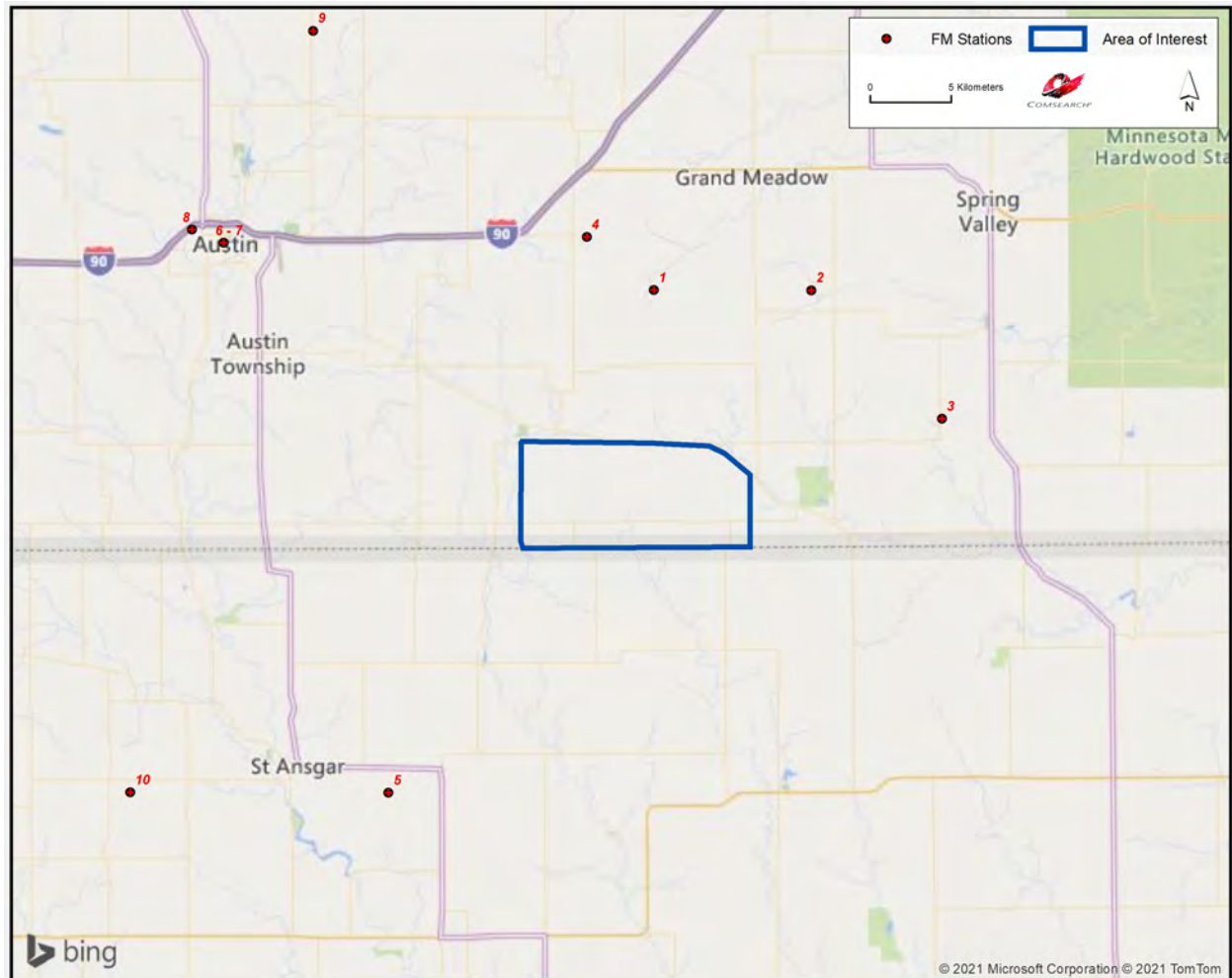
*Table 2: FM Radio Stations within 30 Kilometers of Project Area*

<sup>4</sup> LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

<sup>5</sup> FM = FM broadcast station; FX = FM translator station; FL = Low-power FM station; FS = FM auxiliary (backup) station; FB = FM booster station.

<sup>6</sup> ERP = Transmit Effective Radiated Power.





*Figure 2: FM Radio Stations within 30 Kilometers of Project Area*

### **3. Impact Assessment**

The exclusion distance for AM broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the lesser of 10 wavelengths or 3 kilometers. For non-directional antennas, the exclusion distance is simply equal to 1 wavelength. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from wind turbine towers. The closest AM station (KAUS) is located 20.71 km from the project. As there were no stations found within 3 kilometers of the project, which is the maximum possible exclusion distance based on a directional AM antenna broadcasting at 1000 KHz or less, the project should not impact the coverage of local AM stations.

The coverage of FM stations is generally not sensitive to interference due to wind turbines, especially when large objects (e.g., wind turbines) are located in the far field region of the radiating antenna to avoid the risk of distorting its radiation pattern. Station KFNL-FM would be the nearest FM station to the project area at 9.46 km away. At this distance there should be adequate separation to avoid radiation pattern distortion.

### **4. Recommendations**

Since no impact on the licensed and operational AM or FM broadcast stations was identified in our analysis, no recommendations or mitigation techniques are required for this project.

### **5. Contact**

For questions or information regarding the AM and FM Radio Report, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	<a href="mailto:dmeyer@comsearch.com">dmeyer@comsearch.com</a>
Web site:	<a href="http://www.comsearch.com">www.comsearch.com</a>

# Wind Power GeoPlanner™

## Land Mobile & Emergency Services Report

Rose Creek Wind, LLC



Prepared on Behalf of  
Rose Creek Wind

February 16, 2021



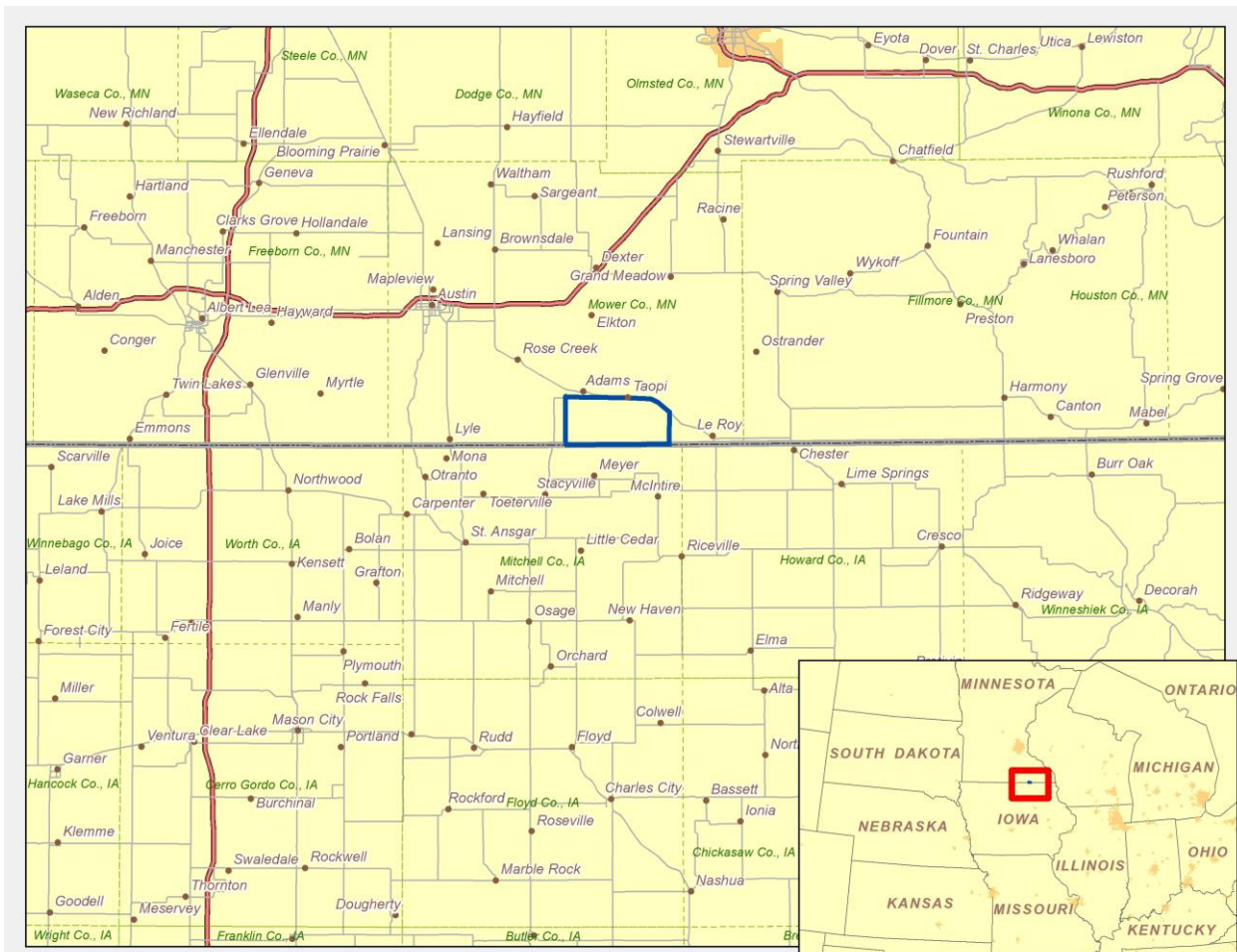


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## 1. Introduction

An assessment of the emergency services in the Rose Creek 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 Mower County, Minnesota, appears below in Figure 1.



**Figure 1: Area of Interest (AOI)**

## 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.

### 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.

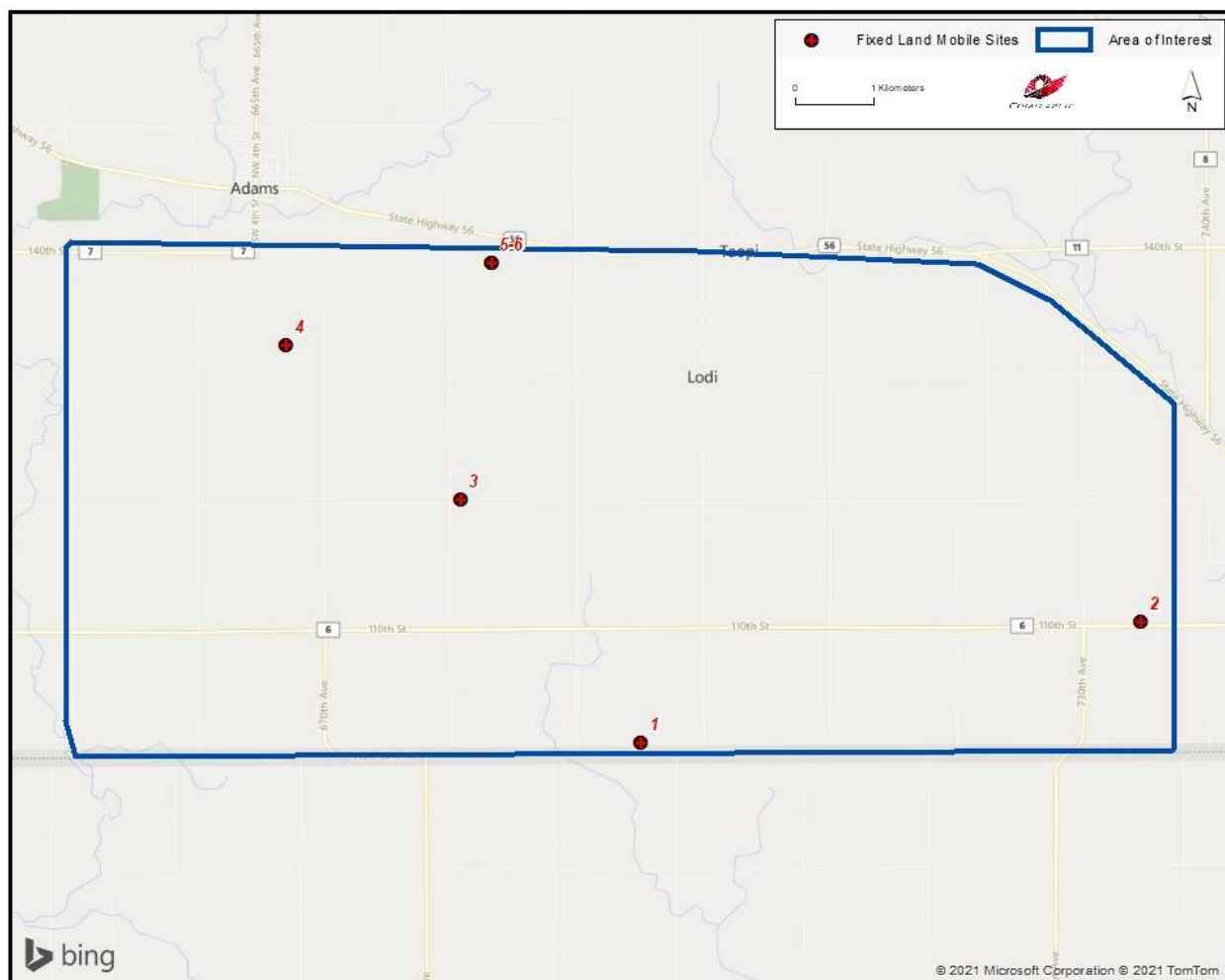


Figure 2: Land Mobile & Emergency Service Sites in Area of Interest

Figure 2 identifies six site-based licenses in the Rose Creek Wind 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)
1	WPCQ731	450-470	SCHAEFER, MARK	37	43.501639	-92.658806
2	WNIV229	450-470	ROE, RUSSELL:ROE, MILO:ROE, RICK:ROE, BRIAN DBA ROE FARMS	23	43.515250	-92.579611
3	WNV429	450-470	FASBENDER, DON:FASBENDER, MARK DBA FASBENDER FARMS	17	43.529694	-92.687139
4	WNLJ839	450-470	MR SAM COMMUNICATIONS	46	43.547472	-92.714639
5	KNNS253	450-470	DAIRYLAND POWER COOPERATIVE	59	43.556917	-92.682139
6	WPBI318	800/900	Interstate Power and Light Company	79	43.556917	-92.682139

**Table 1: Land Mobile & Emergency Service Sites in 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)

## **Mobile Licenses**

In addition to the fixed-site licenses above, 452 mobile licenses defined by center point and radius were found to intersect the Rose Creek Wind project area. Appendix A contains a tabular summary of these stations.

## **Area-Wide Licenses**

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

### **James Mohn**

*Chairperson, Public Safety Region #22*

Office of Statewide Radio Communications, Minnesota Department of Transportation  
1500 W CR B2, Roseville, MN 55113

Phone: 651-234-7969

Email: [james.mohn@state.mn.us](mailto: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, thirteen licenses were found for the State of Minnesota and one for the County of Mower (see Table 2 on next page). 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
2	CART INC	Statewide: Minnesota	150-174
3	City of Minneapolis, MN	Statewide: Minnesota	2450-2500
4	GREATER NORTHWEST EMERGENCY MEDICAL SERVICES	Statewide: Minnesota	450-470
5	HENNEPIN, COUNTY OF	Statewide: Minnesota	25-50, 150-174, 406-413, 450-470, 800/900
6	Minnesota Canine Search Rescue and Tracking	Statewide: Minnesota	150-174
7	MINNESOTA DEPARTMENT OF PUBLIC SAFETY	Statewide: Minnesota	150-174
8	MINNESOTA, STATE OF	Statewide: Minnesota	0-10, 150-174, 450-470, 769-775/799-805, 769-775/799-805, 800/900, 2450-2500, 4940-4990
9	MOWER, COUNTY OF	Countywide: Mower	150-174
10	NATIONAL SKI PATROL SYSTEM INC	Statewide: Minnesota	150-174
11	Nevada Division of Forestry	Statewide: Minnesota	150-174
12	NORTHSTAR SEARCH AND RESCUE	Statewide: Minnesota	150-174
13	ROCHESTER CITY OF	Statewide: Minnesota	150-174
14	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 Mower County, Minnesota, in Table 3.

Mobile Phone Carrier	Service <sup>2</sup>
AT&T	700 MHz, AWS, PCS, WCS
Blue Ridge Wireless II	AWS
Bug Tussel Wireless	AWS
DISH Network	700 MHz, AWS
Orion Wireless	AWS
Sprint	PCS
Standing Rock Telecommunications	PCS
T-Mobile	AWS, PCS
US Cellular	700 MHz
Verizon	700 MHz, AWS, Cellular, PCS

**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 Rose Creek 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 with regard to the

<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  
WCS: Wireless Communications Service at 2.3 GHz  
700 MHz: Lower 700 MHz Service

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:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	dmeyer@comsearch.com
Web site:	www.comsearch.com



## Appendix A

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
1	WNAK990	450-470	2-WAY RADIO OF MINNESOTA INC	64	43.791056	-93.440222
2	WPBU497	450-470	A & K FEED AND GRAIN CO INC	64	43.440250	-92.284889
3	WQNP927	450-470	ABSOLUTE ENERGY	32	43.496944	-92.954722
4	WQYJ371	450-470	ABSOLUTE ENERGY LLC	32	43.497806	-92.954361
5	WQNV897	450-470	ADAMS HEALTH CARE CENTER	5	43.566389	-92.727500
6	WNFA507	150-174	ADAMS, CITY OF	32	43.568139	-92.718361
7	WQUX493	450-470	AG POWER ENTERPRISES	32	43.287250	-92.821778
8	WQUX493	450-470	AG POWER ENTERPRISES	32	43.505083	-92.944722
9	WQXR597	450-470	AG POWER ENTERPRISES	32	43.299722	-92.592306
10	WNSV528	450-470	AGRIMSON, ARNE	121	43.854139	-91.908500
11	WQRX968	450-470	AKKERMAN FARMS	32	43.716694	-92.870806
12	WPJU667	450-470	Allnet Wireless LLC	121	43.983306	-92.208222
13	WPDU983	800/900	Alpha Wireless Communications	113	43.666944	-94.122222
14	WNVS439	450-470	ALPHA WIRELESS COMMUNICATIONS CO.	121	44.148583	-93.979389
15	WNLY834	450-470	American National Red Cross	121	43.811639	-91.187639
16	WQEI908	450-470	AMERICAN TIME & SIGNAL CO.	20	43.662389	-92.949194
17	WQEI908	450-470	AMERICAN TIME & SIGNAL CO.	20	43.666250	-92.945472
18	WQVN419	450-470	AMERICAN TIME & SIGNAL CO.	20	43.513250	-92.510028
19	WQVN419	450-470	AMERICAN TIME & SIGNAL CO.	20	43.708944	-92.562139
20	WRDL268	450-470	AMERICAN TIME & SIGNAL CO.	20	43.568639	-92.716833
21	WPQD717	450-470	Ancom Communications, Inc.	32	43.676389	-93.003611
22	WQAM765	800/900	Ancom Communications, Inc.	113	44.044722	-92.400278
23	WQKF231	450-470	Ancom Communications, Inc.	32	43.361944	-92.548333
24	WQTT427	450-470	Ancom Communications, Inc.	32	43.613139	-92.430556

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
25	WQUZ350	450-470	Ancom Communications, Inc.	32	43.720194	-92.704639
26	WRBL370	450-470	Angell, Gary	32	43.677694	-92.724167
27	WQBK882	150-174	Arens Heating and Cooling	40	43.666639	-92.971306
28	WQGB846	450-470	AUSTIN INDEPENDENT SCHOOL DISTRICT #492	32	43.662556	-92.949583
29	WQGB846	450-470	AUSTIN INDEPENDENT SCHOOL DISTRICT #492	25	43.668333	-92.978333
30	WQGB846	450-470	AUSTIN INDEPENDENT SCHOOL DISTRICT #492	25	43.668611	-92.978333
31	WQAU830	150-174	AUSTIN MEDICAL CENTER	40	43.674417	-92.977972
32	WRJQ424	450-470	AUSTIN UTILITIES	24	43.692750	-92.952222
33	KJZ653	150-174	AUSTIN, CITY OF	40	43.697750	-92.963528
34	WQAW860	150-174	AUSTIN, CITY OF	40	43.666639	-92.966861
35	WQCR764	150-174	AUSTIN, CITY OF	32	43.670417	-92.969389
36	WQGX781	150-174	AUSTIN, CITY OF	40	43.666639	-92.972417
37	WQWR291	450-470	Autumn Ridge Church	80	44.005528	-92.518972
38	WNGG479	450-470	AVERA MC KENNAN HOSPITAL	322	43.530528	-96.713667
39	WPAU761	450-470	BAGLEY, JAMES	56	43.719417	-93.215472
40	WPWJ805	450-470	Baudoin Oil Co Inc	30	43.706639	-92.589056
41	WPPV679	150-174	BBRH INC.	100	44.291083	-93.294111
42	WRCN231	450-470	BEHR, RONALD	159	43.026306	-93.330222
43	WQNE408	450-470	BIO APPLICATION LLC	32	43.436944	-92.593333
44	WQXY414	800/900	BLACK HAWK COUNTY E911	113	42.513333	-92.474722
45	WQXY414	800/900	BLACK HAWK COUNTY E911	113	42.567167	-92.169972
46	WQYR334	800/900	BLACK HAWK COUNTY E911	113	42.513333	-92.474722
47	WQYR334	800/900	BLACK HAWK COUNTY E911	113	42.567167	-92.169972
48	WPOZ203	150-174	BLUMENTHAL LANSING COMPANY	121	43.360250	-91.244583
49	KNET617	25-50	BMC AGGREGATES LLC	72	43.256333	-93.420750

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
50	WQOE288	450-470	Bodensteiner Implement Co	32	43.375333	-92.297000
51	WPQH731	450-470	BOE, WILLIAM D	32	43.561083	-92.630167
52	WQOM569	450-470	BOYSEN FARMS	32	43.821778	-92.877472
53	KNGM712	450-470	BRANSTAD MONROE	80	43.167750	-93.618556
54	WQYD785	450-470	BROADWATER, BEN	48	43.558333	-92.231083
55	WPNW319	450-470	BROADWATER, GARY	32	43.595528	-92.263222
56	WQPJ611	150-174	BRONNER, BRENT	40	43.479472	-92.155556
57	WQNS579	150-174	BROWNSDALE FIRE DEPARTMENT	40	43.741083	-92.870611
58	WQYD339	150-174	BUNNE, DOMINICK	40	43.536611	-92.510139
59	WQSG203	800/900	CARBAJAL, RUDOLPH J	113	44.006722	-92.718611
60	WQRZ612	450-470	CARMAN, MARK	32	43.656139	-92.513972
61	WQYM200	450-470	Carpenter Farms	32	43.655972	-92.690639
62	WNRZ775	450-470	CASSMANN, DENNIS	80	42.859972	-92.926028
63	WQWM718	450-470	Century Farms	40	43.620444	-92.708194
64	WRJQ306	450-470	CHAMBERS, ANDY	64	43.083056	-92.484444
65	WNAW956	450-470	CHARLSON EXCAVATING INC	80	43.132472	-93.216583
66	WQJA679	150-174	CHICAGO, CENTRAL & PACIFIC RAILROAD COMPANY	40	43.284444	-92.819028
67	WQNX764	150-174	Christiansen, Dwayne	50	43.260278	-93.042722
68	WQPH293	150-174	CLARK, TOM L	32	43.271917	-92.713806
69	WNUJ643	150-174	CLAUSSEN, DAVID	48	43.530500	-93.343250
70	KDG651	450-470	Clement, Tracy	20	43.642778	-92.526667
71	KDG651	450-470	Clement, Tracy	32	43.642833	-92.526472
72	WRFK548	450-470	COLE EXCAVATING, LLC	80	42.896389	-92.801111
73	WNQG647	450-470	Cole Farms	121	43.269972	-93.041583
74	WPTW664	150-174	COLOFF MEDIA, LLC	70	43.148583	-93.147139

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
75	WPYH510	450-470	COLOFF MEDIA, LLC	60	43.167778	-93.101389
76	WQXE387	150-174	CRANE CREEK ELECTRIC	32	43.394778	-92.632472
77	WQEM658	450-470	Croell Redi-Mix, Inc	32	43.249028	-92.420667
78	WQEM658	450-470	Croell Redi-Mix, Inc	32	43.283861	-92.717694
79	WPNZ226	150-174	Croell Redi-Mix, Inc.	40	43.509694	-92.501833
80	WPNZ226	150-174	Croell Redi-Mix, Inc.	40	43.669972	-92.386556
81	WNSR429	450-470	CUSTOM COMMUNICATIONS INC	80	44.008306	-92.471000
82	WQHK257	450-470	CUSTOM COMMUNICATIONS, INC.	80	44.001139	-92.487972
83	KNFG989	150-174	D&H STARK FARMS LTD	56	43.370528	-92.456556
84	KNAQ813	150-174	DAHL, DENNIS	64	43.314389	-93.272417
85	WQSY894	450-470	Dahl, Thomas	56	43.712500	-93.248333
86	WPBF383	450-470	DAHLBY, DALE	56	43.477444	-93.221028
87	KOK429	450-470	DAIRYLAND POWER COOPERATIVE	116	43.556917	-92.682139
88	WRBV480	450-470	DAIRYLAND POWER COOPERATIVE	32	43.379444	-92.912083
89	WRBV603	450-470	DAIRYLAND POWER COOPERATIVE	32	43.680000	-92.355083
90	WRBV603	450-470	DAIRYLAND POWER COOPERATIVE	32	43.732778	-92.675556
91	WPMF559	150-174	Dakota Minnesota & Eastern Railroad Corporation	30	43.668306	-92.960194
92	WQNS915	800/900	DAKOTA, COUNTY OF	241	44.714833	-93.124778
93	WQRM434	450-470	DAMEL CORPORATION INC	32	43.701611	-92.982167
94	WQNQ611	450-470	DAVIDSON, MARK	32	43.419444	-93.118889
95	KNGL791	450-470	DAVIS, JIM	32	43.736361	-92.629333
96	KNIF242	450-470	DAVISON, BRUCE:DAVISON, JACK DBA DAVISON FARMS	64	43.184139	-93.046028
97	WNPF547	800/900	DEERE AND COMPANY	113	42.506861	-92.366750
98	WQLJ962	450-470	DIAMOND FARMS INC.	32	43.691750	-92.867361
99	WQTW474	150-174	Diedrich, Brandon	40	43.340500	-93.161750

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
100	WQTW474	150-174	Diedrich, Brandon	40	43.340750	-93.161806
101	KNIG840	450-470	DOUGAN, SUE	32	43.667306	-92.509000
102	WRFS985	450-470	EDF Renewables Services, Inc.	32	43.772694	-92.680694
103	WRFY258	450-470	EDF Renewables Services, Inc.	32	43.385361	-92.495667
104	WNVB930	450-470	Eickhoff, Jeff N	40	43.681917	-92.254056
105	WNGX885	800/900	ELECTRONIC ENGINEERING COMPANY	113	43.120833	-93.193611
106	WNJA778	450-470	ELECTRONIC ENGINEERING COMPANY	64	43.467167	-93.465222
107	WNVV722	450-470	ELECTRONIC ENGINEERING COMPANY	48	43.279139	-92.821028
108	WNGC334	800/900	Electronic Specialties, Inc	112	43.102194	-93.597722
109	KNHH478	800/900	Electronic Specialties, Inc.	113	43.357444	-93.308250
110	WNVP259	800/900	Electronic Specialties, Inc.	113	42.862222	-93.610833
111	WNWK644	450-470	Electronic Specialties, Inc.	80	43.365250	-93.133806
112	WPEN706	450-470	Electronic Specialties, Inc.	97	43.423278	-93.533556
113	WPGZ256	450-470	Electronic Specialties, Inc.	80	43.118583	-93.239639
114	WPHS663	450-470	Electronic Specialties, Inc.	90	42.895806	-93.205750
115	WRCB432	150-174	Ellingson Trenchless LLC	80	44.138417	-92.900417
116	WNYD991	450-470	ELOR INC	64	43.120806	-93.193528
117	WPCT872	450-470	ENABNIT, KENDALL	64	42.954417	-92.927694
118	WQPY464	72-76, 150-174, 450-470, 470-512	ENTERCOM LICENSE, LLC	200	44.976472	-93.276139
119	WQJZ882	450-470	enXco	32	43.361944	-92.548333
120	WQJZ882	450-470	enXco	32	43.741889	-92.705361
121	WQPD808	450-470	FARMERS FEED AND GRAIN CO., INC.	32	43.359167	-92.550833
122	WQPD808	450-470	FARMERS FEED AND GRAIN CO., INC.	32	43.378611	-92.919167
123	WNJI930	450-470	FARMERS WIN COOPERATIVE	56	43.303306	-91.990444

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
124	WNVR429	450-470	FASBENDER, DON:FASBENDER, MARK DBA FASBENDER FARMS	40	43.529694	-92.687139
125	WZC677	150-174	FILLMORE, COUNTY OF	48	43.681083	-92.091278
126	WPEU410	450-470	FINSETH FAMILY FARMS	56	43.762472	-92.097944
127	KNHX289	150-174	FIRST STUDENT INC	56	44.024444	-92.545000
128	WQRP979	150-174	FIVE STAR CO-OP	70	43.071389	-92.317778
129	KFT537	150-174	FLOYD, COUNTY	56	43.044417	-92.666278
130	WQUS500	450-470	Flying S Farm	40	43.851028	-92.866611
131	WQTY287	450-470	FOWLER CORPORATION	32	43.714611	-92.378139
132	WNBX364	450-470	FOX, JOHN A	64	43.010806	-92.625750
133	WQSE517	150-174	FOX, KARL	40	43.269722	-92.583611
134	WQLV443	450-470	FPL Energy Mower County, LLC	32	43.616722	-92.598833
135	WNBY880	450-470	FRANKS, G RONALD	80	43.226333	-93.382972
136	WQJ750	450-470	FRASCHT, ANDREW	64	42.966083	-92.865194
137	WRC284	150-174	FREDRICKSON, KENNETH	32	43.372194	-93.081583
138	KNBG837	450-470	FREEBORN MOWER COOPERATIVE SERVICES	56	43.640806	-93.147694
139	WNFS292	150-174	FRITCHER, DAVID	64	43.409972	-92.377111
140	WQSD395	150-174	FRITCHER, RUSSELL A	40	43.370028	-92.401667
141	WQWY717	150-174	G & J PRAIRIE FARM INC	32	43.487361	-93.054972
142	WNRK620	450-470	GEBHARDT, MICHAEL:GEBHARDT, ROBERT:GEBHARDT, JAMES DBA GEBHA	48	43.815806	-92.868528
143	WRAX937	450-470	Gerlach, Larry	32	43.630056	-92.928694
144	KNBA595	25-50	GM CONTRACTING INC	161	44.114694	-94.211639
145	KNAR750	450-470	GOLDBECK TOWING SERVICE	129	43.865528	-91.321528
146	WRJI999	450-470	GOPLERUD, GREG	32	43.433194	-92.987167

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
147	WQVN549	450-470	Goslee, Larry	32	43.558056	-93.048056
148	WQSF996	800/900	GOUAUX, SUE M	113	44.006722	-92.718611
149	WNII614	450-470	GRAIN MILLERS INC	48	43.385056	-92.922417
150	WQGX590	150-174	GRAND MEADOW, CITY OF	24	43.702750	-92.574889
151	WPSF967	450-470	Great River Energy	32	43.802500	-92.683889
152	WNJZ902	150-174	GRISIM, CURT	48	43.848861	-92.487944
153	WPPD445	150-174	GUNDERSEN LUTHERAN MEDICAL CENTER	600	43.794417	-91.249583
154	WNNO413	450-470	HAARSTAD, ODEAN:HAARSTAD, ANDREW:HAARSTAD, KENNETH:HAARSTAD,	48	43.781083	-92.706861
155	WQNR476	450-470	HAARSTADS HOME IMPROVEMENTS LLC	80	43.676167	-92.869222
156	WQOC975	450-470	HAFNER FARMS	32	43.620556	-92.348611
157	WQWN580	450-470	Hahn, Brian	40	43.848972	-92.749750
158	WPEG465	150-174	HALVORSON, CURTIS	56	43.477194	-92.944083
159	WRFE865	450-470	HAM, JAMIE	80	43.242222	-92.865556
160	WRJT635	150-174	Hanegraaf Farms	40	43.623750	-92.896500
161	WPHM349	450-470	HARMONY AGRI SERVICES, INC.	80	43.554583	-92.002194
162	WNVR420	450-470	HARVEST STATES COOPERATIVES	32	43.661361	-92.709083
163	WQXG860	450-470	HAWBAKER, ERIC	48	43.261139	-92.299000
164	WQVH719	450-470	HAYES BROS., LLC	113	42.491083	-92.711500
165	WNGC397	800/900	HDH Leasing Inc.	113	44.524167	-92.576389
166	KKI491	450-470	Heartland Power Cooperative	32	43.379417	-92.911583
167	WPHB812	150-174	Helena Agri-Enterprises, LLC	48	43.282750	-92.791861
168	KNNF382	150-174	HEMANN, JOHN	39	43.451639	-92.797417
169	WQYF728	450-470	HEMANN, KURT	32	43.466667	-92.777500
170	WQTT782	450-470	Hemingway, Eric	97	44.412500	-92.594417



ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
171	WQPI707	150-174	HENDERSON, DAVE	30	43.653028	-92.389056
172	WQVM230	450-470	H-FARMS, INC.	32	43.685639	-92.688472
173	WQWZ877	150-174	HIGH PRAIRIE 2 WIND FARM, LLC DBA	32	43.496250	-92.579306
174	WSS343	450-470	Hilltop Communications, Inc	80	44.006083	-92.423778
175	WNYY719	450-470	Hilltop Communications, Inc.	80	44.006083	-92.423778
176	WPHD723	450-470	Hilltop Communications, Inc.	80	44.081639	-93.191333
177	WPIC271	450-470	Hilltop Communications, Inc.	121	44.303306	-93.240500
178	WPIE272	450-470	Hilltop Communications, Inc.	121	44.006083	-92.423778
179	WPIF622	450-470	Hilltop Communications, Inc.	121	44.236639	-92.558806
180	WPIF624	450-470	Hilltop Communications, Inc.	121	44.081639	-93.191333
181	WPIF625	450-470	Hilltop Communications, Inc.	121	44.303306	-93.240500
182	WPIF626	450-470	Hilltop Communications, Inc.	121	44.303306	-93.240500
183	WQVQ405	450-470	HILTON, BILL	32	43.685056	-92.687611
184	WRCQ820	450-470	HINDT FAMILY FARMS	32	43.674250	-92.395750
185	WQQ590	150-174	HINKLE, GREG	40	43.839139	-92.386833
186	KNJX373	150-174	HOUSE CHEVROLET COMPANY	48	43.850806	-92.488500
187	KAB264	150-174	HOWARD, COUNTY OF	40	43.367472	-92.405722
188	KDW967	150-174	HOWARD, COUNTY OF	40	43.367472	-92.405722
189	WQMN376	150-174	HOWARD, COUNTY OF	40	43.373194	-92.298278
190	WQNG447	150-174	HOWARD, COUNTY OF	40	43.370778	-92.298278
191	WRCQ237	150-174	Howe Farms	32	43.746750	-92.690139
192	WQNX367	150-174	HUISMAN, MICHAEL	35	43.340833	-92.849444
193	WQNR970	150-174, 450-470	HUISMAN, WILLIAM	80	42.866556	-93.073528
194	WQXR614	450-470	HUNT, JASON	80	43.993611	-92.448167
195	WQOJ599	450-470	HURST, ABE	32	43.392778	-92.613889



ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
196	WQRH271	450-470	INDEPENDENT SCHOOL DISTRICT 495	32	43.709056	-92.561778
197	WRCL625	150-174	INDEPENDENT SCHOOL DISTRICT 497	32	43.508806	-92.943194
198	WQRE385	450-470	INNOVATIVE AG SERVICES	32	43.248556	-92.438056
199	WPUF832	450-470	International Paper	32	43.681333	-92.964667
200	WQDV323	150-174	Interstate Power & and Light Company	290	42.686944	-91.826389
201	WQDV323	150-174	Interstate Power & and Light Company	290	43.557167	-93.661056
202	WQCT231	800/900	INTERSTATE POWER & LIGHT COMPANY	113	43.372028	-92.100194
203	WQMN422	800/900	Interstate Power & Light Company	113	42.629000	-93.232222
204	WQMN422	800/900	Interstate Power & Light Company	113	42.686778	-93.276250
205	WPBI315	800/900	Interstate Power and Light Company	113	42.686944	-91.826389
206	WPBI316	800/900	Interstate Power and Light Company	113	43.850278	-92.175278
207	WPBI317	800/900	Interstate Power and Light Company	113	42.849056	-92.415889
208	WPBI317	800/900	Interstate Power and Light Company	113	43.059722	-91.503333
209	WPBI317	800/900	Interstate Power and Light Company	113	43.315778	-91.788972
210	WPBI318	800/900	Interstate Power and Light Company	113	43.098028	-93.289889
211	WPBI318	800/900	Interstate Power and Light Company	113	43.188056	-92.358333
212	WPBI318	800/900	Interstate Power and Light Company	113	43.240667	-92.973639
213	WPBI318	800/900	Interstate Power and Light Company	113	43.556917	-92.682139
214	WPBI319	800/900	Interstate Power and Light Company	113	43.094167	-93.294167
215	WPBI319	800/900	Interstate Power and Light Company	113	43.557167	-93.661056
216	WPBI319	800/900	Interstate Power and Light Company	113	43.745306	-93.452639
217	WPXS635	800/900	Interstate Power and Light Company	113	42.980278	-93.608611
218	WPYY361	800/900	Interstate Power and Light Company	113	43.090222	-91.854833
219	WQAR953	800/900	Interstate Power and Light Company	113	43.315722	-91.438139
220	WQAR953	800/900	Interstate Power and Light Company	113	43.316500	-91.455000

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
221	WQBR912	800/900	Interstate Power and Light Company	113	43.120833	-93.193611
222	WQCS284	800/900	Interstate Power and Light Company	113	42.955833	-91.816111
223	WQSF998	800/900	Iota Spectrum Partners, LP	113	44.006722	-92.718611
224	WQSF999	800/900	Iota Spectrum Partners, LP	113	44.006722	-92.718611
225	WQSG202	800/900	Iota Spectrum Partners, LP	113	44.006722	-92.718611
226	WQTI695	800/900	Iota Spectrum Partners, LP	113	44.006722	-92.718611
227	WQTI696	800/900	Iota Spectrum Partners, LP	113	44.006722	-92.718611
228	WQTN282	800/900	Iota Spectrum Partners, LP	50	44.006722	-92.718611
229	WPWI271	150-174	IOWA, STATE OF, DEPARTMENT OF TRANSPORTATION	40	43.285528	-92.842417
230	WPWK973	150-174	IOWA, STATE OF, DOT	40	43.371556	-92.299639
231	WQMM943	450-470	ITC MIDWEST	80	42.881000	-92.967833
232	WQMM943	450-470	ITC MIDWEST	80	43.801111	-92.189889
233	WQMM943	450-470	ITC MIDWEST	80	43.959056	-93.466639
234	WQZF388	450-470	J & K CONSTRUCTION	80	43.283611	-92.790556
235	WQTU931	450-470	J & S Repair Precision Inc	32	43.714611	-92.378083
236	WQVB228	450-470	J.E.D. CONSTRUCTION LLC	40	43.243889	-92.435556
237	WPPB574	450-470	JAX DAIRY FARMS INC	30	43.519972	-92.809361
238	WQYD441	450-470	Jensen, Michael D	80	43.703111	-93.568222
239	WQTZ589	450-470	JOHANNIS TILING AND EXCAVATING	32	43.282500	-92.655833
240	WQKM777	450-470	JONES, TERRY	32	43.710833	-92.596944
241	WNXU627	450-470	JURGEMEYER, WILLIAM M	64	43.009417	-93.064361
242	WQIU913	150-174	K.S.S. FARMS, INC.	40	43.261667	-93.003889
243	WPLQ539	450-470	KAAL-TV, LLC	32	43.409972	-92.951028
244	WPLQ539	450-470	KAAL-TV, LLC	32	43.675806	-92.951861

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
245	WQWK773	450-470	Keim, Nathan	32	43.565278	-92.269167
246	WRJA435	450-470	KEIM, ROBERT	32	43.553611	-92.309167
247	WNJZ554	450-470	KEOKUK CO AMBULANCE	322	41.333333	-92.204639
248	WQNK299	450-470	KINGSLAND PUBLIC SCHOOL DISTRICT #2137	32	43.697444	-92.387167
249	WRO409	450-470	KNAPP, CARL	80	43.196083	-92.595750
250	KNEP328	150-174	KOENIGS, JEROME A	40	43.457472	-92.638806
251	WRCH993	450-470	Krahn X, LLC	32	43.730139	-92.350889
252	WNNM962	450-470	KRAUSHAAR, STEVEN	64	43.583306	-93.151583
253	WQVP932	150-174	Krell, Justin	80	43.864417	-93.061944
254	WNPO812	450-470	KRUEGELS INC	32	43.682750	-92.383778
255	KC7907	150-174	KSTP-TV, LLC	161	44.947194	-93.086611
256	KPF364	25-50	KSTP-TV, LLC	241	44.968583	-93.207722
257	WRCX876	150-174	KUPER, DALLAS	40	43.359972	-92.811389
258	KNFU686	150-174	LA VALLE, TOWN OF	232	43.584417	-90.134583
259	WNNY447	150-174	LADWIG, MARVIN	40	43.494417	-92.384333
260	WQXB359	450-470	Lagerstedt, David L	32	43.563889	-92.733333
261	KAH922	450-470	LAKESIDE FOODS INC	97	44.155250	-92.175167
262	WQSV435	450-470	LARSON, DUKE R	32	43.466528	-92.416028
263	WPBB549	450-470	Latham Hi-Tech Hybrids, Inc.	121	42.796917	-93.496583
264	WQPM433	450-470	Lau, Mike	40	43.528611	-93.187944
265	WNRV825	450-470	LECY, DELBERT	32	43.791639	-92.671000
266	WQPL917	150-174	Lembcke, Arden L	40	43.175111	-92.377111
267	WQBC937	150-174	LEROY, CITY OF	16	43.511639	-92.505167
268	WNPC334	150-174	LEWIS, MICHAEL	48	43.432472	-92.400722
269	WNVD801	150-174	LEWIS, MICHAEL	40	43.255250	-92.748528

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
270	WQWR612	150-174	LICHTY FARMS LLC	32	43.371111	-92.385000
271	WQSW614	450-470	Lickteig & Bastyr Farms, LLC.	32	43.641389	-93.018056
272	WQSF987	800/900	LNS SPECTRUM, LLC	113	44.006722	-92.718611
273	WPWI617	450-470	Loose, Daniel	250	44.335000	-95.288611
274	WRT797	450-470	LOREN & HANSON FARM	32	43.734139	-92.504583
275	WPCI553	450-470	LOVRIEN, RUSS	64	42.938306	-92.816861
276	WNYK609	450-470	LUTHERAN HOSPITAL LA CROSSE	121	43.794417	-91.249583
277	WPAW465	150-174	LYLE, CITY OF	32	43.505806	-92.943806
278	WQUD932	450-470	M & L FARMS	32	43.821806	-92.883778
279	WQPM436	450-470	M J MERTEN P T S P	32	43.629972	-93.016306
280	WQSB927	450-470	MAHR, GREG	40	43.392500	-92.276944
281	WQZC959	150-174	MAHR, JOHN	40	43.401111	-92.263611
282	WQQV208	450-470	Malt-O-Meal Co.	32	43.378889	-92.919444
283	WNJQ766	450-470	MARTIN, RODGER	64	43.196639	-92.732417
284	KAA983	450-470	MASON CITY, CITY OF	64	43.155528	-93.196028
285	WPXH582	450-470	Mason, Joe	20	43.471028	-92.365889
286	KXO942	450-470	MATHIAS, ROMAINE	32	43.369417	-92.364056
287	WNBA817	150-174	MAY, GABRIEL	48	43.457194	-92.713250
288	KDR729	150-174	MAYO FOUNDATION	56.3	44.029417	-92.461833
289	KDR729	150-174	MAYO FOUNDATION	56.3	44.042194	-92.471000
290	WPJZ485	150-174	MAYO FOUNDATION	24	43.674139	-92.977694
291	WPMA361	800/900	MAYO FOUNDATION	113	44.021639	-92.467111
292	WPMA366	800/900	MAYO FOUNDATION	113	44.021639	-92.467111
293	WPZR841	216-220	Mayo Foundation	80	44.021667	-92.466944
294	WQTD968	150-174	McCarthy, Stephen G	15	43.465333	-92.653111

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
295	WQNK329	450-470	MCNEILUS TRUCK & MANUFACTURING INC	32	43.340000	-92.554194
296	WRCM913	450-470	MERFELD, STEVE	64	42.996667	-92.709722
297	WQMN993	450-470	Meyer, Doug	32	43.419444	-93.119167
298	WPBD259	450-470	MEYERHOFER, LE VERNE	40	43.679139	-92.596000
299	WQJI438	450-470	MIDAMERICAN ENERGY COMPANY	80	43.054417	-92.673806
300	KNGA793	450-470	MiEnergy Cooperative	48	43.371639	-92.099889
301	WQZA414	450-470	MIENERGY COOPERATIVE	80	43.772222	-91.985000
302	WQTX675	150-174	MILLER, DOUG	32	43.236278	-92.573694
303	WQZW790	450-470	MILLER, JOE	32	43.269083	-92.622889
304	WQTH200	150-174, 450-470	Minnesota Freezer Warehouse Company	40	43.685000	-92.955278
305	WQDI812	800/900	MINNESOTA, STATE OF	40	43.854917	-92.336278
306	WQDJ729	800/900	MINNESOTA, STATE OF	113	44.048111	-92.962389
307	WQDJ729	800/900	MINNESOTA, STATE OF	113	44.093611	-93.253889
308	WQDJ729	800/900	MINNESOTA, STATE OF	113	44.291111	-93.211389
309	WQDJ729	800/900	MINNESOTA, STATE OF	113	44.342806	-92.642389
310	WQDJ729	800/900	MINNESOTA, STATE OF	113	44.416556	-92.874306
311	WQDJ729	800/900	MINNESOTA, STATE OF	113	44.524167	-92.576389
312	WQHE600	800/900	MINNESOTA, STATE OF	40	43.658361	-92.688694
313	WQHE600	800/900	MINNESOTA, STATE OF	40	43.659306	-92.299667
314	WQHE600	800/900	MINNESOTA, STATE OF	40	43.848111	-92.861722
315	WQHF415	800/900	MINNESOTA, STATE OF	113	43.550583	-91.361472
316	WQHF415	800/900	MINNESOTA, STATE OF	113	43.668750	-91.404194
317	WQHF415	800/900	MINNESOTA, STATE OF	113	43.810889	-91.644750
318	WQHK535	800/900	MINNESOTA, STATE OF	113	43.652028	-93.547556
319	WQHK535	800/900	MINNESOTA, STATE OF	113	43.662000	-93.114389

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
320	WQHK535	800/900	MINNESOTA, STATE OF	113	43.817500	-93.292778
321	WQNG466	150-174	MINNESOTA, STATE OF	40	43.658361	-92.688694
322	WQNG466	150-174	MINNESOTA, STATE OF	40	43.662000	-93.114389
323	WQPT587	800/900	MINNESOTA, STATE OF	40	43.545611	-92.470000
324	WQSK907	800/900	MINNESOTA, STATE OF	40	43.848111	-92.861722
325	WPYE254	150-174	MITCHELL, COUNTY OF	40	43.282417	-92.813444
326	WPYE254	150-174	MITCHELL, COUNTY OF	40	43.427750	-92.782750
327	WQCQ408	150-174	MITCHELL, COUNTY OF	40	43.294306	-92.788528
328	WPQJ977	450-470	MOBILE RADIO ENGINEERING INC	121	44.559972	-93.321056
329	WNQZ567	150-174	MOWER, COUNTY OF	48	43.658361	-92.688694
330	WPMJ464	450-470	MOWER, COUNTY OF	32	43.658361	-92.688694
331	WPMX953	800/900	MOWER, COUNTY OF	40	43.658361	-92.688694
332	WPNR583	150-174	MOWER, COUNTY OF	32	43.670389	-92.969389
333	WQGM683	450-470	MOWER, COUNTY OF	32	43.658361	-92.688694
334	WQHH552	800/900	MOWER, COUNTY OF	40	43.501083	-92.992694
335	WQHH552	800/900	MOWER, COUNTY OF	40	43.658361	-92.688694
336	WQVL496	800/900	MOWER, COUNTY OF	40	43.668528	-92.992583
337	WNLJ839	450-470	MR SAM COMMUNICATIONS	56	43.547472	-92.714639
338	WNNU894	450-470	MR SAM COMMUNICATIONS	64	43.645222	-93.468000
339	WPPN854	450-470	MR SAM COMMUNICATIONS	30	43.438028	-92.783806
340	WPDI471	450-470	MURRAY FARMS INC	64	43.068306	-92.763806
341	WQVN590	150-174	NEIA Pump Service Inc	96	43.221111	-91.835028
342	WQTM684	150-174	Nelson, Joel	40	43.501528	-92.901472
343	WNLG922	450-470	NESS, STERLING	48	43.965528	-92.699917
344	WPZH549	800/900	New Hampton Red Power, Inc.	113	43.008889	-92.316667



ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
345	WQSJ709	450-470	NORTHERN COUNTRY CO-OP	32	43.439167	-92.780833
346	WQJR520	450-470	Northern Iowa Windpower II, LLC	80	43.364528	-93.269389
347	KSI896	150-174	NORTHWAY COMMUNICATIONS INC.	322	44.888028	-89.652056
348	WNNB993	450-470	NUTRIEN AG SOLUTIONS INC	121	42.972194	-93.796056
349	WNNB993	450-470	NUTRIEN AG SOLUTIONS INC	121	43.008028	-94.056056
350	WQYD346	450-470	OEHLKE FARMS	32	43.756139	-92.553778
351	WNWK891	450-470	OLTROGGE, DELBERT	113	42.687472	-92.218778
352	WZX299	150-174	OSAGE MUNICIPAL UTILITIES	40	43.278944	-92.815472
353	WNQO287	150-174	Owatonna Concrete Products, LLC	80	44.074972	-93.206056
354	WQUR381	450-470	Pacelli Catholic Schools	24	43.669222	-92.980417
355	WSE810	150-174	Palmer Bus Co.	40	43.686833	-92.980694
356	WQRR650	150-174	PATTERSON, CHRISTOPHER L	32	43.490278	-92.877778
357	WQPM434	450-470	Popp Farm Drainage	32	43.288861	-92.932417
358	WQXB751	450-470	Powers, Chris	121	44.021278	-92.495806
359	WNYV328	150-174	PUBLIC UTILITIES COMMISSION	40	43.687194	-92.389611
360	WNMD677	450-470	R Comm wireless	97	42.831083	-93.189083
361	WPYB749	800/900	RACOM Corporation	113	43.098056	-93.289722
362	WQKD865	800/900	RACOM Corporation	113	43.279722	-91.787778
363	WQKD880	800/900	RACOM Corporation	113	43.121389	-93.194444
364	WQKD884	800/900	RACOM Corporation	113	43.038056	-92.390556
365	WQKD916	800/900	RACOM Corporation	113	42.694167	-92.782778
366	WQKD923	800/900	RACOM Corporation	113	42.490000	-92.503611
367	WQKD925	800/900	RACOM Corporation	113	43.754722	-91.296389
368	WQKD926	800/900	RACOM Corporation	113	43.970278	-92.418333
369	WPHV336	450-470	RADIO COMMUNICATIONS CO	120	42.445833	-92.374917

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
370	WNSO204	450-470	RADIO COMMUNICATIONS CO / RCSYSTEMS	121	42.445833	-92.374917
371	WNIG566	450-470	RADIO COMMUNICATIONS CO / RCSYSTEMS	121	42.445833	-92.374917
372	WNIC728	450-470	RADIO COMMUNICATIONS CO INC	121	42.751361	-92.796028
373	WNIE201	450-470	RADIO COMMUNICATIONS CO INC/ RCSYSTEMS	121	42.445833	-92.374917
374	KNJB945	450-470	RADIO COMMUNICATIONS CO/ RCSYSTEMS	121	42.445833	-92.374917
375	WNIE202	450-470	RADIO COMMUNICATIONS CO/ RCSYSTEMS	121	42.445833	-92.374917
376	WNIG565	450-470	RADIO COMMUNICATIONS CO/ RCSYSTEMS	121	42.445833	-92.374917
377	WPHU970	450-470	RADIO COMMUNICATIONS CO/RCSYSTEMS	120	42.445833	-92.374917
378	WNWA349	150-174	RAUSCH BROTHERS TRUCKING INC	121	43.034139	-92.451028
379	WQSG200	800/900	RAZI, LLC	113	44.006722	-92.718611
380	WNMX401	150-174	REGIONAL HEALTH SERVICES OF HOWARD COUNTY	56	43.371639	-92.109889
381	WRJL608	450-470	REICHERTS, GARY	50	43.373889	-92.672778
382	WNIU517	450-470	RESSLER, JOHN	48	43.627472	-92.626000
383	WPKQ441	150-174	RICEVILLE AMBULANCE SERVICE INC	32	43.320806	-92.541833
384	WRCL894	450-470	RINDELS, SCOTT	32	43.563389	-92.348917
385	WPEG804	450-470	RIVERLAND COMMUNITY COLLEGE	32	43.676083	-93.002694
386	WNHT247	450-470	ROCHESTER GOLF & COUNTRY CLUB	64	44.053306	-92.405167
387	WPKV380	450-470	ROCHESTER PUBLIC SCHOOLS	120	44.046361	-92.449333
388	WNIV229	450-470	ROE, RUSSELL:ROE, MILO:ROE, RICK:ROE, BRIAN DBA ROE FARMS	40	43.515250	-92.579611
389	WRCI945	450-470	ROONEY TRUCKING, INC.	152	42.643139	-92.912417
390	KNFZ492	150-174	ROSE CREEK, CITY OF	24	43.601361	-92.832694
391	WNLK592	450-470	ROSENBERG RICHARD ROSENBERG JEFF DBA ROSENBERG F	64	43.372194	-93.011306
392	WQOY313	150-174	ROSENBERG, JAMES K	40	43.380528	-93.102972
393	WRDR853	450-470	Rosenberg, Josh	32	43.401500	-93.074056

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
394	WRCD294	450-470	ROTTINGHAUS GRAIN INC.	64	43.123194	-92.795417
395	WQTY473	450-470	RUEHLOW, BLAKE	50	43.298611	-92.760278
396	WQSC810	150-174	RUNDE, RONNIE	40	43.486944	-92.611111
397	WQYI475	450-470	RUSSELL AND JORDAN NELSON	32	43.444444	-92.870556
398	WNAK403	450-470	SAINT ANSGAR COMMUNITY SCHOOLS	80	43.382472	-92.919639
399	WQLH415	150-174	SAINT ANSGAR, CITY OF	32	43.377583	-92.920972
400	WYY356	450-470	SAMPSON, GERALD	72	43.508028	-92.877139
401	WPCQ731	450-470	SCHAEFER, MARK	48	43.501639	-92.658806
402	WRDT637	450-470	Schams Heifer Express	121	44.278333	-91.843889
403	WQTS820	450-470	Schlicter Farms	32	43.593972	-92.780444
404	WQRR574	450-470	SCHMIDT STOCK 'N GRAIN INC.	40	43.176667	-92.830833
405	WQTP571	150-174	SCHMITT, LAVERN V	40	43.374694	-92.207111
406	WNMH579	450-470	SCHWARTZHOFF, ART	40	43.422750	-92.214333
407	WPBZ649	450-470	SCHWIZER, MERLYN D	64	43.134417	-92.892139
408	WSH917	450-470	SCOTT, ALLEN	64	43.720528	-92.703528
409	WPMH948	150-174	SHATEK, TOM	40	43.227750	-92.314889
410	WQRV582	450-470	SHEELY FARMS	32	43.756417	-92.820528
411	WNLK244	450-470	SHELDON MUNN HOTEL INC	56	43.121639	-93.197417
412	WRDS659	450-470	SHOWALTER, DANIEL	80	43.485000	-92.870278
413	WQUD957	450-470	Simplified Technology Solutions, LLC	32	43.667167	-92.972889
414	WQRV886	450-470	SISKOW FARMS	42	43.575611	-92.510139
415	WPCS262	150-174	SLAICHERT, HARLAN W	56	43.377194	-92.937694
416	KNHQ355	450-470	SOBOLIK, JAMES R	80	43.356917	-92.162667
417	KNAO871	150-174	SONBERG FARMS LLC	80	43.313028	-92.870472
418	WRDI677	450-470	Southland School District 500	32	43.568139	-92.718222

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
419	WQRZ991	150-174	Spring Valley Street Department	40	43.692194	-92.374333
420	KNIC679	150-174	SPRING VALLEY, CITY OF	72	43.686917	-92.390167
421	WNUA855	150-174	SPRING VALLEY, CITY OF	24	43.684139	-92.387389
422	WQPC975	450-470	SPRUNG, LEVI	32	43.407778	-92.661111
423	WQNT540	150-174	ST ANSGAR MILLS INC	40	43.378056	-92.917500
424	KNDL309	150-174	ST ANSGAR, CITY OF	32	43.377750	-92.920750
425	WRP910	150-174	STACYVILLE COOPERATIVE CO	70	43.436361	-92.781306
426	WQQT329	450-470	START FARMS INC	32	43.573278	-92.445500
427	WQED612	450-470	STEINKAMP, ALAN	24	43.566000	-92.719194
428	WNSE844	450-470	STEVENSON JR, RUSSELL	48	43.463861	-92.211833
429	WPBZ652	450-470	STRICKER FARMS LTD	40	43.212750	-92.751028
430	WQPJ513	450-470	THOME, PETER	32	43.298333	-92.826667
431	WQWP689	450-470	Thunder Farms	40	43.514167	-92.269917
432	WPAP494	450-470	TORRENS, LOREN A	113	43.949972	-92.700194
433	WQYC577	450-470	Twin Creek Farms	80	44.071083	-92.897500
434	WPTI620	800/900	Upper Iowa Communications	113	43.381639	-92.107417
435	WQTU928	450-470	VALENT BIO SCIENCES CORP	32	43.271222	-92.799250
436	WQSF992	800/900	VERTICAL VENTURES V, LLC	113	44.044722	-92.400278
437	WQSG211	800/900	VERTICAL VENTURES V, LLC	113	44.044722	-92.400278
438	WQWT339	450-470	Vestas American Wind Technology	32	43.371361	-92.295056
439	WQWT339	450-470	Vestas American Wind Technology	32	43.371361	-92.245056
440	WQWT339	450-470	Vestas American Wind Technology	32	43.436556	-92.783583
441	WQWT339	450-470	Vestas American Wind Technology	40	43.720361	-92.704972
442	WQYV525	150-174	VICKERMAN, SHELBY	80	43.536833	-91.744556
443	WQOS636	450-470	VIKING AUTOMATIC SPRINKLER COMPANY	80	44.043306	-92.528361

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
444	WNMX504	450-470	VOGEL, KURT G	121	42.482222	-92.102944
445	WQTN743	450-470	Vorwerk, Adam	32	43.680556	-92.273611
446	WQYR274	450-470	WEST UNION TRENCHING LLC	160	42.963556	-91.799028
447	WQSF994	800/900	WIGGINS, WESLEY	113	44.006722	-92.718611
448	WQVP550	150-174	Wigham, Duane	32	43.629222	-92.710722
449	KNHD485	450-470	WILLERT, DAVID	64	43.024139	-92.884083
450	WQSG201	800/900	WILLSON SPECTRUM, LLC	113	44.006722	-92.718611
451	KD50657	150-174	WISCONSIN POWER AND LIGHT COMPANY	241	43.776389	-90.443333
452	KOL657	150-174	WYBORN, GLEN R:WYBORN, RONNIE:WYBORN, MICHAEL	40	43.179139	-92.900194

**Table A: Mobile Licenses Intersecting Project Area**



# Wind Power GeoPlanner™

## Off-Air TV Analysis

Rose Creek Wind



Prepared on Behalf of  
Rose Creek Wind, LLC

February 17, 2021







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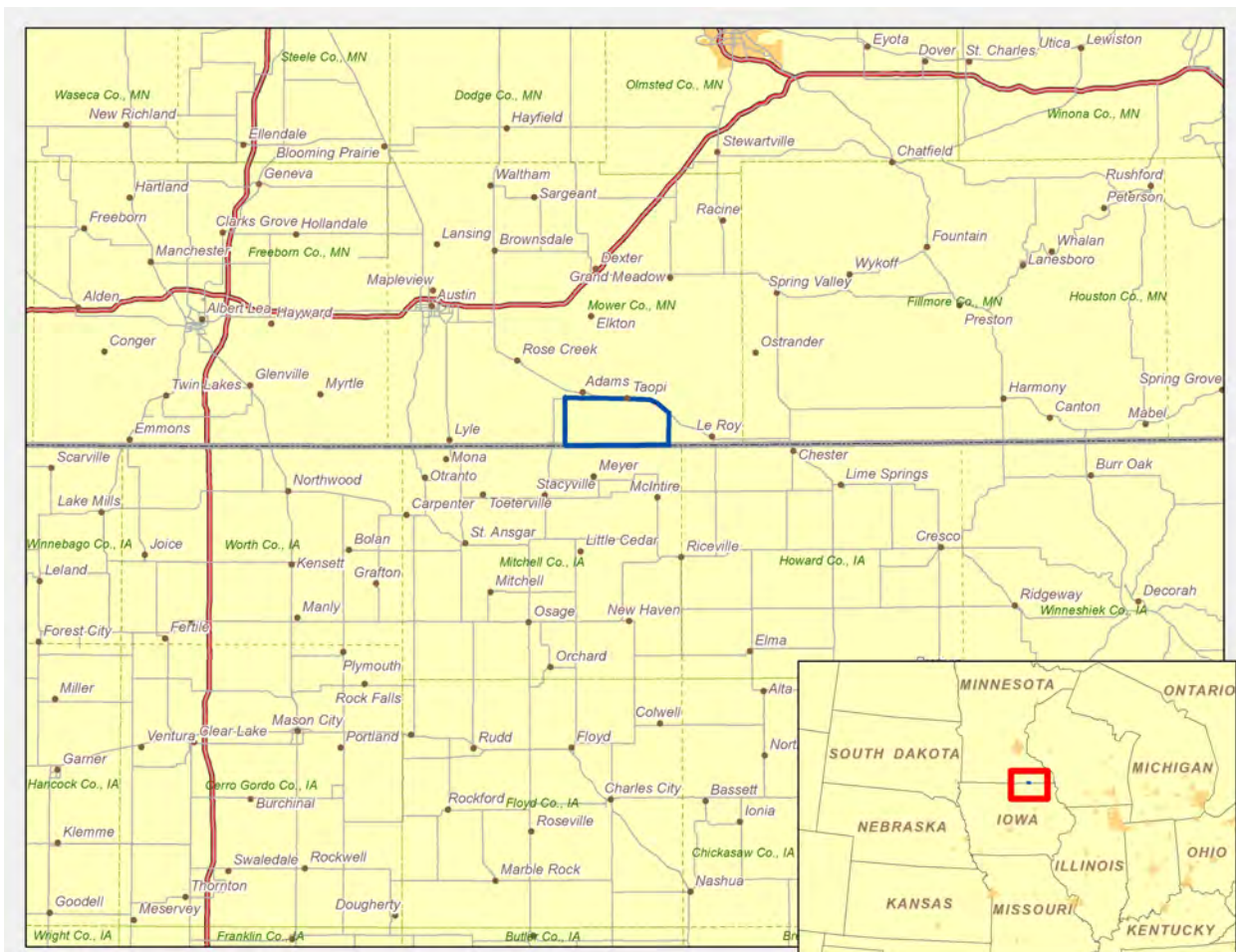
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## 1. Introduction

Off-air television stations broadcast signals from terrestrially-based facilities directly to television receivers. Comsearch identified those off-air stations whose service could potentially be affected by the proposed Rose Creek Wind project in Mower County, Minnesota. Comsearch then examined the coverage of the stations and the communities in the area that could potentially have degraded television reception due to the location of the proposed wind turbines.

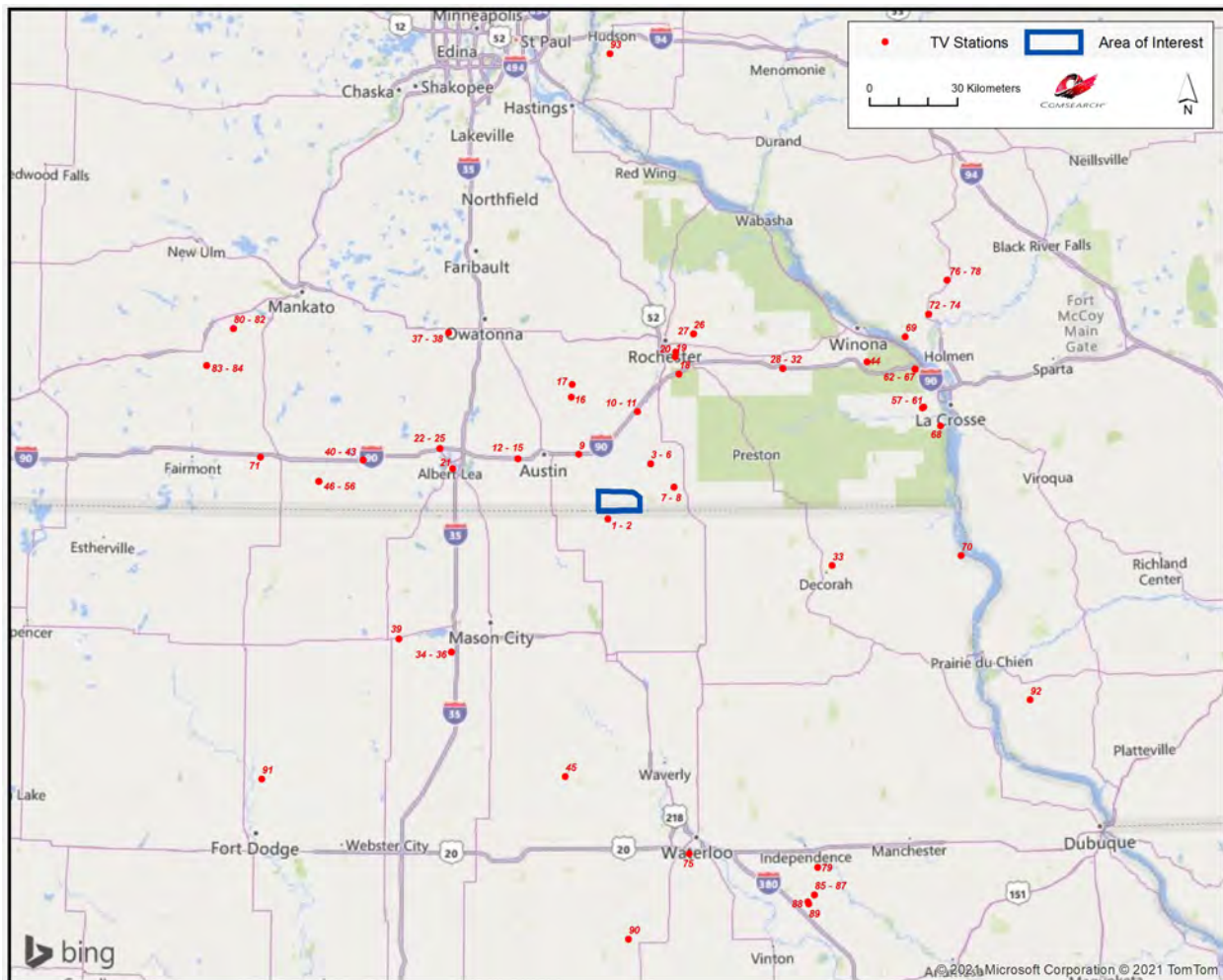
## 2. Summary of Results

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 proposed turbines. TV stations at a distance of 150 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 their locations is provided in Figure 2. There are a total of 93 database records for stations within approximately 150 kilometers of the proposed turbines. Of these stations, only 44 stations are currently licensed and operating, 25 of which are low-power stations or translators. Translator stations are low-power stations that receive signals from distant broadcasters and retransmit the signal to a local audience. These stations serve local audiences and have limited range, which is a function of their transmit power and the height of their transmit antenna.



*Figure 2: Plot of Off-Air TV Stations within 150 Kilometers of Proposed Turbines*

<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).

ID	Call Sign	Status	Service <sup>2</sup>	Channel	Transmit ERP <sup>3</sup> (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Area of Interest (km)
1	KYIN	LIC	DTV	18	533.0	43.475556	-92.708333	2.76
2	KIMT	LIC	DTV	24	472.0	43.475556	-92.708333	2.76
3	KSMQ-TV	APP/STA	DTV	20	319.2	43.642778	-92.526667	11.42
4	KSMQ-TV	LIC	DTV	20	319.2	43.642778	-92.526667	11.42
5	KXLT-TV	LIC	DTV	26	108.0	43.642778	-92.526667	11.42
6	KAAL	LIC	DTV	36	620.0	43.642778	-92.526667	11.42
7	KTTC	CP	DTV	10	80.0	43.570833	-92.427222	12.35
8	KTTC	LIC	DTV	10	43.1	43.570833	-92.427222	12.35
9	K27OW-D	LIC	LPT	27	5.62	43.672556	-92.830306	14.19
10	K43OH-D	CP	LPD	43	1.0	43.804028	-92.580222	27.56
11	K45MO-D	CP	LPD	45	1.0	43.804028	-92.580222	27.56
12	K14PU-D	CP	LPD	14	1.0	43.659639	-93.086750	29.43
13	K19KB-D	CP	LPD	19	1.0	43.659639	-93.086750	29.43
14	K34MP-D	CP	LPD	34	1.0	43.659639	-93.086750	29.43
15	K47OF-D	CP	LPD	47	1.0	43.659639	-93.086750	29.43
16	K40JT	CP	LPD	40	15.0	43.848111	-92.861722	33.34
17	W22FD-D	CP	LPD	22	15.0	43.888056	-92.857833	37.55
18	K41MP-D	CP	LPD	41	1.0	43.917444	-92.404333	43.24
19	K35PC-D	CP	LPD	35	15.0	43.970278	-92.418333	48.36
20	K31LN-D	CP	LPD	31	4.0	43.986139	-92.417667	50.05
21	K40JT	LIC	LPX	40	10.7	43.627778	-93.363889	50.18
22	K30NI-D	CP	LPD	30	1.0	43.690333	-93.417778	55.86
23	K32LB-D	CP	LPD	32	1.0	43.690333	-93.417778	55.86

<sup>2</sup> Definitions of service and status codes:

ACA - Analog Class A  
DCA - Digital Class A  
DRT - Digital Replacement Translator  
DT - ETL testing  
DTS - Distributed Transmission System  
DTV - Full Service Television  
DTX - Digital TV Auxiliary  
LPA - Low Power Analog TV  
LPD - Low Power Digital TV  
LPT - Digital TV Translator  
LPX - Analog TV Translator  
TS - Legacy Service for Analog TV Auxiliary  
TV - Analog TV legacy

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  
AMD - Amendment

<sup>3</sup> ERP = Transmit Effective Radiated Power



ID	Call Sign	Status	Service <sup>2</sup>	Channel	Transmit ERP <sup>3</sup> (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Area of Interest (km)
24	K38OU-D	CP	LPD	38	1.0	43.690333	-93.417778	55.86
25	K44LT-D	CP	LPD	44	1.0	43.690333	-93.417778	55.86
26	K25NK-D	LIC	LPD	25	15.0	44.041111	-92.340556	57.89
27	K25NK-D	CP	LPD	25	15.0	44.041139	-92.340417	57.89
28	K19IT-D	CP	LPD	19	1.0	43.932167	-91.962333	65.75
29	K27KL-D	CP	LPD	27	1.0	43.932167	-91.962333	65.75
30	K29JH-D	CP	LPD	29	1.0	43.932167	-91.962333	65.75
31	K31KX-D	CP	LPD	31	1.0	43.932167	-91.962333	65.75
32	K40NI-D	CP	LPD	40	1.0	43.932167	-91.962333	65.75
33	K25PE-D	LIC	LPT	25	15.0	43.326667	-91.765833	68.27
34	K22LJ-D	CP	LPD	22	5.0	43.066639	-93.365250	69.46
35	K27MI-D	CP	LPD	27	3.0	43.066639	-93.365250	69.46
36	K35PA-D	CP	LPD	35	15.0	43.066639	-93.365250	69.46
37	K21NU-D	CP	LPD	21	5.0	44.045528	-93.384083	74.35
38	K48KJ-D	LIC	LPD	48	4.92	44.045528	-93.384083	74.35
39	KAAL	LIC	DRT	33	8.3	43.105917	-93.585361	80.79
40	K22LG-D	CP	LPD	22	1.0	43.652528	-93.742222	80.79
41	K26MG-D	CP	LPD	26	1.0	43.652528	-93.742222	80.79
42	K28MU-D	CP	LPD	28	1.0	43.652528	-93.742222	80.79
43	K50NB-D	CP	LPD	50	1.0	43.652528	-93.742222	80.79
44	K24JA-D	CP	LPD	24	0.05	43.947806	-91.604028	90.29
45	K17MH-D	CP	LPD	17	6.0	42.685861	-92.889917	91.17
46	K14KD-D	LIC	LPD	14	3.0	43.585833	-93.929722	95.35
47	K16MA-D	LIC	LPT	16	3.0	43.585833	-93.929722	95.35
48	K17MX-D	LIC	LPD	17	3.0	43.585833	-93.929722	95.35
49	K19LJ-D	LIC	LPT	19	3.0	43.585833	-93.929722	95.35
50	K21KF-D	LIC	LPD	21	3.0	43.585833	-93.929722	95.35
51	K23FY-D	LIC	LPT	23	3.0	43.585833	-93.929722	95.35
52	K27FI-D	LIC	LPT	27	3.0	43.585833	-93.929722	95.35
53	K29IF-D	LIC	LPD	29	3.1	43.585833	-93.929722	95.35
54	K31EF-D	LIC	LPT	31	3.0	43.585833	-93.929722	95.35
55	K34NV-D	LIC	LPT	34	3.0	43.585833	-93.929722	95.35
56	K35IU-D	LIC	LPT	35	3.0	43.585833	-93.929722	95.35
57	WEAU	LIC	DRT	30	15.0	43.804444	-91.372167	101.26
58	WLAX	LIC	DTV	33	1000.0	43.804444	-91.372167	101.26
59	WHLA-TV	LIC	DTV	15	400.0	43.805083	-91.368083	101.59
60	WXOW	LIC	DTV	28	251.0	43.806389	-91.367500	101.68
61	W34FC-D	LIC	LPT	34	15.0	43.806389	-91.367500	101.68
62	K28MV-D	CP	LPD	28	2.0	43.923306	-91.400389	103.67
63	W32DW-D	CP	LPD	32	1.0	43.923306	-91.400389	103.67
64	W34EB-D	CP	LPD	34	1.0	43.923306	-91.400389	103.67
65	K36MW-D	CP	LPD	36	2.0	43.923306	-91.400389	103.67

ID	Call Sign	Status	Service <sup>2</sup>	Channel	Transmit ERP <sup>3</sup> (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Area of Interest (km)
66	W45DM-D	CP	LPD	45	1.0	43.923306	-91.400389	103.67
67	W46EP-D	CP	LPD	46	1.0	43.923306	-91.400389	103.67
68	KQEG-CA	LIC	DCA	23	15.0	43.748056	-91.297500	105.54
69	W26FD-D	CP	LPD	26	15.0	44.023389	-91.439222	105.93
70	K31NJ-D	LIC	LPT	31	15.0	43.349722	-91.221111	110.85
71	K45MN-D	CP	LPD	45	1.0	43.658556	-94.176750	115.71
72	WKBT-DT	CP	DTV	8	38.7	44.091111	-91.338056	116.74
73	WKBT-DT	LIC	DTV	8	25.7	44.091111	-91.338056	116.74
74	W19DP-D	CP	LPD	19	15.0	44.091111	-91.338056	116.74
75	K44FK	LIC	LPX	44	9.1	42.445833	-92.375000	118.25
76	W28DT-D	CP	LPD	28	1.0	44.194694	-91.255611	128.50
77	W21DC-D	CP	LPD	21	1.0	44.194667	-91.255417	128.51
78	W22DT-D	CP	LPD	22	0.5	44.194667	-91.255417	128.51
79	KWWL	LIC	DTV	7	49.0	42.400556	-91.843611	135.94
80	K25QC-D	CP	LPD	25	7.5	44.051500	-94.299972	136.20
81	K43JE-D	AMD	LPD	25	7.5	44.051500	-94.299972	136.20
82	K43JE-D	LIC	LPD	43	10.82	44.051500	-94.299972	136.20
83	KMNF-LD	LIC	LPT	7	3.0	43.936750	-94.410833	140.20
84	KEYC-TV	LIC	DTV	12	52.7	43.936944	-94.410833	140.20
85	KCRG-TV	LIC	DTV	9	48.0	42.316389	-91.858611	143.91
86	KGAN	LIC	DTV	29	850.0	42.316389	-91.858611	143.91
87	KRIN	LIC	DTV	35	250.0	42.316389	-91.858611	143.91
88	KPXR-TV	LIC	DTV	22	215.0	42.295278	-91.886389	145.16
89	KFKZ-LD	LIC	LPD	32	15.0	42.288139	-91.881806	146.04
90	K31PO-D	LIC	LPT	31	2.9	42.184750	-92.629306	146.11
91	KEOF-LD	CP	LPD	17	15.0	42.671667	-94.153333	146.79
92	W16DU-D	LIC	LPT	16	4.58	42.902417	-90.946528	148.03
93	W19EN-D	LIC	LPT	19	6.0	44.902778	-92.691111	149.27

*Table 1: Off-Air TV Stations within 150 Kilometers of Proposed Turbines*

### 3. Impact Assessment

Based on a contour analysis of the licensed stations within 150 kilometers of the Rose Creek Wind, it was determined that 11 of the full-power digital stations, identified below in Table 2, along with two low-power digital stations, may have their reception disrupted in and around the project. The areas primarily affected would include TV service locations within 10 kilometers of the turbines that have clear line-of-sight (LOS) to a proposed wind turbine but not to the respective station. After the wind turbines are installed, communities and homes in these locations may have degraded reception of these stations. This is due to multipath interference



caused by signal scattering as TV signals are reflected by the rotating wind turbine blades and mast.

ID	Call Sign	Status	Service	Channel	Transmit ERP (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Area of Interest (km)
1	KYIN	LIC	DTV	18	533.0	43.475556	-92.708333	2.76
2	KIMT	LIC	DTV	24	472.0	43.475556	-92.708333	2.76
4	KSMQ-TV	LIC	DTV	20	319.2	43.642778	-92.526667	11.42
5	KXLT-TV	LIC	DTV	26	108.0	43.642778	-92.526667	11.42
6	KAAL	LIC	DTV	36	620.0	43.642778	-92.526667	11.42
8	KTTC	LIC	DTV	10	43.1	43.570833	-92.427222	12.35
9	K27OW-D	LIC	LPT	27	5.62	43.672556	-92.830306	14.19
26	K25NK-D	LIC	LPD	25	15.0	44.041111	-92.340556	57.89
58	WLAX	LIC	DTV	33	1000.0	43.804444	-91.372167	101.26
59	WHLA-TV	LIC	DTV	15	400.0	43.805083	-91.368083	101.59
60	WXOW	LIC	DTV	28	251.0	43.806389	-91.367500	101.68
73	WKBT-DT	LIC	DTV	8	25.7	44.091111	-91.338056	116.74
79	KWWL	LIC	DTV	7	49.0	42.400556	-91.843611	135.94

*Table 2: Licensed Off-Air TV Stations Subject to Degradation*

## 4. Recommendations

While TV signals are reflected by wind turbines, which can cause multipath interference to the TV receiver, modern digital TV receivers have undergone significant improvements to mitigate the effects of signal scattering. When used in combination with a directional antenna, it becomes even less likely that signal scattering from wind farms will cause interference to digital TV reception.

Nevertheless, signal scattering could still impact certain areas currently served by the TV station mentioned above, especially those that would have line-of-sight to at least one wind turbine but not to the station antenna. In the unlikely event that interference is observed in any of the TV service areas, it is recommended that a high-gain directional antenna be used, preferably outdoors, and oriented towards the signal origin in order to mitigate the interference.

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.



## **5. Contact**

For questions or information regarding the Off-Air TV Analysis, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	<a href="mailto:dmeyer@comsearch.com">dmeyer@comsearch.com</a>
Web site:	<a href="http://www.comsearch.com">www.comsearch.com</a>

# Wind Power GeoPlanner™

## Mobile Phone Carrier Report

Rose Creek Wind, LLC



Prepared on Behalf of  
Rose Creek Wind

February 16, 2021



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## **1. Introduction**

Comsearch has developed and maintains comprehensive technical databases containing information on licensed mobile phone carriers across the US. Mobile phone carriers operate in multiple frequency bands and are often referred to as Advanced Wireless Service (AWS), Personal Communication Service (PCS), 700 MHz Band, Wireless Communications Service (WCS), and Cellular. They hold licenses on an area-wide basis which are typically comprised of several counties.

This report focuses on the potential impact of wind turbines on mobile phone operations in and around the project area.





## **Results**

The Rose Creek Wind Project is located in Mower County, MN. We have identified the type of service, channel block, market ID and FCC callsign for each carrier in the county of interest. A description of the various service types and geographic market areas is below with a summary table on the following page.

## **AWS**

AWS licensees won their spectrum in an auction that started in August 2006. The licensees are authorized by 734 Cellular Market Areas (CMA) for Block A, 176 Economic Areas (BEA) for Blocks B and C, and 12 Regional Economic Area Groupings (REAG) for Blocks D, E and F. This spectrum at 1.7 and 2.1 GHz was allocated for mobile broadband and advanced wireless services. Partitioning and leases are permitted in the band.

## **Cellular**

Licensees are authorized by Metropolitan and Rural Statistical Areas, also known as CMAs. Unserved areas can be covered by licensees other than the original A or B block licensee. To determine the most realistic coverage, we compiled the Cellular Geographic Service Areas (CGSA) from the 32 dBu contours defined by Part 22.911(a) of the FCC rules. Mobile services are provided at 800 MHz and partitioning and leases are permitted in the band.

## **PCS**

There have been nine auctions for this band, with the last one being held in August 2008. Licensees are authorized by 51 Major Trading Areas (MTA) for Blocks A and B, 493 Basic Trading Areas (BTA) for Blocks C through F, and 176 Economic Areas (EA) for Block G. This band has been heavily partitioned and disaggregated both by counties and by smaller polygons within counties (known as undefined areas or partial counties). The 1.9 GHz PCS carriers provide mobile services and leases are permitted in the band.

## **700 MHz Band**

Originally used for analog television broadcasting, this band consists of an upper and lower band, each having its own set of frequency blocks. There have been three auctions in this band with the last one (Auction 73) being held in 2008 and mobile phone carriers eventually winning licenses for Blocks A, B, and C of the Lower 700 MHz band and Block C of the Upper 700 MHz band. Licensees are authorized by 176 Economic Areas (EA) for Lower Block A, 734 Cellular Market Areas (CMA) for Lower Blocks B and C, and 12 Regional Economic Area Groupings (REAG) for Upper Block C. Partitioning and leases are permitted in the band.

## **WCS**

Mobile services provided in the 2.3 GHz band occupy frequency blocks above and below the spectrum allocated for Satellite Digital Audio Radio Service (SDARS) from 2320 MHz to 2345 MHz. WCS licensees are authorized by 52 Major Economic Areas (MEA) for Blocks A and B and 12 Regional Economic Area Groupings (REAG) for Blocks C and D. Partitioning and leases are permitted in the band.

Service <sup>1</sup>	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
AWS	AT&T	A	Mower	MN	CMA492	WQGL794
AWS	Verizon	B	Mower	MN	BEA106	WQGA989
AWS	Bug Tussel Wireless	C	Mower	MN	BEA106	WQVD432
AWS	T-Mobile	D	Mower	MN	REA003	WQQA471
AWS	T-Mobile	E	Mower	MN	REA003	WQGB376
AWS	Verizon	F	Mower	MN	REA003	WQGA717
Cellular	Verizon	A	Mower	MN	CMA492	WPSJ612
Cellular	Verizon	B	Mower	MN	CMA492	KNKN416
PCS	Sprint	A	Mower	MN	MTA012	KNLF223
PCS	Verizon	A	Mower	MN	MTA012	WQIQ265
PCS	T-Mobile	B	Mower	MN	MTA012	KNLF224
PCS	Verizon	C	Mower	MN	BTA378	WPOK679
PCS	AT&T	C	Mower	MN	BTA378	WPZU213
PCS	AT&T	D	Mower	MN	BTA378	WQGH837
PCS	Verizon	E	Mower	MN	BTA378	KNLG880
PCS	Sprint	F	Mower	MN	BTA378	KNLG954
PCS	Sprint	G	Mower	MN	BEA106	WQKT214
700 MHz	US Cellular	Lower A	Mower	MN	BEA106	WQLE672
700 MHz	AT&T	Lower B	Mower	MN	CMA492	WQIZ626
700 MHz	AT&T	Lower C	Mower	MN	CMA492	WPWV450
700 MHz	AT&T	Lower D	Mower	MN	EAG704	WPZA238
700 MHz	DISH Network	Lower E	Mower	MN	BEA106	WQJZ248
700 MHz	Verizon	Upper C	Mower	MN	REA003	WQJQ691
WCS	AT&T	A	Mower	MN	MEA020	KNLB218
WCS	AT&T	B	Mower	MN	MEA020	KNLB292
WCS	AT&T	C	Mower	MN	REA003	WPQL713
WCS	AT&T	D	Mower	MN	REA003	WQDM396

*Table 1: Mobile Phone Carriers in the Area of Interest*

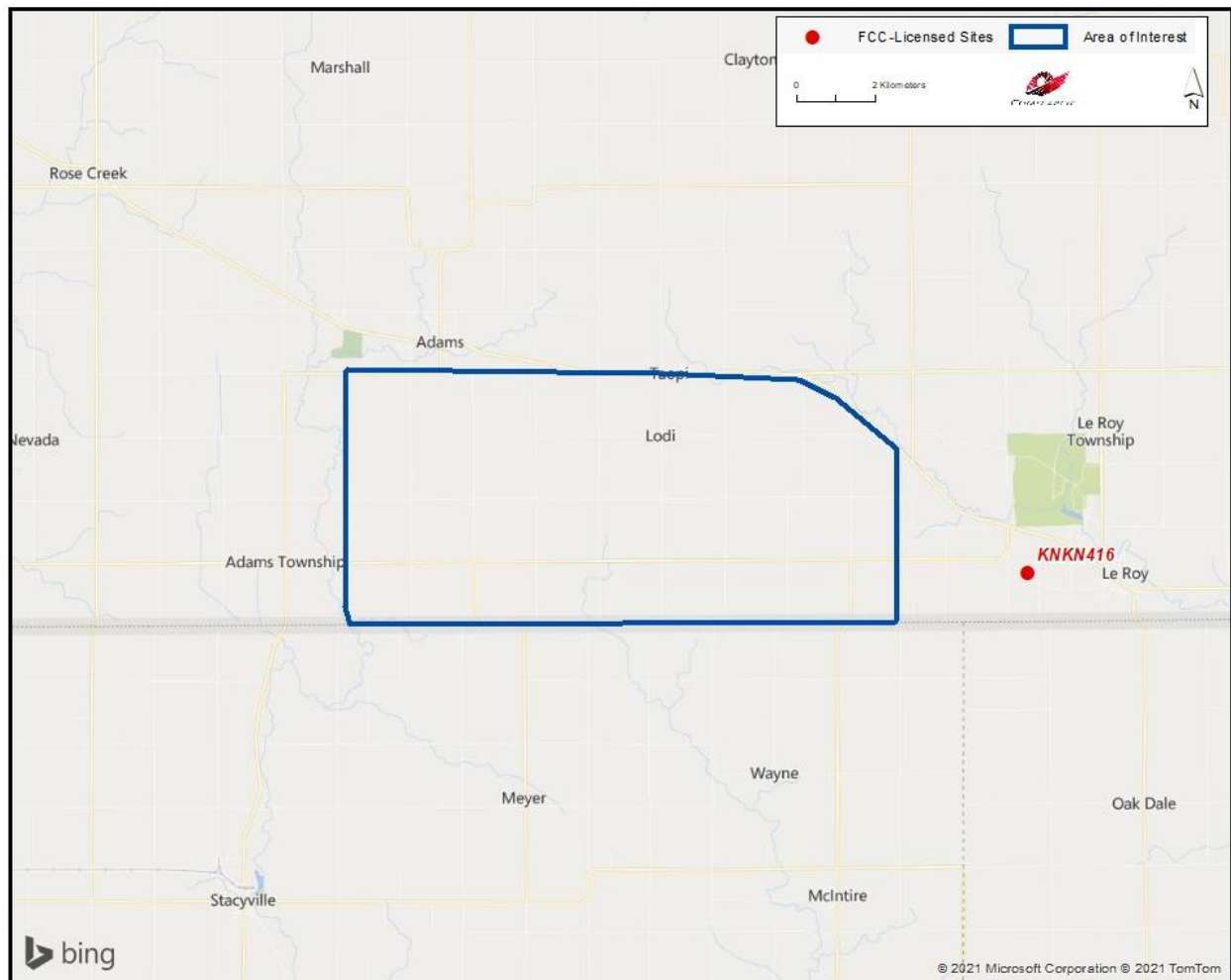
<sup>1</sup> AWS: Advanced Wireless Service at 1.7/2.1 GHz  
CELL: Cellular Service at 800 MHz  
PCS: Personal Communication Service at 1.9 GHz  
700 MHz: Commercial Mobile Phone at 700 MHz  
WCS: Wireless Communication Service at 2.3 GHz

### **FCC-Licensed Sites**

For competitive and confidentiality reasons, most mobile phone carriers' individual sites are not licensed with the FCC. However, in the cellular band, if a base station extends the existing Cellular Geographic Service Area (CGSA), then it must be recorded with the FCC. We identified one cellular site near the Rose Creek Wind area of interest. Figure 2 on the next page depicts its location in relation to the area of interest and Table 2 contains the technical parameters on the FCC license.

Callsign	Licensee	Structure Height to Tip (m)	ASR Number	Location Address	Latitude (NAD83)	Longitude (NAD83)	Distance to the Area of Interest (km)
KNKN416	Verizon	76.2	1209201	76000 105th Street	43.511611	-92.532667	3.34

*Table 2: FCC-Licensed Mobile Phone Site*



*Figure 2: FCC-Licensed Mobile Phone Site near the Area of Interest*

## Impact Assessment and Distance Setback Requirements

The cellular mobile phone signal propagation is typically not affected by physical structures because the beam widths of the radiated signal from the base stations and mobile units are very wide and the wavelength of the signal is long enough to wrap around objects such as wind turbine towers and blades. In addition, the cellular network consists of multiple base stations that are designed so that if the connection cannot be made to one base station it will shift to adjacent base stations to make the connection. This enables cellular mobile telephone systems to provide coverage in areas that are congested with physical structures such as downtown urban areas. Areas containing wind turbines have less of a coverage issue than urban areas, so the wind turbines presence does not require any special setback for signal obstruction consideration other than physical clearance of the blades. From an electromagnetic interference standpoint, the emissions from the wind turbines, which are specified by the FCC, should be taken into account to ensure they will not interfere with the base stations or the mobile units. Part 15 of the FCC regulations covers the emissions from unintentional radiating devices, such as wind turbines. The field strength limits for the emissions from unintentional radiators is given in paragraph 15.109 of Part 15 of the FCC rules. The emission limits are stated for a distance of 3 meters or approximately 10 feet and are shown below.

### Radiated Emission Limits at 3 Meters

<u>Frequency of Emission (MHz)</u>	<u>Field Strength (microVolts/meter)</u>
30 – 88	100
88 – 216	150
216 – 960	200
> 960	500

From these limits and the receiver sensitivity of the cellular base stations and mobile units we can determine a setback requirement for wind turbines and cellular system. The typical sensitivity of mobile units is -90 dBm ( $1 \times 10^{-12}$  Watts) and the typical sensitivity of base stations is -93 dBm ( $5 \times 10^{-13}$  Watts). The gain of mobile unit antennas are -10dB or 0.1 and the gain of base station antennas are 17 dB or 50. The effective area (A) of the mobile unit and base station antennas are determined from the following formula.

$$A = G \cdot \lambda^2 / 4 \cdot \pi$$

Where,

G = Antenna Gain, number

$\lambda$  = Wavelength, 0.353 meters

$\pi$  = 3.14

This gives us an effective area for the mobile unit antenna of  $9.9 \times 10^{-4}$  meter<sup>2</sup> and the effective area for the base station antenna of 0.496 meter<sup>2</sup>. Using the typical receiver sensitivities of the mobile and base units above, we can determine their power flux density ( $P_D$ ) from the following formula:

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$$P_D = S/A$$

Where S is defined as the sensitivity for Mobile Unit or for the Base Station expressed in Watts

To calculate the electric field strength (E) we use the following formula:

$$E = (P_D * 377)^{1/2}$$

So for the mobile unit,  $P_D = 1.01 \times 10^{-9}$  Watts/meter<sup>2</sup> and  $E = 617$  microVolts/meter. And, for the base station unit,  $P_D = 1.008 \times 10^{-12}$  Watts/meter<sup>2</sup> and  $E = 19.4$  microVolts/meter.

These results show that the mobile units' sensitivity expressed as field strength is above the level allowed as an emission for the wind turbines at a distance of 3 meters. Therefore, no setback for the use of a mobile unit is needed beyond 3 meters. Since the base station has field strength sensitivity below the allowed emission level of the wind turbines a setback distance is needed to ensure that the base stations will not be affected. The field strength of the emission is inversely proportional to separation distance in meters. To determine the setback distance to reduce the field strength to 19.4 microVolts/meter the following formula is used.

$$D = (500 \text{ MicroVolts/meter}) * (3 \text{ meters}) / 19.4 \text{ MicroVolts/meter}$$

Where,

D = Setback Distance for Base Station to avoid interference, meters

Thus the setback distance for the cellular tower base station from the wind turbines should be 77.3 meters or greater.

### **Summary**

The telephone communications in the mobile phone carrier bands are typically unaffected by the presence of the wind turbines and we do not anticipate any significant harmful effect to mobile phone services in the Rose Creek Wind Project area. Mobile phone systems are designed with multiple base transmitter stations covering a specific area. Since mobile telephone signals are designed with overlap between adjacent base transmitter sites in order to provide handoff between cells, any signal blockage caused by the wind turbines does not materially degrade the reception because the end user may be receiving from multiple transmitter locations. For example, if a particular turbine attenuates the signal reception into a mobile phone, the phone may receive an alternate signal from a different transmit location, resulting in no disruption in service. Mobile phone systems that are implemented in urban areas near large structures and buildings often have to combat even more problematic signal attenuation and reflection conditions than rural areas containing a wind energy turbine facility.

For the cellular towers located within the project area, no setback distance is required from an interference standpoint other than physical clearance of the blades. From an electromagnetic



standpoint, a setback distance of 77.3 meters should be used to meet FCC emission requirements.

In the unlikely event that a mobile phone carrier believes their coverage has been compromised by the presence of the wind energy facility, they have many options to improve their signal coverage to the area through optimization of a nearby base transmitter or even adding a new sector or cell site. Utility towers, meteorological towers or even the turbine towers within the wind project area can serve as the platform for a base transmit site or cell enhancer.

### **3. Contact Us**

For questions or information regarding the Mobile Phone Carrier Report, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	<a href="mailto:dmeyer@comsearch.com">dmeyer@comsearch.com</a>
Web site:	<a href="http://www.comsearch.com">www.comsearch.com</a>