

# **APPENDIX F**

## **Telecommunication Studies**

(See attached)

# Wind Power GeoPlanner™

## Land Mobile Report

Goodhue Wind Project



Prepared on Behalf of  
Goodhue Wind LLC

October 6, 2009



**COMSEARCH**  
A CommScope Company



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## **1. Introduction**

Comsearch compiles and provides information on land mobile sites identified within or near a defined area of interest related to proposed wind energy facilities. This information is useful in the planning stages of the wind energy facilities to identify fixed land mobile stations where critical telecommunication services are provided such as emergency (police, fire, 911, e.g.) response, public safety and local government communications, or industrial and business wireless radio operations. This data can be used in support of the wind energy facilities communications needs or to avoid any potential impact to the current land mobile services provided in that region.

## 2. Summary of Results

### Methodology

Our land mobile report is derived from the FCC's Universal Licensing System (ULS). The data is imported into GIS software and the land mobile sites are geographically mapped with the wind energy area of interest defined by the customer. Each site on the map is identified with an ID number associated with site information provided in a data table.

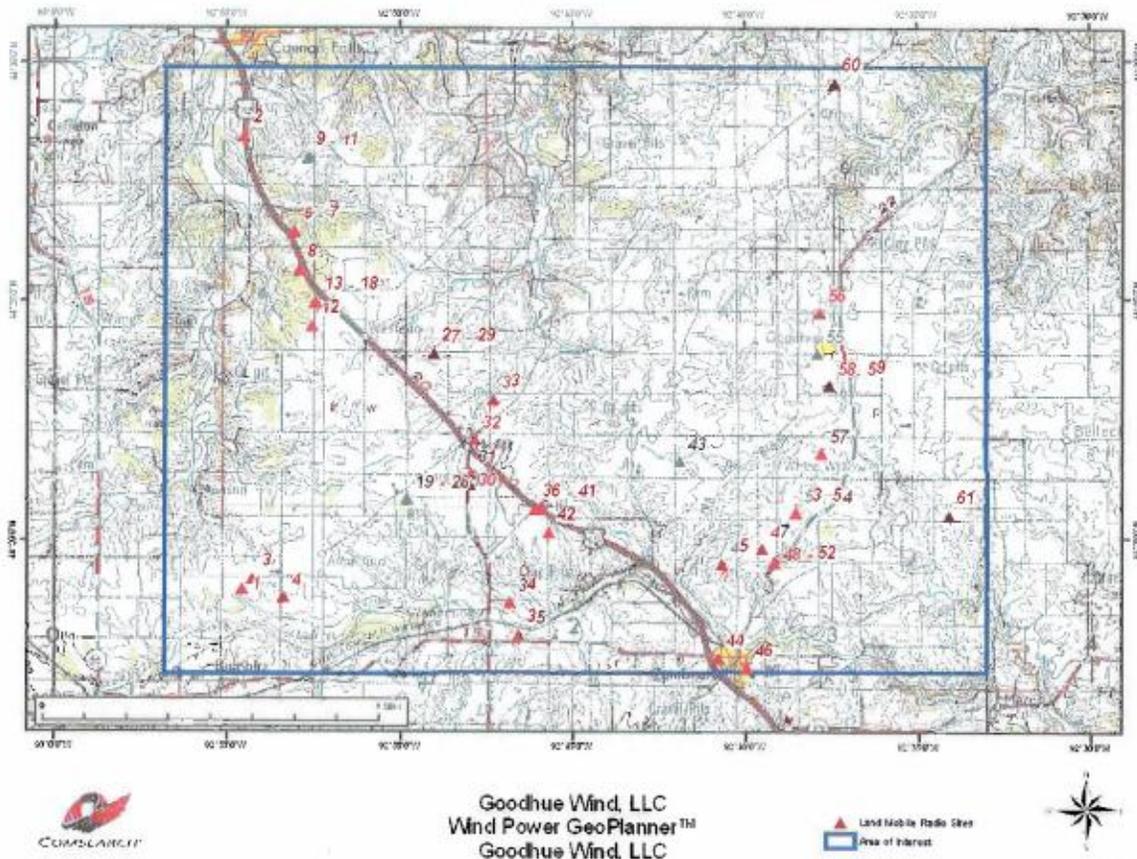


Figure 1: Land Mobile Sites in the Area of Interest

## Results

Figure 1 identifies sixty-one land mobile sites within the wind energy area of interest using the data sources described in our methodology above. Specific information about these sites is provided in Table 1 including location coordinates, frequency band, antenna height above ground level, and licensee name. Most of the land mobile sites licensed to county and state entities are providing critical public safety and emergency communications.

ID	Callsign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	City	ST	Latitude (NAD83)	Longitude (NAD83)
1	WNMN479	150 - 174 MHz	Berg, Gary A	16.0	Kenyon	MN	44.316639	-92.909361
2	WGK500	150 - 174 MHz	Great River Energy	3.0	Cannon Falls	MN	44.474417	-92.908806
3	WPBX519	150 - 174 MHz	Voxland, Lloyd	9.0	Kenyon	MN	44.320250	-92.904639
4	WNSZ454	150 - 174 MHz	Flom, Elroy B	16.0	Kenyon	MN	44.313861	-92.889639
5	WPNZ964	450 - 470 MHz	Hilltop Communications	45.0	Cannon Falls	MN	44.441083	-92.884639
6	WPSG356	450 - 470 MHz	Albers Sr, Ronald	45.0	Cannon Falls	MN	44.441083	-92.884639
7	WPTF405	450 - 470 MHz	Hilltop Communications	52.0	Cannon Falls	MN	44.441083	-92.884639
8	WPSU634	800 - 900 MHz	Sprint Nextel	58.5	Cannon Falls	MN	44.427500	-92.882500
9	WPWN449	450 - 470 MHz	Hilltop Communications	55.0	Cannon Falls	MN	44.466917	-92.878250
10	WPNT801	450 - 470 MHz	Schmidtke, H Dave	43.0	Cannon Falls	MN	44.467194	-92.877417
11	WPRV601	450 - 470 MHz	Aldrich Communications	43.0	Cannon Falls	MN	44.467222	-92.877222
12	WNGJ249	450 - 470 MHz	Hernkers Inc.	30.0	Cannon Falls	MN	44.408306	-92.875750
13	KTY965	150 - 174 MHz	Minnesota, State of	106.4	Cannon Falls	MN	44.416556	-92.874306
14	WQDH377	800 - 900 MHz	Minnesota, State of	106.3	Cannon Falls	MN	44.416556	-92.874306
15	WQGP332	150 - 174 MHz	Minnesota, State of	106.4	Cannon Falls	MN	44.416556	-92.874306
16	WQGP332	150 - 174 MHz	Minnesota, State of	82.3	Cannon Falls	MN	44.416556	-92.874306
17	WQHS592	800 - 900 MHz	Minnesota, State of	105.8	Cannon Falls	MN	44.416556	-92.874306
18	WQKC716	800 - 900 MHz	Minnesota, State of	100.6	Cannon Falls	MN	44.416556	-92.874306
19	WPQA505	800 - 900 MHz	Minnesota, State of	78.6	Wanamingo	MN	44.348056	-92.830278
20	WPTR887	450 - 470 MHz	Sugar Loaf Bus Service	81.9	Wanamingo	MN	44.348056	-92.830278
21	KUM313	450 - 470 MHz	Kielmeyer Construction	82.0	Wanamingo	MN	44.348028	-92.830194
22	WNHL716	150 - 174 MHz	Minnesota, State of	82.0	Wanamingo	MN	44.348028	-92.830194
23	WNIN614	450 - 470 MHz	Dettling, Shad	82.0	Wanamingo	MN	44.348028	-92.830194
24	WNKP939	450 - 470 MHz	Zumbrota Mazeppa Public Schools	82.0	Wanamingo	MN	44.348028	-92.830194
25	WPGK514	450 - 470 MHz	Aldrich Communications	82.0	Wanamingo	MN	44.348028	-92.830194
26	WPNR315	450 - 470 MHz	Schmidtke, H Dave	82.0	Wanamingo	MN	44.348028	-92.830194
27	WPHA250	450 - 470 MHz	Hilltop Communications	49.0	Hader	MN	44.398583	-92.817417
28	WPHA251	450 - 470 MHz	Hilltop Communications	49.0	Hader	MN	44.398583	-92.817417
29	WZM585	450 - 470 MHz	Nelson, Thomas	49.0	Hader	MN	44.398583	-92.817417
30	WSU426	150 - 174 MHz	Rostad, George N	10.0	Zumbrota	MN	44.352750	-92.799917
31	WQC�892	450 - 470 MHz	Hader Farms Inc.	57.0	Zumbrota	MN	44.356639	-92.799639
32	WGK500	150 - 174 MHz	Great River Energy	9.0	Wanamingo	MN	44.368861	-92.797694
33	WPSU635	800 - 900 MHz	Sprint Nextel	125.6	Hader	MN	44.382500	-92.788611

Table 1: Summary of Land Mobile Sites

ID	Callsign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	City	ST	Latitude (NAD83)	Longitude (NAD83)
34	WPOE497	450 - 470 MHz	Bakers Tire Service	30.0	Wanamingo	MN	44.311639	-92.780750
35	WNVI648	150 - 174 MHz	Groth Implement	30.0	Wanamingo	MN	44.300528	-92.776583
36	KAE754	150 - 174 MHz	Goodhue County Coop Elect Assoc	73.0	Hader	MN	44.344417	-92.768528
37	WPRI349	450 - 470 MHz	Great River Energy	81.0	Hader	MN	44.344417	-92.768528
38	WNGC709	150 - 174 MHz	Great River Energy	83.8	Hader	MN	44.344444	-92.768333
39	WQAJ655	150 - 174 MHz	Great River Energy	83.8	Wanamingo	MN	44.344444	-92.768333
40	WNYG614	150 - 174 MHz	Goodhue, County of	46.0	Hader	MN	44.344972	-92.765750
41	WQX214	150 - 174 MHz	Goodhue, City of	46.0	Hader	MN	44.344972	-92.765750
42	WQHB590	150 - 174 MHz	City of Pine Island	6.1	Wanamingo	MN	44.335972	-92.761917
43	WPOZ778	150 - 174 MHz	Jonas, Mike	11.0	Goodhue	MN	44.361083	-92.698528
44	KNAL744	150 - 174 MHz	Hinrichs, Duane F	21.0	Zumbrota	MN	44.292194	-92.679917
45	WPSU636	800 - 900 MHz	Sprint Nextel	57.9	Zumbrota	MN	44.325278	-92.678056
46	WPLI761	450 - 470 MHz	Anderson Veterinary Service	19.0	Zumbrota	MN	44.288861	-92.666028
47	WPLE937	450 - 470 MHz	Custom Sanding & Snowplowing	34.0	Zumbrota	MN	44.330528	-92.658806
48	WNRW374	450 - 470 MHz	Hilltop Communications	61.0	Zumbrota	MN	44.325250	-92.652972
49	WPGZ803	450 - 470 MHz	Hilltop Communications	61.0	Zumbrota	MN	44.325250	-92.652972
50	WQBC733	450 - 470 MHz	Hilltop Communications	36.0	Zumbrota	MN	44.325250	-92.652972
51	KNCX205	450 - 470 MHz	Farm County Coop	60.7	Zumbrota	MN	44.325278	-92.652778
52	WPWP658	450 - 470 MHz	Hilltop Communications	55.0	Zumbrota	MN	44.325278	-92.652778
53	WQDH377	800 - 900 MHz	Minnesota, State of	106.3	Zumbrota	MN	44.342806	-92.642389
54	WQKC716	800 - 900 MHz	Minnesota, State of	100.6	Zumbrota	MN	44.342806	-92.642389
55	WPKQ845	25 - 50 MHz	Holm Bros Construction	40.0	Goodhue	MN	44.398583	-92.631861
56	WGK500	150 - 174 MHz	Great River Energy	6.0	Goodhue	MN	44.412750	-92.630750
57	WPJP895	150 - 174 MHz	Zemke, Arleigh	12.0	Zumbrota	MN	44.363583	-92.629917
58	WGK239	150 - 174 MHz	Goodhue, City of	20.0	Goodhue	MN	44.387194	-92.626306
59	WQX213	150 - 174 MHz	Goodhue, City of	20.0	Goodhue	MN	44.387194	-92.626306
60	WQDR798	450 - 470 MHz	Hindrich Brothers Farms	20.7	Red Wind	MN	44.492389	-92.623222
61	WNPG914	450 - 470 MHz	Vieths, Curtis W	21.0	Goodhue	MN	44.341917	-92.568806

Table 1: Summary of Land Mobile Sites (continued)

In planning the wind energy turbine locations in the area of interest, a conservative approach would dictate not locating any turbines in close proximity to these land mobile sites to avoid any possible impact to the communications services provided by these stations. However, the frequencies of operation used by the land mobile sites are generally unaffected by the presence of wind turbines. In the unlikely event that a land mobile licensee 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 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 land mobile base station or repeater site.

### 3. Recommended Ancillary Reports

Comsearch offers the following wind energy services.

- **Licensed Microwave Report** – Assess all licensed non-Federal Government microwave paths and worst case Fresnel Zones that intersect the wind energy project area. If any potential obstructions exist, perform a **Detailed Fresnel Zone Analysis** to consider the actual horizontal and vertical Fresnel Zone clearances.
- **Coordination with Federal Government Systems** - Coordinate with NTIA, the agency that manages government spectrum, to determine if the proposed wind energy project will impact Federal Government links.
- **TV Analysis** - Plot off-air TV stations within 100 miles of the project area to identify which communities may have signal reception issues.
- **Ancillary Telecommunication Studies** – Conduct obstruction studies of other potentially-affected wireless telecommunication systems. This includes:
  - Land Mobile Sites
  - AM and FM Broadcast Stations
  - Advanced Wireless and Mobile Phone Carriers
  - Cable Facilities
  - Radio Astronomy Sites
- **Tower Structures** - Identify and map tower structures owned by the top five tower companies and those found in the FCC's Antenna Structure Registration database.
- **TV Baseline Measurements** - Perform baseline measurements of off-air TV stations in the vicinity of the wind energy facility. The measurements will be performed at various locations in population centers and at locations where the potential for signal blockage, multipath and electromagnetic noise degradation is probable.
- **Measurements to Identify Government and Unlicensed Operators** – Identify all commercial and government signals in the area, including unlicensed operators. Frequency range of this measurement will be from 400 MHz – 12,000 MHz.
- **Post Installation Measurements and Consultation** - Perform measurements after the installation of the wind energy facility. The measurements will be made at all sites where signal blockage, multipath and/or electromagnetic noise is reported and/or suspected. If the measurements and analysis verify signal blockage, multipath or electromagnetic noise due to the wind turbines, provide consulting services to mitigate the conditions. Perform radiation hazard compliance measurements.
- **Regulatory Support** - Complete and file FAA forms on behalf of the wind energy developer.





## **4. Contact Us**

For questions or information regarding the Land Mobile Report, contact:

Contact person:	Denise Finney
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Web site:	<a href="http://www.comsearch.com">www.comsearch.com</a>

# Wind Power GeoPlanner™

## Licensed Microwave Report

Goodhue Wind, LLC



Prepared on Behalf of  
Goodhue Wind, LLC

October 1, 2009



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## **1. Introduction**

The use of wind energy, one of the oldest forms of harnessing a natural energy source, is now one of the world's fastest growing alternative energy sources. The United States is committed to the use of wind energy, and over the next several years billions of dollars will be spent on wind power projects. However, as new wind turbine generators are installed around the country, it is important to note that they may pose an interference threat to existing microwave systems and broadcast stations licensed to operate in the United States.

Wind turbines can interfere with microwave paths by physically blocking the line-of-sight between two microwave transmitters. Additionally, wind turbines have the potential to cause blockage and reflections ("ghosting") to television reception. Blockage is caused by the physical presence of the turbines between the television station and the reception points. Ghosting is caused by multipath interference that occurs when a broadcast signal reflects off of a large reflective object—in this case a wind turbine—and arrives at a television receiver delayed in time from the signal that arrives via direct path.

Many states and other jurisdictions recognize the need for regulations addressing interference to radio signal transmissions from the wind turbine installations. Specifically, local planning authorities typically require project developers to ensure wind turbines will not cause interference. In some cases they require developers to notify the telecommunication operators in the area of the proposed wind turbine installation. Other factors prompting developers to undertake proactive investigation into potential interference include the need to prevent legal and regulatory problems and the desire to promote goodwill within the community—a good neighbor approach.

Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). 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 non-federal government microwave systems. Comsearch provides additional wind energy services, a description of which can be found at the end of this report.

## 2. Summary of Results

An overall summary of results appears below.

### Project Information

Name: Goodhue Wind, LLC

County: Goodhue

State: Minnesota

Number of Microwave Paths Analyzed	Number of Turbines	Number of Potential Obstructions
21	N/A	N/A

### Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed paths from 0.9 - 23 GHz<sup>1</sup>. First, we determined all microwave paths that intersect the area of interest<sup>2</sup>. The area of interest was defined by the client and encompasses the planned turbine locations. Next, for each microwave path that intersected the project area, we calculated a Worst Case Fresnel Zone (WCFZ). The mid-point of a full microwave path is the location where the widest (or worst case) Fresnel zone occurs. Fresnel zones were calculated for each path using the following formula.

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

Where,

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

For worst case Fresnel zone calculations,  $d_1 = d_2$

<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.

The calculated WCFZ radius, giving the linear path an area or swath, buffers each microwave path in the project area. See the Tables and Figures section for a summary of paths and WCFZ distances. In general, this is the two-dimensional area where the planned wind turbines should be avoided, if possible. A depiction of the WCFZ overlaid on topographic basemaps can be found in the Tables and Figures section, and is also included on the enclosed CD<sup>3</sup>.

#### **Discussion of Potential Obstructions**

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.

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



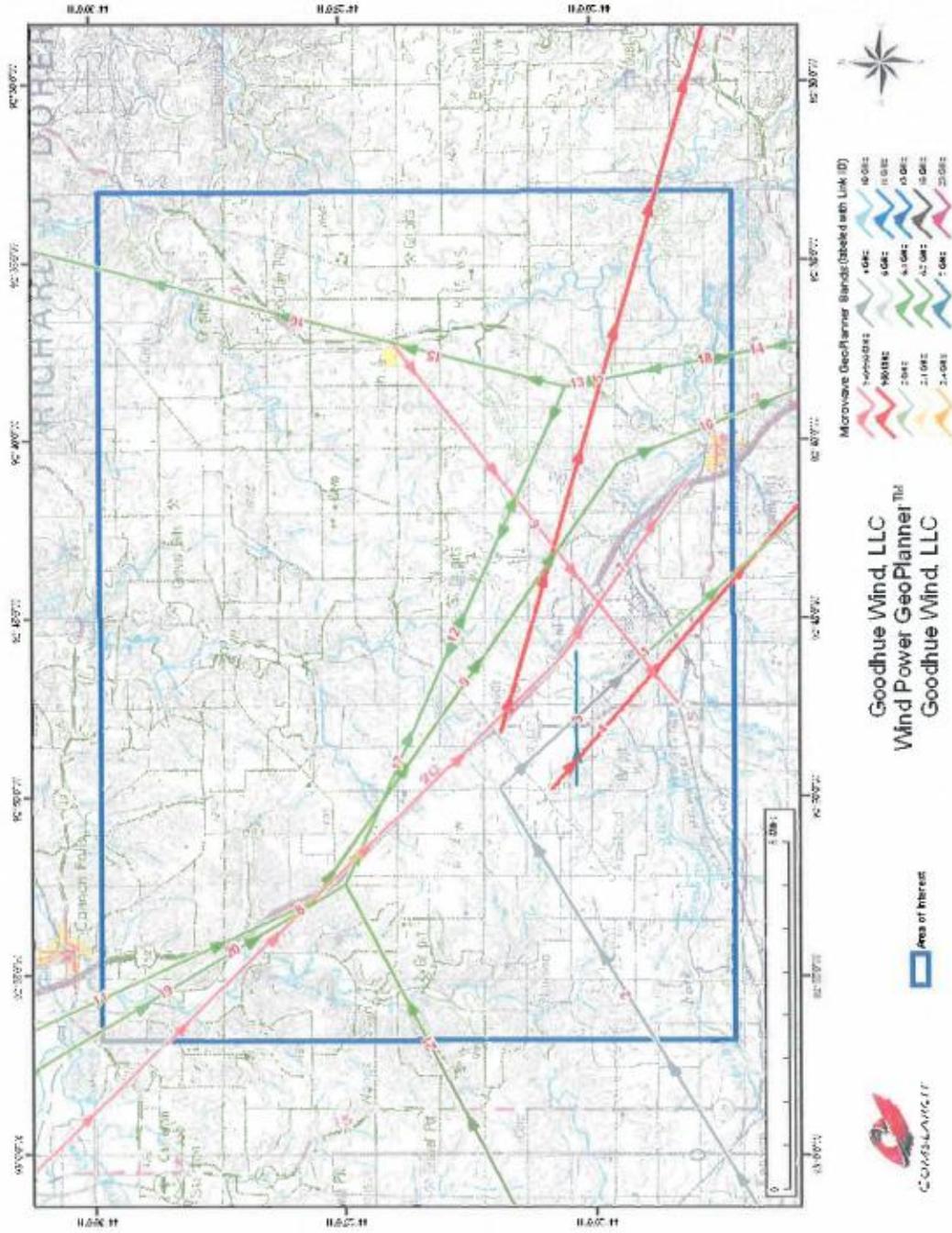
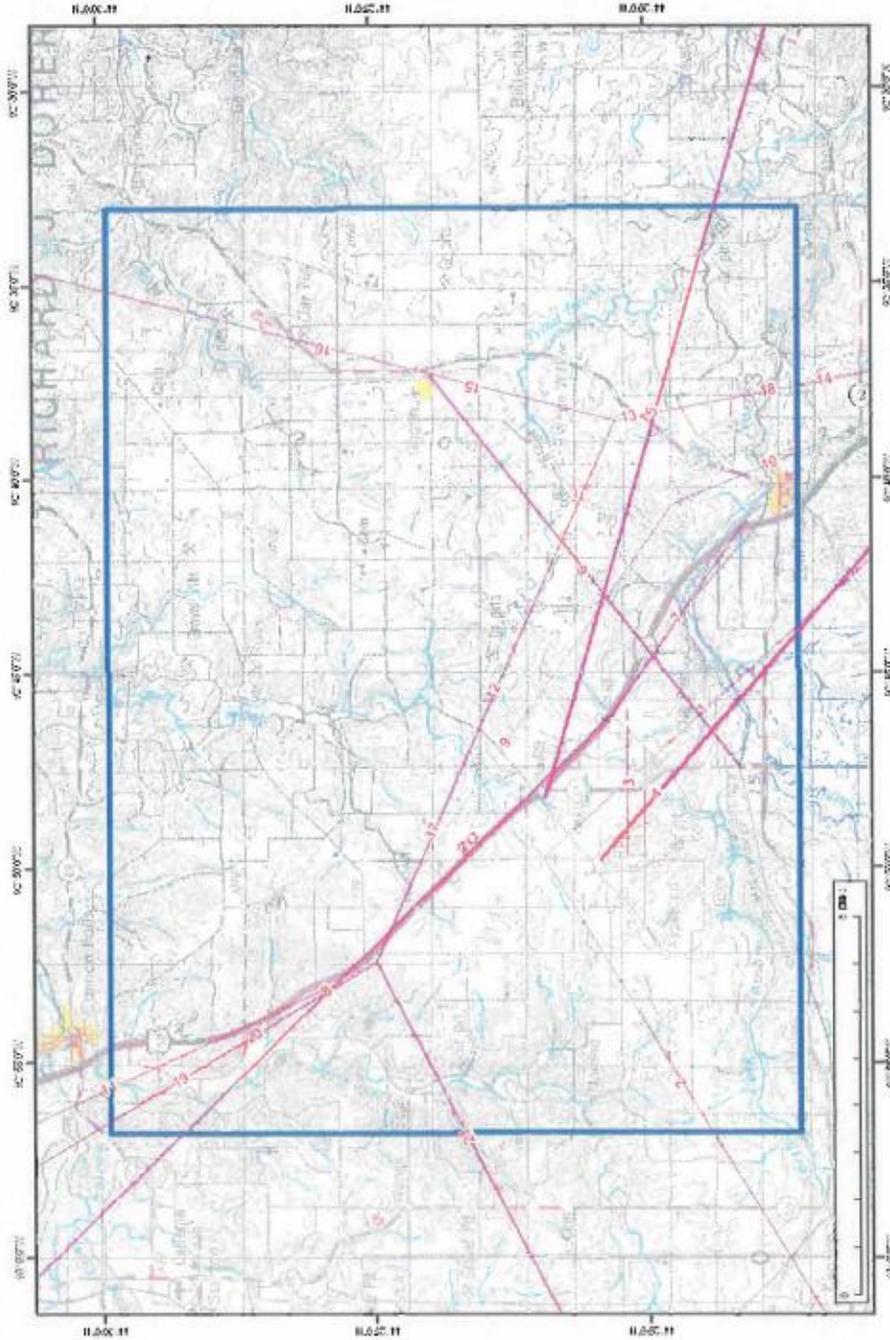


Figure 2: Microwave Paths that Intersect the Area of Interest



Goodhue Wind, LLC  
Wind Power GeoPlanner™  
Goodhue Wind, LLC



WCFZ (Labeled with Link ID)  
Area of Interest



Figure 3: Microwave Paths with WCFZ Buffers



ID	Site Name 1	Site Name 2	Callsign 1	Callsign 2	Band	Licensee	WCFZ (m)
1	HADER	N ROCHESTER	KBL99	WHR360	Lower 6 GHz	AT&T COMMUNICATIONS OF THE MIDWEST INC	22.28
2	MEDFORD	HADER	KFJ59	KBL99	Lower 6 GHz	AT&T COMMUNICATIONS OF THE MIDWEST INC	22.59
3	WANAMINGO	RECEIVE	KXY62	RXONLY	7 GHz	Cumulus Media, Inc.	7.31
4	HADER	ROCHESTER	WLI434	RXONLY	950 MHz	Minnesota Public Radio (KRSD-FM)	63.94
5	HADAR	ZUMBRO FALLS	WLP597	RXONLY	950 MHz	CC LICENSES, LLC	51.79
6	GOODHUE	WANAMINGO	WNTT311	WNTT310	940-960 MHz	AG PARTNERS	36.53
7	MINNEOLA TWP	224 MAIN ST	WNTV866	WNTV867	940-960 MHz	Great River Energy	25.23
8	RANDOLPH	MINNEOLA TWP	WNTV944	WNTV866	940-960 MHz	Great River Energy	52.69
9	A1Q0060A	QO81	WPQR847	WPQS214	Upper 6 GHz	T-Mobile License LLC	14.90
10	QO81	QO95	WPQS214	WPSL824	Upper 6 GHz	T-Mobile License LLC	16.31
11	A1Q0061A	A1Q0060A	WPSL826	WPQR847	Upper 6 GHz	T-Mobile License LLC	14.70
12	ZUMBROTA	CANNON FALLS	WQCT665	WQCT678	Upper 6 GHz	Minnesota, State of (DOT)	15.03
13, 14	ZUMBROTA	NEW HAVEN	WQCT665	WQCT701	Lower 6 GHz	Minnesota, State of (DOT)	16.91
15, 16	ZUMBROTA	RED WING	WQCT665	WQHT569	Upper 6 GHz	Minnesota, State of (DOT)	15.25
17	CANNON FALLS	ZUMBROTA	WQCT678	WQCT665	Lower 6 GHz	Minnesota, State of (DOT)	15.65
18	NEW HAVEN	ZUMBROTA	WQCT701	WQCT665	Lower 6 GHz	Minnesota, State of (DOT)	16.91
19	EMPIRE	CANNON FALLS	WQDC989	WQCT678	Lower 6 GHz	Minnesota, State of (DOT)	21.64
20	EMPIRE	CANNON FALLS	WQDC989	WQCT678	Upper 6 GHz	Minnesota, State of (DOT)	20.78
21	FAIRBAULT	CANNON FALLS	WQIQ307	WQCT678	Upper 6 GHz	Minnesota, State of (DOT)	18.39

Table 1: Microwave Paths that Intersect the Area of Interest

(See enclosed mw\_geopl.xls for more information and  
GP\_dict\_matrix\_description.xls for detailed field descriptions)

## 4. Recommended Ancillary Reports

Comsearch offers the following wind energy services.

- **Licensed Microwave Report** – Assess all licensed non-Federal Government microwave paths and worst case Fresnel Zones that intersect the wind energy project area. If any potential obstructions exist, perform a **Detailed Fresnel Zone Analysis** to consider the actual horizontal and vertical Fresnel Zone clearances.
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- **Regulatory Support** - Complete and file FAA forms on behalf of the wind energy developer.



## **5. Contact Us**

For questions or information regarding the Licensed Microwave Report, contact:

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

ID	SEQ_NO	SITE1	SITE2	STATUS1	STATUS2	CALL1	CALL2	OWNER1	OWNER2	BILL1	BILL2
1	17327	HADER	N ROCHESTER	LP	LP	KBL99	WHR360	ATTCMW	ATTCMW		
2	17219	MEDFORD	HADER	LP	LP	KFJ59	KBL99	ATTCMW	ATTCMW		
3	17307	WANAMINGO	RECEIVE	LP	LP	KXY62	RXONLY	SOUJIN	SOUJIN		
4	17319	HADER	ROCHESTER	LP	LP	WLI434	RXONLY	S05985	S05985	1000038426	1000038426
5	17325	HADAR	ZUMBRO FALLS	LP	LP	WLP597	RXONLY	CCLICE	CCLICE		
6	17414	GOODHUE	WANAMINGO	LP	LP	WNTT311	WNTT310	S02697	S02697		
7	17317	MINNEOLA TWP	224 MAIN ST	LP	LP	WNTV866	WNTV867	GRIVER	GRIVER		
8	17603	RANDOLPH	MINNEOLA TWP	LP	LP	WNTV944	WNTV866	GRIVER	GRIVER		
9	17439	A1Q0060A	MINNEOLA TWP	LP	LP	WPQR847	WPQS214	OMNPTC	OMNPTC		
10	17298	QO81	QO81	LP	LP	WPQS214	WPSL824	OMNPTC	OMNPTC		
11	17609	A1Q0061A	A1Q0060A	LP	LP	WPSL826	WPQR847	OMNPTC	OMNPTC		
12	17313	ZUMBROTA	CANNON FALLS	LP	LP	WQCT665	WQCT678	S05795	S05795		
13	17312	ZUMBROTA	NEW HAVEN	PN	PN	WQCT665	WQCT701	S05795	S05795		
14	17314	ZUMBROTA	NEW HAVEN	LP	LP	WQCT665	WQCT701	S05795	S05795		
15	17315	ZUMBROTA	RED WING	LP	LP	WQCT665	WQHT569	S05795	S05795		
16	17316	ZUMBROTA	RED WING	LP	LP	WQCT665	WQHT569	S05795	S05795		
17	17434	CANNON FALLS	ZUMBROTA	PN	PN	WQCT678	WQCT665	S05795	S05795		
18	17006	NEW HAVEN	ZUMBROTA	PN	PN	WQCT701	WQCT665	S05795	S05795		
19	17743	EMPIRE	CANNON FALLS	PA	PA	WQDC989	WQCT678	S05795	S05795		
20	17745	EMPIRE	CANNON FALLS	LP	LP	WQDC989	WQCT678	S05795	S05795		
21	17271	FAIRBAULT	CANNON FALLS	LP	LP	WQIQ307	WQCT678	S05795	S05795		

LAT1	LON1	LAT2	LON2	LAT1_DS	LON1_DS	LAT2_DS
44.3655277780	-92.82963888890	44.09275000000	-92.48461111110	159715.90000000000	-334186.70000000000	158733.90000000000
44.16747222220	-93.27938888890	44.36552777780	-92.82963888890	159002.90000000000	-335805.80000000000	159715.90000000000
44.33966666670	-92.82880555560	44.33963888890	-92.76611111110	159622.80000000000	-334183.70000000000	159622.70000000000
44.34800000000	-92.83019444440	44.04052777780	-92.34127777780	159652.80000000000	-334188.70000000000	158545.90000000000
44.36497222220	-92.80380555560	44.27913888890	-92.39405555560	159713.90000000000	-334093.70000000000	159404.90000000000
44.39941666670	-92.62241666670	44.30580555560	-92.79019444440	159837.90000000000	-333440.70000000000	159500.90000000000
44.34441666670	-92.76852777780	44.30302777780	-92.68519444440	159639.90000000000	-333966.70000000000	159490.90000000000
44.57136111110	-93.07800000000	44.34441666670	-92.76852777780	160456.90000000000	-335080.80000000000	159639.90000000000
44.42758333330	-92.88255555560	44.32516666670	-92.67791666670	159939.30000000000	-334377.20000000000	159570.60000000000
44.32516666670	-92.67791666670	44.12675000000	-92.56547222220	159570.60000000000	-333640.50000000000	158856.30000000000
44.58566666670	-92.98461111110	44.42758333330	-92.88255555560	160508.40000000000	-334744.60000000000	159939.30000000000
44.34280555560	-92.64238888890	44.41655555560	-92.87430555560	159634.10000000000	-333512.60000000000	159899.60000000000
44.34280555560	-92.64238888890	44.13416666670	-92.58750000000	159634.10000000000	-333512.60000000000	158883.00000000000
44.34280555560	-92.64238888890	44.13416666670	-92.58750000000	159634.10000000000	-333512.60000000000	158883.00000000000
44.34280555560	-92.64238888890	44.52416666670	-92.57638888890	159634.10000000000	-333512.60000000000	160287.00000000000
44.34280555560	-92.64238888890	44.52416666670	-92.57638888890	159634.10000000000	-333512.60000000000	160287.00000000000
44.41655555560	-92.87430555560	44.34280555560	-92.64238888890	159899.60000000000	-334347.50000000000	159634.10000000000
44.13416666670	-92.58750000000	44.34280555560	-92.64238888890	158883.00000000000	-333315.00000000000	159634.10000000000
44.71483333330	-93.12477777780	44.41655555560	-92.87430555560	160973.40000000000	-335249.20000000000	159899.60000000000
44.71483333330	-93.12477777780	44.41655555560	-92.87430555560	160973.40000000000	-335249.20000000000	159899.60000000000
44.29111111110	-93.21138888890	44.41655555560	-92.87430555560	159448.00000000000	-335561.00000000000	159899.60000000000

LON2_DS	STATE1	STATE2	GNDELEV1	GNDELEV2	BEAR12	BEAR21	DIST_K
-332944.600000000000	MIN	MIN	362.000000000000	350.000000000000	137.592526000000	317.833193000000	40.971400000000
-334186.700000000000	MIN	MIN	364.000000000000	362.000000000000	58.342613000000	238.656537000000	42.118700000000
-333958.000000000000	MIN	MIN	365.000000000000	373.000000000000	90.013462000000	270.057280000000	4.999900000000
-332428.600000000000	MIN	MIN	373.000000000000	379.000000000000	130.985242000000	311.326062000000	51.913700000000
-332618.600000000000	MIN	MIN	368.000000000000	319.000000000000	106.123254000000	286.409543000000	34.050200000000
-334044.700000000000	MIN	MIN	347.000000000000	320.000000000000	232.190711000000	52.073422000000	16.945500000000
-333666.700000000000	MIN	MIN	377.000000000000	298.000000000000	124.647686000000	304.705912000000	8.083400000000
-333966.700000000000	MIN	MIN	316.000000000000	377.000000000000	135.566850000000	315.783600000000	35.250800000000
-333640.500000000000	MIN	MIN	355.000000000000	356.000000000000	124.834611000000	304.977729000000	19.887700000000
-333235.700000000000	MIN	MIN	356.000000000000	342.000000000000	157.788832000000	337.867260000000	23.807600000000
-334377.200000000000	MIN	MIN	311.000000000000	355.000000000000	155.167093000000	335.238633000000	19.350600000000
-334347.500000000000	MIN	MIN	368.000000000000	350.000000000000	293.993051000000	113.830846000000	20.218000000000
-333315.000000000000	MIN	MIN	368.000000000000	359.000000000000	169.270369000000	349.308662000000	23.594100000000
-333315.000000000000	MIN	MIN	368.000000000000	359.000000000000	169.270369000000	349.308662000000	23.594100000000
-333275.000000000000	MIN	MIN	368.000000000000	322.000000000000	14.591964000000	194.638169000000	20.826700000000
-333275.000000000000	MIN	MIN	368.000000000000	322.000000000000	14.591964000000	194.638169000000	20.826700000000
-333512.600000000000	MIN	MIN	350.000000000000	368.000000000000	113.830846000000	293.993051000000	20.218000000000
-333512.600000000000	MIN	MIN	359.000000000000	368.000000000000	349.308662000000	169.270369000000	23.594100000000
-334347.500000000000	MIN	MIN	288.000000000000	350.000000000000	148.934443600000	329.110199000000	38.659400000000
-334347.500000000000	MIN	MIN	288.000000000000	350.000000000000	148.934443600000	329.110199000000	38.659400000000
-334347.500000000000	MIN	MIN	362.000000000000	350.000000000000	62.468599000000	242.704250000000	30.275500000000

TANTMAN1	TANTMAN2	TANTMOD1	TANTMOD2	TACL1	TACL2	TANTGAIN1
ANDREW CORPORATION	ANDREW CORPORATION	SHX10B	SHX10B	77.72000000000000	77.72000000000000	42.70000000000000
ANDREW CORPORATION	ANDREW CORPORATION	SHX10B	SHX10B	57.00000000000000	128.63000000000000	42.70000000000000
TYPICAL		2 FOOT DISH		6.10000000000000	0.00000000000000	30.00000000000000
MARK ANTENNA		P-996G		76.20000000000000	0.00000000000000	25.00000000000000
SCALA ELECTRONICS		PR-450U (H)		115.82000000000000	0.00000000000000	18.10000000000000
SCALA ELECTRONICS	SCALA ELECTRONICS	MF-960B (V)	MF-960B (V)	42.37000000000000	30.48000000000000	16.20000000000000
DECIBEL PRODUCTS	DECIBEL PRODUCTS	DB-496-A (V)	DB-496-A (V)	42.67000000000000	14.94000000000000	13.60000000000000
MARK ANTENNA	SINCLAIR TECHNOLOG	P-9A96G	SRL-460V (H POL)	90.22000000000000	42.67000000000000	24.60000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A RF	PAR6-65A RF	48.20000000000000	51.20000000000000	38.79000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A RF	PAR6-65A RF	49.70000000000000	57.00000000000000	38.79000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A RF	PAR6-65A RF	30.48000000000000	30.48000000000000	38.79000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A LF	PAR6-65A LF	64.00000000000000	47.20000000000000	38.79000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-59A	PAR6-59A	25.90000000000000	41.10000000000000	38.20000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR8-65A LF	PAR6-65A LF	25.90000000000000	41.10000000000000	41.30000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A RF	PAR6-65A RF	42.70000000000000	51.80000000000000	38.79000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A RF	PAR6-65A RF	42.70000000000000	51.80000000000000	38.79000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-59A	PAR6-59A	47.20000000000000	64.00000000000000	38.20000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-59A	PAR6-59A	41.10000000000000	25.90000000000000	38.20000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR10-59A	PAR8-59A	74.70000000000000	61.00000000000000	43.20000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR10-65 LF	PAR8-65A LF	74.70000000000000	61.00000000000000	43.60000000000000
ANDREW CORPORATION	ANDREW CORPORATION	PAR6-65A RF	PAR6-65A RF	70.10000000000000	36.60000000000000	38.79000000000000

TANTGAIN2	TANTBW3_1	TANTBW3_2	EQPMAN1	EQPMAN2	EQPMOD1
42.700000000000	0.700000000000	0.700000000000	AT&T TECHNOLOGIES, INC	AT&T TECHNOLOGIES, INC	AS593MDR6-30-135E
42.700000000000	0.700000000000	0.700000000000	AT&T TECHNOLOGIES, INC	AT&T TECHNOLOGIES, INC	AS593MDR6-30-135E
0.000000000000	2.500000000000	0.000000000000	AB EQUIPMENT	RECEIVE	UNKNOWN
0.000000000000	4.650000000000	0.000000000000	AB EQUIPMENT	RECEIVE	UNKNOWN
0.000000000000	12.000000000000	0.000000000000	AB EQUIPMENT	RECEIVE	UNKNOWN
16.200000000000	8.000000000000	8.000000000000	MULTIPOINT NETWORKS	MULTIPOINT NETWORKS	EV95S8MN10D25
13.600000000000	9.500000000000	9.500000000000	MICROWAVE DATA SYSTEMS, INC	MICROWAVE DATA SYSTEMS, INC	E5M5LL1460
18.200000000000	4.550000000000	13.000000000000	MICROWAVE DATA SYSTEMS, INC	MICROWAVE DATA SYSTEMS, INC	E5M5LL1460
38.790000000000	0.900000000000	0.900000000000	HARRIS STRATEX NETWORKS	HARRIS STRATEX NETWORKS	HRS-CX-06G16D1
38.790000000000	0.900000000000	0.900000000000	HARRIS STRATEX NETWORKS	HARRIS STRATEX NETWORKS	HRS-CX-06G16D1
38.790000000000	0.900000000000	0.900000000000	HARRIS STRATEX NETWORKS	HARRIS STRATEX NETWORKS	HRS-CX-06G16D1
38.790000000000	0.900000000000	0.900000000000	HARRIS STRATEX NETWORKS	HARRIS STRATEX NETWORKS	HRS-CX-06G28D1
38.200000000000	0.950000000000	0.950000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	AMT-M6-I-30-155MBPS
38.790000000000	0.650000000000	0.900000000000	HARRIS STRATEX NETWORKS	HARRIS STRATEX NETWORKS	HRS-CX-06G28D1
38.790000000000	0.900000000000	0.900000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	LBW-CM6HC-MDS1
38.790000000000	0.900000000000	0.900000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	AMT-M6-I-3.75-12
38.200000000000	0.950000000000	0.950000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	AMT-M6-I-30-155MBPS
38.200000000000	0.950000000000	0.950000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	AMT-M6-I-30-155MBPS
40.790000000000	0.550000000000	0.700000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	AMT-M6-I-30-155MBPS
41.300000000000	0.500000000000	0.650000000000	HARRIS STRATEX NETWORKS	HARRIS STRATEX NETWORKS	HRS-CX-06G28D1
38.790000000000	0.900000000000	0.900000000000	MICROWAVE NETWORKS	MICROWAVE NETWORKS	AMT-M6-I-3.75-12

EQPMOD2	CHLOAD1	CHLOAD2	PWR1	PWR2	LL1	LL2	EQPED1	EQPED2	CHANNELS1
AS593MDR6-30-135E	2016	2016	36.000000000000	36.000000000000	2.000000000000	2.000000000000	30M0A7W	30M0A7W	2016CH
AS593MDR6-30-135E	2016	2016	36.000000000000	36.000000000000	3.000000000000	4.000000000000	30M0A7W	30M0A7W	2016CH
ONLY	1	1	41.000000000000	0.000000000000	0.000000000000	0.000000000000	25M0F3E		1 CH
ONLY	1	1	33.000000000000	0.000000000000	0.000000000000	0.000000000000	500KF9W		1 CH
ONLY	1	1	31.000000000000	0.000000000000	0.000000000000	0.000000000000	500KF9W		1 CH
EV95S8MIN10D25	1	1	36.000000000000	36.000000000000	4.000000000000	4.000000000000	25K0F7W	25K0F7W	1 CH
E5M5LL1460	12	12	37.000000000000	37.000000000000	4.000000000000	2.000000000000	200KF8W	200KF8W	12 CH
E5M5LL1460	12	12	37.000000000000	37.000000000000	3.000000000000	2.000000000000	200KF8W	200KF8W	12 CH
HRS-CX-06G16D1	384	384	29.000000000000	29.000000000000	3.000000000000	3.000000000000	5M00D7W	5M00D7W	384 CH
HRS-CX-06G16D1	384	384	29.000000000000	29.000000000000	3.000000000000	4.000000000000	5M00D7W	5M00D7W	384 CH
HRS-CX-06G16D1	384	384	28.000000000000	28.000000000000	1.000000000000	1.000000000000	5M00D7W	5M00D7W	384 CH
HRS-CX-06G28D1	672	672	28.000000000000	28.000000000000	3.000000000000	3.000000000000	10M0D7W	10M0D7W	672 CH
AMT-M6-I-30-155MBPS	2016	2016	29.000000000000	29.000000000000	6.000000000000	5.000000000000	30M0D7W	30M0D7W	2016CH
HRS-CX-06G28D1	672	672	28.000000000000	28.000000000000	1.000000000000	2.000000000000	10M0D7W	10M0D7W	672 CH
LBW-CM6HC-MDS1	672	672	29.000000000000	29.000000000000	4.000000000000	3.000000000000	10M0D7W	10M0D7W	672 CH
AMT-M6-I-3.75-12	192	192	29.000000000000	29.000000000000	4.000000000000	3.000000000000	3M75D7W	3M75D7W	192 CH
AMT-M6-I-30-155MBPS	2016	2016	29.000000000000	29.000000000000	5.000000000000	6.000000000000	30M0D7W	30M0D7W	2016CH
AMT-M6-I-30-155MBPS	2016	2016	32.000000000000	32.000000000000	4.000000000000	4.000000000000	30M0D7W	30M0D7W	2016CH
AMT-M6-I-30-155MBPS	2016	2016	29.000000000000	29.000000000000	6.000000000000	5.000000000000	30M0D7W	30M0D7W	2016CH
HRS-CX-06G28D1	672	672	28.000000000000	28.000000000000	4.000000000000	3.000000000000	10M0D7W	10M0D7W	672 CH
AMT-M6-I-3.75-12	192	192	30.000000000000	30.000000000000	1.000000000000	1.000000000000	3M75D7W	3M75D7W	192 CH

CHANNELS2	CLASS1	CLASS2	STABILITY1	STABILITY2	BAND_NUM	SERVICE	BAND_NAME	BAND	FREQ1_1	FREQ1_2
2016CH	DIG	DIG	0.002	0.002	6.000000000000	cc	Lower 6 GHz	6.1 GHz	6197.24000H	6256.54000H
2016CH	DIG	DIG	0.002	0.002	6.000000000000	cc	Lower 6 GHz	6.1 GHz	5945.20000H	5974.85000V
1 CH	FMV	FMV	0.005	0.005	7.000000000000	tv	7 GHz	7 GHz	7075.00000B	
1 CH	MSG	MSG	0.005	0.005	1.000000000000	tv	950 MHz	950 MHz	946.00000 H	
1 CH	MSG	MSG	0.005	0.005	1.000000000000	tv	950 MHz	950 MHz	949.50000 H	
1 CH	DIG	DIG	0.00015	0.00015	1.000000000000	of	940-960 MHz	940-960 MHz	959.55000 V	
12 CH	MSG	MSG	0.00015	0.00015	1.000000000000	of	940-960 MHz	940-960 MHz	958.55000 V	
12 CH	MSG	MSG	0.00015	0.00015	1.000000000000	of	940-960 MHz	940-960 MHz	953.95000 H	
384 CH	DIG	DIG	0.0003	0.0003	6.000000000000	of	Upper 6 GHz	6.7 GHz	6565.00000H	6625.000000H
384 CH	DIG	DIG	0.0003	0.0003	6.000000000000	of	Upper 6 GHz	6.7 GHz	6770.00000V	6830.000000V
384 CH	DIG	DIG	0.0003	0.0003	6.000000000000	of	Upper 6 GHz	6.7 GHz	6845.00000V	
672 CH	DIG	DIG	0.0003	0.0003	6.000000000000	of	Upper 6 GHz	6.7 GHz	6625.00000V	
2016CH	DIG	DIG	0.001	0.001	6.000000000000	cc	Lower 6 GHz	6.1 GHz	6004.50000V	
672 CH	DIG	DIG	0.0003	0.0003	6.000000000000	of	Upper 6 GHz	6.7 GHz	6645.00000V	
672 CH	DIG	DIG	0.001	0.001	6.000000000000	of	Upper 6 GHz	6.7 GHz	6695.00000V	
192 CH	DIG	DIG	0.001	0.001	6.000000000000	of	Upper 6 GHz	6.7 GHz	6605.62500V	
2016CH	DIG	DIG	0.001	0.001	6.000000000000	cc	Lower 6 GHz	6.1 GHz	6197.24000V	
2016CH	DIG	DIG	0.001	0.001	6.000000000000	cc	Lower 6 GHz	6.1 GHz	6152.75000V	
2016CH	DIG	DIG	0.001	0.001	6.000000000000	cc	Lower 6 GHz	6.1 GHz	6093.45000H	
672 CH	DIG	DIG	0.0003	0.0003	6.000000000000	of	Upper 6 GHz	6.7 GHz	6695.00000H	
192 CH	DIG	DIG	0.001	0.001	6.000000000000	of	Upper 6 GHz	6.7 GHz	6830.62500V	

FREQ1\_3 FREQ1\_4 FREQ1\_5 FREQ1\_6 FREQ1\_7 FREQ1\_8 FREQ1\_9 FREQ1\_10 FREQ1\_11 FREQ1\_12 FREQ1\_13 FREQ2\_1  
6315.84000H 6375.14000H 5974.85000H  
6063.80000H 6093.45000V 6197.24000H

955.95000 V  
954.95000 V  
957.55000 H  
6735.00000H  
6610.00000V  
6685.00000V  
6785.00000V  
6256.54000V  
6805.00000V  
6855.00000 V  
6765.62500V  
5974.85000V  
6404.79000V  
6345.49000H  
6855.00000H  
6670.62500V

FREQ2\_2 FREQ2\_3 FREQ2\_4 FREQ2\_5 FREQ2\_6 FREQ2\_7 FREQ2\_8 FREQ2\_9 FREQ2\_10 FREQ2\_11 FREQ2\_12 FREQ2\_13

6034.15000H 6093.45000H 6152.75000H

6226.89000V

6785.00000H

6670.00000V





STREET2	CITY2	STATE_2	ZIP2	ZIPEX2	AREA2	PHONE2	PHONEEX2	FAXAREA2	FAX2	WCFZ
2315 SALEM ROAD, FIRST FLOOR, H9	CONYERS	GA	30013		770	6022065	0	404	8107349	22.28
2315 SALEM ROAD, FIRST FLOOR, H9	CONYERS	GA	30013		770	6022065	0	404	8107349	22.59
5100 South Tennis Lane	Sioux Falls	SD	57108		0	0	0	0	0	7.31
45 East 7th Street	St Paul	MN	55101		651	2901418	0	651	2222065	63.94
2625 SOUTH MEMORIAL DR - SUITE A	TULSA	OK	74129		918	6644581	0	918	6643066	51.79
PO BOX 218	GOODHUE	MN	55027		515	2282183	0	0	0	36.53
12300 Elm Creek Blv.	Maple Grove	MN	55369		763	4413121	0	0	0	25.23
12300 Elm Creek Blv.	Maple Grove	MN	55369		763	4413121	0	0	0	52.69
12920 SE 38th Street	Bellevue	WA	98006		425	3834000	0	425	3837080	14.90
12920 SE 38th Street	Bellevue	WA	98006		425	3834000	0	425	3837080	16.31
12920 SE 38th Street	Bellevue	WA	98006		425	3834000	0	425	3837080	14.70
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	15.03
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	16.91
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	16.23
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	15.25
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	15.25
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	15.65
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	16.91
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	21.64
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	20.78
395 John Ireland Blvd., MS 730	St. Paul	MN	55155		651	2347973	0	651	2347960	18.39

## GeoPlanner Microwave Data Field Descriptions

Attribute	Description
SITE1	NAME SITE 1
SITE2	NAME SITE 2
STATUS1	STATUS SITE 1
STATUS2	STATUS SITE 2
CALL1	CALLSIGN SITE 1
CALL2	CALLSIGN SITE 2
LAT1	LATITUDE DECIMAL DEGREES SITE 1
LON1	LONGITUDE DECIMAL DEGREES SITE 1
LAT2	LATITUDE DECIMAL DEGREES SITE 2
LON2	LONGITUDE DECIMAL DEGREES SITE 2
LAT1_DS	LATITUDE DECIMAL SECONDS SITE 1
LON1_DS	LONGITUDE DECIMAL SECONDS SITE 1
LAT2_DS	LATITUDE DECIMAL SECONDS SITE 2
LON2_DS	LONGITUDE DECIMAL SECONDS SITE 2
STATE1	STATE SITE 1
STATE2	STATE SITE 2
GNDELEV1	GROUND ELEVATION SITE 1 (meters) AMSL
GNDELEV2	GROUND ELEVATION SITE 2 (meters) AMSL
BEAR12	PATH AZIMUTH FROM SITE 1 TO SITE 2 (degrees)
BEAR21	PATH AZIMUTH FROM SITE 2 TO SITE 1 (degrees)
DIST_K	PATH DISTANCE (kilometers)
TANTMAN1	ANTENNA MANUFACTURER SITE 1
TANTMAN2	ANTENNA MANUFACTURER SITE 2
TANTMOD1	ANTENNA MODEL SITE 1
TANTMOD2	ANTENNA MODEL SITE 2
TACL1	ANTENNA CENTERLINE SITE 1 (meters) AGL
TACL2	ANTENNA CENTERLINE SITE 2 (meters) AGL
TANTGAIN1	ANTENNA GAIN SITE 1 (dBi)
TANTGAIN2	ANTENNA GAIN SITE 2 (dBi)
TANTBW3_1	ANTENNA 3db BANDWIDTH SITE 1 (degrees)
TANTBW3_2	ANTENNA 3db BANDWIDTH SITE 2 (degrees)
EQPMAN1	EQUIPMENT MANUFACTURER SITE 1
EQPMAN2	EQUIPMENT MANUFACTURER SITE 2
EQPMOD1	EQUIPMENT MODEL SITE 1
EQPMOD2	EQUIPMENT MODEL SITE 2
CHLOAD1	EQUIPMENT CHANNEL LOADING SITE 1 (# of Channels)
CHLOAD2	EQUIPMENT CHANNEL LOADING SITE 2 (# of Channels)
PWR1	EQUIPMENT POWER SITE 1 (dBm)
PWR2	EQUIPMENT POWER SITE 2 (dBm)
LL1	EQUIPMENT LINE LOSS SITE 1 (dB)
LL2	EQUIPMENT LINE LOSS SITE 2 (dB)
EQPED1	EQUIPMENT EMISSION DESIGNATOR SITE 1
EQPED2	EQUIPMENT EMISSION DESIGNATOR SITE 2
CHANNELS1	NUMBER OF CHANNELS SITE 1 (Loading)
CHANNELS2	NUMBER OF CHANNELS SITE 2 (Loading)
CLASS1	EQUIPMENT CLASS SITE 1
CLASS2	EQUIPMENT CLASS SITE 2
STABILITY1	EQUIPMENT STABILITY SITE 2 (%)
STABILITY2	EQUIPMENT STABILITY SITE 2 (%)
BAND_NUMBER	BAND NUMBER
SERVICE	SERVICE
BAND_NAME	BAND NAME
BAND	BAND
FREQ1_1	FREQUENCY SITE 1_1      V=Vertical Polarization
FREQ1_2	FREQUENCY SITE 1_2      H=Horizontal Polarization
FREQ1_3	FREQUENCY SITE 1_3
FREQ1_4	FREQUENCY SITE 1_4

## GeoPlanner Microwave Data Field Descriptions

Attribute	Description
FREQ1_5	FREQUENCY SITE 1_5
FREQ1_6	FREQUENCY SITE 1_6
FREQ1_7	FREQUENCY SITE 1_7
FREQ1_8	FREQUENCY SITE 1_8
FREQ1_9	FREQUENCY SITE 1_9
FREQ1_10	FREQUENCY SITE 1_10
FREQ1_11	FREQUENCY SITE 1_11
FREQ1_12	FREQUENCY SITE 1_12
FREQ1_13	FREQUENCY SITE 1_13
FREQ2_1	FREQUENCY SITE 2_1
FREQ2_2	FREQUENCY SITE 2_2
FREQ2_3	FREQUENCY SITE 2_3
FREQ2_4	FREQUENCY SITE 2_4
FREQ2_5	FREQUENCY SITE 2_5
FREQ2_6	FREQUENCY SITE 2_6
FREQ2_7	FREQUENCY SITE 2_7
FREQ2_8	FREQUENCY SITE 2_8
FREQ2_9	FREQUENCY SITE 2_9
FREQ2_10	FREQUENCY SITE 2_10
FREQ2_11	FREQUENCY SITE 2_11
FREQ2_12	FREQUENCY SITE 2_12
FREQ2_13	FREQUENCY SITE 2_13
COMPANY1	COMPANY SITE 1
CONTACT1	CONTACT SITE 1
STREET1	STREET SITE 1
CITY1	CITY SITE 1
STATE_1	STATE SITE 1
ZIP1	ZIP CODE SITE 1
ZIPEX1	ZIP CODE EXTENSION SITE 1
AREA1	AREA CODE SITE 1
PHONE1	PHONE SITE 1
PHONEEX1	PHONE EXTENSION SITE 1
FAXAREA1	FACSIMILE AREA CODE SITE 1
FAX1	FACSIMILE SITE 1
COMPANY2	COMPANY SITE 2
CONTACT2	CONTACT SITE 2
STREET2	STREET SITE 2
CITY2	CITY SITE 2
STATE_2	STATE SITE 2
ZIP2	ZIP CODE SITE 2
ZIPEX2	ZIP CODE EXTENSION SITE 2
AREA2	AREA CODE SITE 2
PHONE2	PHONE SITE 2
PHONEEX2	PHONE EXTENSION SITE 2
FAXAREA2	FACSIMILE AREA CODE SITE 2
FAX2	FACSIMILE SITE 2

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## Wind Energy Project Datasheet

Company Name: Goodhue Wind, LLC  
(to appear on report)

Project Name: Goodhue Wind, LLC

County: Goodhue

State: MN

Ship to:

Company/Contact Name: Goodhue Wind, c/o Tiff Thompson

Address: 3033 Excelsior Blvd., Suite 525, Minneapolis MN 55416

Bill to:

Company/Contact Name: Goodhue Wind, LLC

Address: 3033 Excelsior Blvd., Suite 525

PO Number, if required: GOW1100

Hub Height Above Ground Level (in meters)\*: 80

Turbine Rotor Diameter (in meters)\*: 93

Coordinate Block for the Area of Interest: (DD - decimal degree format preferred)

Min Latitude:	<u>-92.947</u>
Min Longitude:	<u>44.498</u>
Max Latitude:	<u>-92.551</u>
Max Longitude:	<u>44.287</u>

**Turbine locations (optional):** Please provide an Excel Spreadsheet containing turbine locations using Latitude/Longitude coordinates [DD - decimal degree format with minimum of six decimal places preferred.] Please check here whether datum is NAD83 , NAD27  or WGS84 .

\*Please provide values for these fields even if no turbine locations are being provided. A typical value of 80 meters hub height and 90 meters rotor diameter will be used if no value is entered. These values will also appear on any correspondence with the federal government (NTIA).

Fax or Email completed forms to [dfinney@comsearch.com](mailto:dfinney@comsearch.com) Fax: (703) 726-5595  
Questions? Please call (703) 726-5650



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### **GeoPlanner™ and ArcReader**

The GeoPlanner™ product lines and data are provided in industry standard Geographic Information System (GIS) formats. The two formats are ESRI shapefile format and MapInfo tab format. The Digital Raster Graphics (DRG's) are also in the industry standard GeoTiff format. This delivery leverages ESRI ArcReader software and ESRI compatible data files. ArcReader is a free GIS viewer that supports both shapefile and GeoTiff formats. This application was chosen as an interface for the GeoPlanner™ product line(s) to enable users to view, manipulate, and present the data without acquiring additional software costs. ArcReader supports our GeoPlanner™ formats seamlessly and offers the functionality needed to provide detailed analysis of the GeoPlanner™ data for critical, strategic business assessments and decisions.

### **Installing ArcReader**

From the project directory, double-click the setup.exe in the ArcReader folder. This will start the installation wizard.

### **Loading the GeoPlanner™ Project**

Once ArcReader has successfully been installed navigate to and double click on geoplanner.pmf in the project directory on the CD or local disk. This is the ArcReader Project file. A project file contains saved information about map, view and theme properties, classification or labels applied to themes, and any other information applicable to that specific project file. It is in a printable format so custom maps can be created and printed.

**Note:** We no longer provide ArcExplorer as the default GIS viewer. With ArcReader there is no need to copy the project folder to the c:/temp drive. It can be loaded directly from the CD, or any directory it has been copied to as long as the geoplanner.pmf is opened from that location. To store the geoplanner.pmf in a different location from the project files, simply make a shortcut by right clicking and that shortcut can be saved anywhere. ArcExplorer can be included with the geoplanner on request.

### **Getting Help from ArcReader**

 ArcReader comes with two viewing formats, data and display (bottom left of the map screen). Using the display the user can customize a map page that can be printed or saved as a picture file. The layer list on the left allows users to turn features on or off for clearer display



The magnifying tools allow users to zoom in and out for the best viewing resolution.



The Change Title tool can be used to customize the map title.

Additional tools are available and information on them can be found from the Help menu. Or to find out what a tool does, just move the cursor over it. A short description called a Tool Tip will appear in a small popup next to the tool. You can view or print it in PDF format. This will give you valuable insight as to how you can leverage the functionality of ArcReader and the data of GeoPlanner™ to their fullest potential.



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- b. *All Other Licensees.* Except as provided in Section 9.7, any dispute arising out of or relating to this License Agreement or the breach thereof, which cannot be settled through negotiation, shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one (1) arbitrator appointed in accordance with said rules. The language of the arbitration shall be in English. The place of the arbitration shall be at an agreed-upon location. This License Agreement shall not be governed by the United Nations Convention on Contracts for the International Sale of Goods, the application of which is expressly excluded. Either party shall, at the request of the other, make available documents or witnesses relevant to the major aspects of the dispute.

**9.10 Maintenance.** Maintenance for qualifying Software or Data consists of updates and other benefits such as access to technical support, specified in ESRI's or its distributor's most current applicable software maintenance policy.

**9.11 Entire Agreement.** This License Agreement, including Exhibit 1, constitutes the sole and entire agreement of the parties as to the subject matter set forth herein and supersedes any previous license agreements, understandings, and arrangements between the parties relating to such subject matter. Additional or different terms included with an order or other document shall not be binding upon ESRI. Any modification(s) or amendment(s) to this License Agreement must be in writing and signed by each party.

### EXHIBIT 1 SCOPE OF USE (E300 5/08C)

The scope of use for each ESRI Software identified below is described in the applicable footnotes listed in parentheses.

- ArcReader (20 and 25)
  - ArcGIS Online (6, 25, 33, 34, and 35)
6. Provided only as a Term License.
  20. Licensee may reproduce and deploy the Software provided all of the following occur: (a) The Software is reproduced and deployed in its entirety; (b) a license agreement accompanies each copy of the Software that protects the Software to the same extent as the ESRI License Agreement, and the recipient agrees to be bound by the terms and conditions of the license agreement; (c) all copyright and trademark attributions/notices are reproduced; and (d) there is no charge or fee attributable to the use of the Software.
  25. Use of included third-party owned data shall be subject to the Use of Data Restrictions found at <http://www.esri.com/legal/> for the specific Data accessed. The Use of Data Restrictions may be modified by ESRI from time to time. If a modification is unacceptable to Licensee, Licensee may cancel a subscription upon written notice to ESRI, or discontinue use of the Data or Web Services, as applicable. If Licensee continues to use the Data or Web Services, Licensee will be deemed to have accepted the modification.
  33. ArcGIS Online may only be utilized in conjunction with ArcGIS Desktop, ArcGIS Server (including the Web ADF), ArcGIS Mobile, and ArcGIS Explorer Software, and the ArcGIS APIs (including JavaScript™ and Adobe® Flex®).
  34. Licensee's organization is limited to the number of specified credits, transactions, geography, or number of users as described in the online product description.
  35. Licensed end users shall not share client-side data cache derived from ArcGIS Online with other licensed end users or third parties.