Wind Power GeoPlanner™

Communication Tower Study

Aurora Wind Project

Prepared on Behalf of
Aurora Wind Project, LLC

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1. Introduction

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

2. Summary of Results

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

A total of 15 tower structures and 59 communication antennas were identified within the Aurora Wind Project area of interest using the data sources described in our methodology above. The tower structures identified contain 13 of the 59 communication antennas. The remaining antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops or portable structures. The specific type of structure would normally need to be determined by an on-site visit.

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

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

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

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

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
Tower001	1262776	Tioga Municipal Airport Authority	9.10	48.38338889	-102.89847222
Tower002	1294452	Northwest Dakota Cellular of North Dakota Limited Partnership	24.40	48.38747222	-102.93172222
Tower003	1281361	Tioga Broadcasting Corp	59.10	48.39122222	-102.93491667
Tower004	1207772	TIOGA BROADCASTING CORP	62.60	48.39130556	-102.93650000
Tower005	1265315	Northwest Communications Cooperative	36.60	48.39205556	-102.94022222
Tower006	1206464	The Burlington Northern and Santa Fe Railway Co	30.00	48.39475000	-102.93852778
Tower007	N/A	KGI	6.1	48.39554800	-102.93024700
Tower008	1202434	Hess Bakken Investments II, LLC	18.20	48.39916667	-102.91822222
Tower009	1278466	Northwest Dakota Cellular of North Dakota Limited Partnership	33.50	48.40172222	-102.95386111
Tower010	1208967	Montana-Dakota Utilities Co.	39.60	48.40780556	-102.86352778
Tower011	1286018	BASIN ELECTRIC POWER COOPERATIVE	88.40	48.40838889	-102.86091667
Tower012	1287589	Skyway Towers, LLC	64.00	48.44547222	-102.90827778
Tower013	1051850	PORTAL PIPE LINE COMPANY	76.00	48.45277778	-102.92972222
Tower014	1038858	VB-S1 Assets, LLC	57.00	48.59061111	-103.32211111
Tower015	1267208	Northwest Communications Cooperative	103.60	48.59766667	-103.18797222

Table 1: Summary of Tower Structures

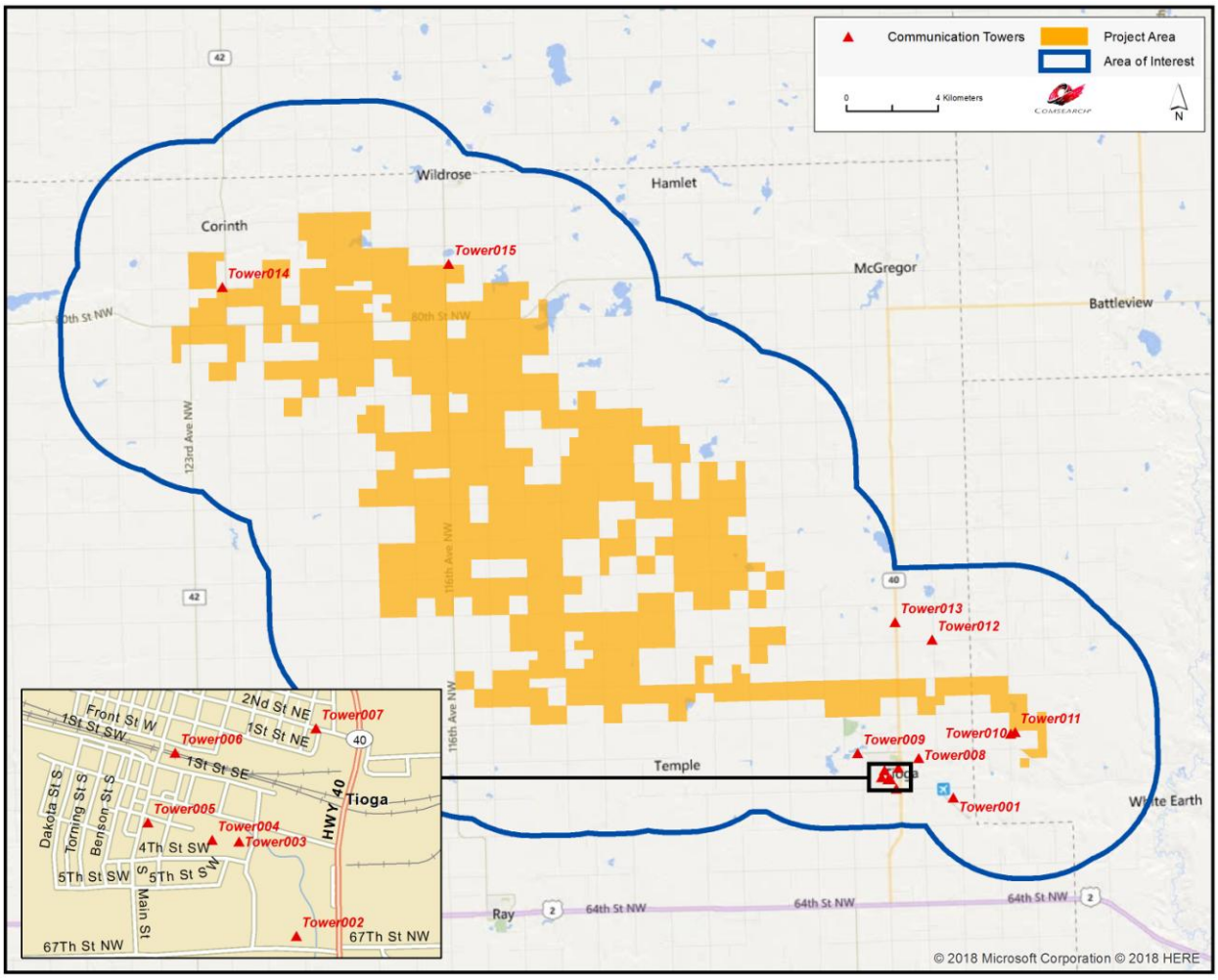

Figure 1: Towers within the Area of Interest

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
1	Tower001	WQIU457	Land Mobile	tioga municipal airport	10.7	48.38338889	-102.89847222
2		WPJX639	Land Mobile	BNSF Railway Co.	8.5	48.38344444	-103.08905556
3		WQJD208	Aviation	tioga municipal airport	4.4	48.38633333	-102.90352778
4		WQIU457	Land Mobile	tioga municipal airport	4.4	48.38633333	-102.90352778
5		WPJX639	Land Mobile	BNSF Railway Co.	10.7	48.38702778	-102.80630556
6		WQRU774	Microwave	Continental Resources, Inc.	7.62	48.38741667	-102.93683333
7		WQQP811	Land Mobile	Hess North Dakota Export Logistics LLC	10.0	48.38877778	-102.95583333
8		WQOL659	Land Mobile	BNSF Railway Co.	15.2	48.38897222	-102.86244444
9		WQUA277	Land Mobile	BNSF RAILWAY CO.	3.7	48.38933333	-103.06775000
10		WQLE363	Land Mobile	REHAK, DENNIS	6.0	48.38966667	-102.94111111
11		WPJV691	Land Mobile	BNSF Railway Co.	10.1	48.39052778	-102.86788889
12	Tower003	KTGO	AM	BAKKEN BEACON MEDIA LLC	Unknown	48.39113306	-102.93490465
13	Tower003	K224FJ	FM	BAKKEN BEACON MEDIA LLC	57.0	48.39113306	-102.93490465
14		WPJX639	Land Mobile	BNSF Railway Co.	5.5	48.39169444	-103.03716667
15		WQMF627	Land Mobile	Continental Resources, Inc.	9.0	48.39191667	-102.93266667
16		WQTB945	Land Mobile	BNSF RAILWAY CO.	10.2	48.39194444	-102.87138889
17		WQTU978	Land Mobile	BNSF RAILWAY CO.	10.1	48.39319444	-103.02302778
18		WQTB945	Land Mobile	BNSF RAILWAY CO.	10.2	48.39361111	-102.91416667
19		WQQP811	Land Mobile	Hess North Dakota Export Logistics LLC	15.0	48.39363889	-102.95925000
20		WQQP811	Land Mobile	Hess North Dakota Export Logistics LLC	15.0	48.39363889	-102.95911111
21		WQQP811	Land Mobile	Hess North Dakota Export Logistics LLC	18.0	48.39363889	-102.95666667
22		WQOL659	Land Mobile	BNSF Railway Co.	15.2	48.39377778	-102.91202778
23		WQPK452	Land Mobile	TIOGA, CITY OF	11.0	48.39613889	-102.93825000
24		WPBM404	Land Mobile	TIOGA, CITY OF	15.0	48.39613889	-102.93769444
25		WQVA418	Land Mobile	Tioga Police Dept	7.9	48.39622222	-102.93777778
26		WQOM219	Land Mobile	BNSF Railway Co.	15.2	48.39655556	-103.00308333
27		WQUA277	Land Mobile	BNSF RAILWAY CO.	3.7	48.39733333	-102.95072222
28		WQSC370	Land Mobile	BNSF RAILWAY CO.	13.1	48.39783333	-102.96413889
29		WQOL659	Land Mobile	BNSF Railway Co.	15.2	48.39808333	-102.96727778
30		WQUE654	Land Mobile	HESS NORTH DAKOTA EXPORT LOGISTICS LLC	30.0	48.40036111	-102.91416667
31		K220FH	FM	PRAIRIE PUBLIC BROADCASTING, INC.	42.0	48.40141106	-102.93768242
32		KDV691	Land Mobile	TIOGA MEDICAL CENTER	37.0	48.40280556	-102.93408333
33		WNRB580	Land Mobile	TIOGA MEDICAL CENTER	18.0	48.40280556	-102.93408333

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
34	Tower010	KAD948	Land Mobile	Montana-Dakota Utilities Co., A Division of MDU Resources Group, Inc.	40.5	48.40780556	-102.86352778
35		WHJ624	Microwave	Basin Electric Power Cooperative	27.432	48.40780556	-102.86352778
36	Tower011	WQSB262	Land Mobile	BASIN ELECTRIC POWER COOPERATIVE	73.5	48.40838889	-102.86091667
37	Tower011	WQQW846	Microwave	Basin Electric Power Cooperative	59.44 - 86.87	48.40838889	-102.86094444
38		WQVA418	Land Mobile	Tioga Police Dept	31.0	48.41141667	-102.92988889
39		WQNZ498	Land Mobile	Knife River Inc.	26.2	48.42166667	-102.86250000
40		WRAQ862	Land Mobile	SAGASER FARMS	25.0	48.43275000	-102.99811111
41	Tower012	KNKN285	Cellular	AT&T Mobility Spectrum LLC		48.44547222	-102.90827778
42		WQOK920	Land Mobile	STATIC OILFIELD SERVICE	18.0	48.46052778	-103.23241667
43		WQAP805	Land Mobile	Hamm & Phillips Service Company	51.8	48.47000000	-102.93666667
44		WPCQ417	Land Mobile	SUNDHAGEN, SCOTT	18.0	48.50252778	-103.05880556
45		WNQN724	Land Mobile	Hess Corporation	12.0	48.51197222	-102.99158333
46		WPCQ417	Land Mobile	SUNDHAGEN, SCOTT	18.0	48.51780556	-103.06130556
47		WPXP604	Land Mobile	GOHRICK FARMS	20.0	48.53086111	-102.97713889
48		WQPT498	Land Mobile	Vestas American Wind Technology Inc	13.0	48.53188889	-102.99475000
49		WQMA573	Land Mobile	KUTTER, RICK	14.0	48.54133333	-102.97466667
50		WQCV562	Land Mobile	SEVRE, LYLE	24.0	48.58944444	-103.19083333
51		WQTV298	Land Mobile	M & C SALES, INC.	45.7	48.59052778	-103.32188889
52	Tower014	WQRU770	Microwave	Continental Resources, Inc.	36.58/51.82	48.59061111	-103.32211111
53	Tower014	KNEK337	Land Mobile	WILLIAMS, COUNTY OF	57.0	48.59061111	-103.32211111
54	Tower014	WQBR535	Land Mobile	WILLIAMS, COUNTY OF	62.8	48.59061111	-103.32211111
55	Tower014	WQWP378	Land Mobile	WILLIAMS, COUNTY OF	37.0	48.59061111	-103.32211111
56	Tower015	WQPD309	Land Mobile	ROSS ERIKSMOEN INC	75.0	48.59766667	-103.18797222
57	Tower015	WQVC403	Land Mobile	DIVIDE, COUNTY OF	68.6	48.59766667	-103.18797222
58		WQJP467	Land Mobile	CVANCARA, DOUG	37.0	48.61938889	-103.18677778
59		WPJB257	Microwave	Prairie Public Broadcasting, Inc.	52.12	48.63752778	-103.32269444

Table 2: Summary of Communication Antennas

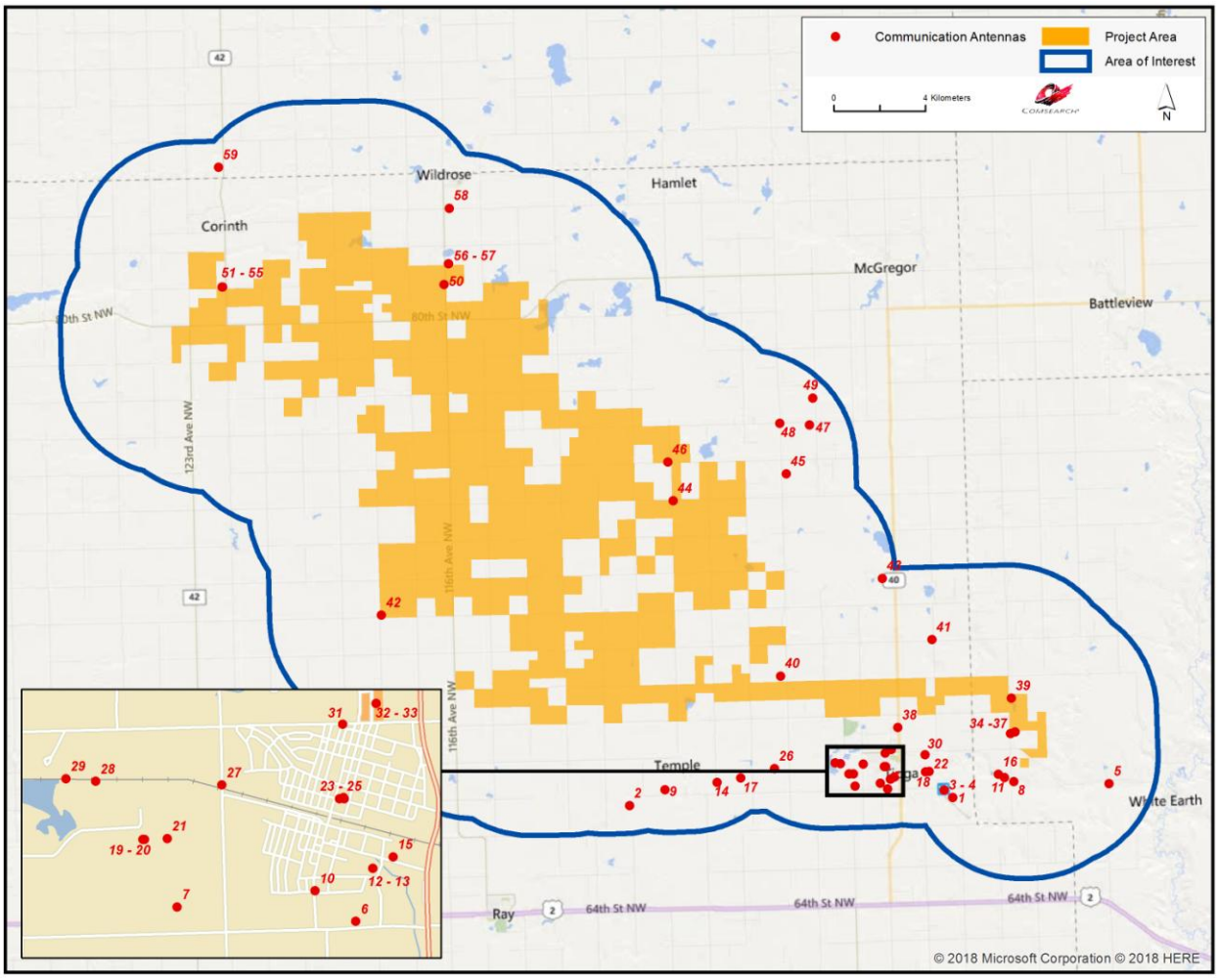

Figure 2: Communication Antennas within the Area of Interest

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

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

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

4. Conclusions

Our study identified 15 communication tower structures and 59 communication antennas within the Aurora project area of interest. They are used for microwave, cellular, AM, FM, Aviation and land mobile services in the area.

5. Contact Us

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

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