Wind Power GeoPlanner™

Doppler Weather Radar Study

Eight Point Wind Energy Center

Prepared on Behalf of
Eight Point Wind, LLC

April 6, 2017

COMSEARCH®
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1. Introduction

The purpose of this document is to describe the research, calculations, and analysis performed to assess the impact of the proposed Eight Point Wind Energy Center project on the operation of Doppler Weather Radar Systems owned and operated by television stations and commercial interests within the vicinity of the project. The report also discusses the New York State Mesonet weather station network and addresses any potential for impact from the presence of the wind energy project. This study was performed for Eight Point Wind, LLC.

2. Project Area

The location of the Eight Point Wind Energy Center project in Steuben County, New York is shown in Figure 1. The proposed turbines will have a maximum hub height of 110 meters and a rotor diameter of up to 137 meters, giving the structures an overall maximum height of 178.5 meters above ground level. At the time of this study, there are thirty-six turbines proposed for the Eight Point Wind Energy Center project. Table 1 lists these turbines and their coordinates within the project area. A detailed view is provided in Figure 2.

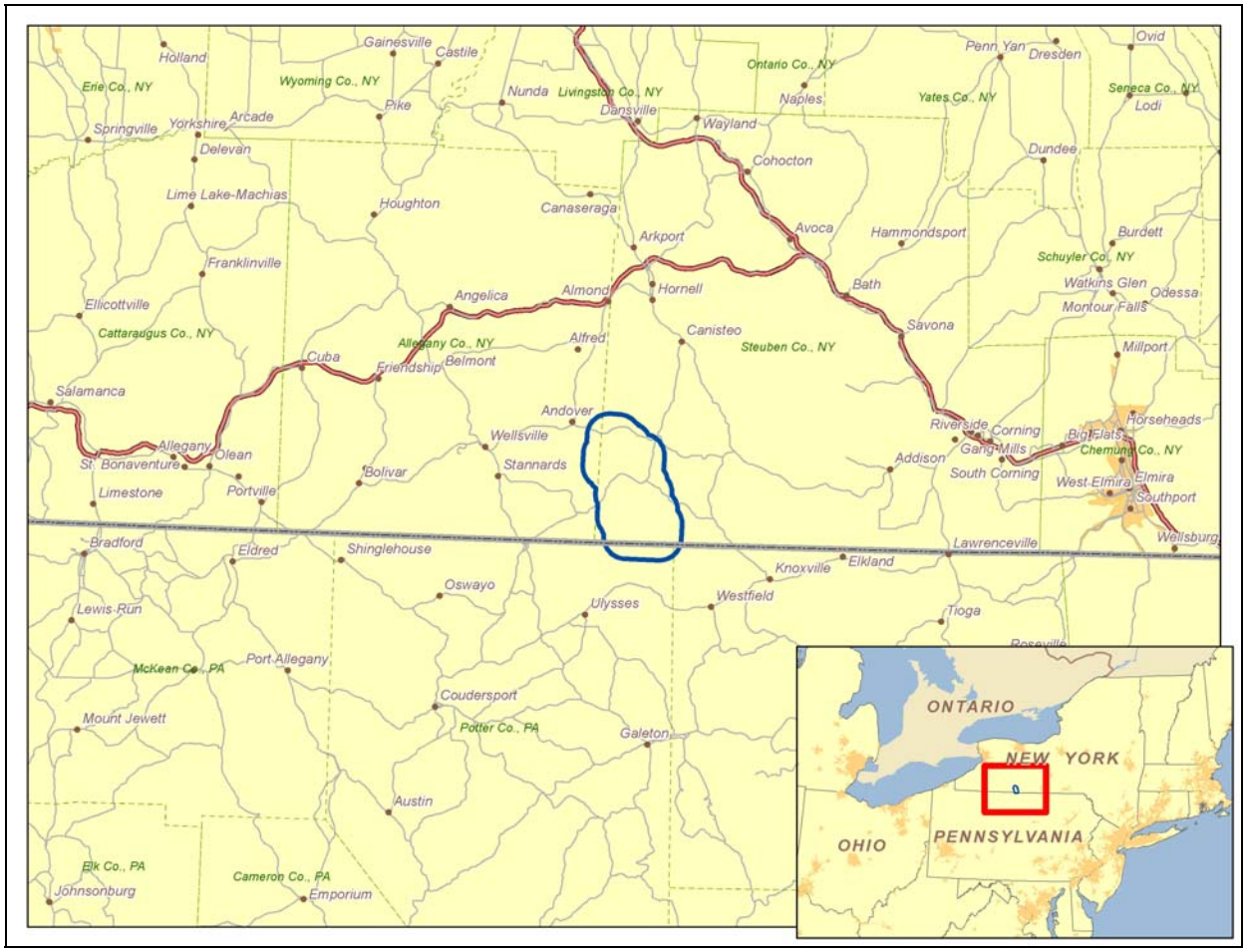

Figure 1: Location of Eight Point Wind Energy Center Project in the State of New York

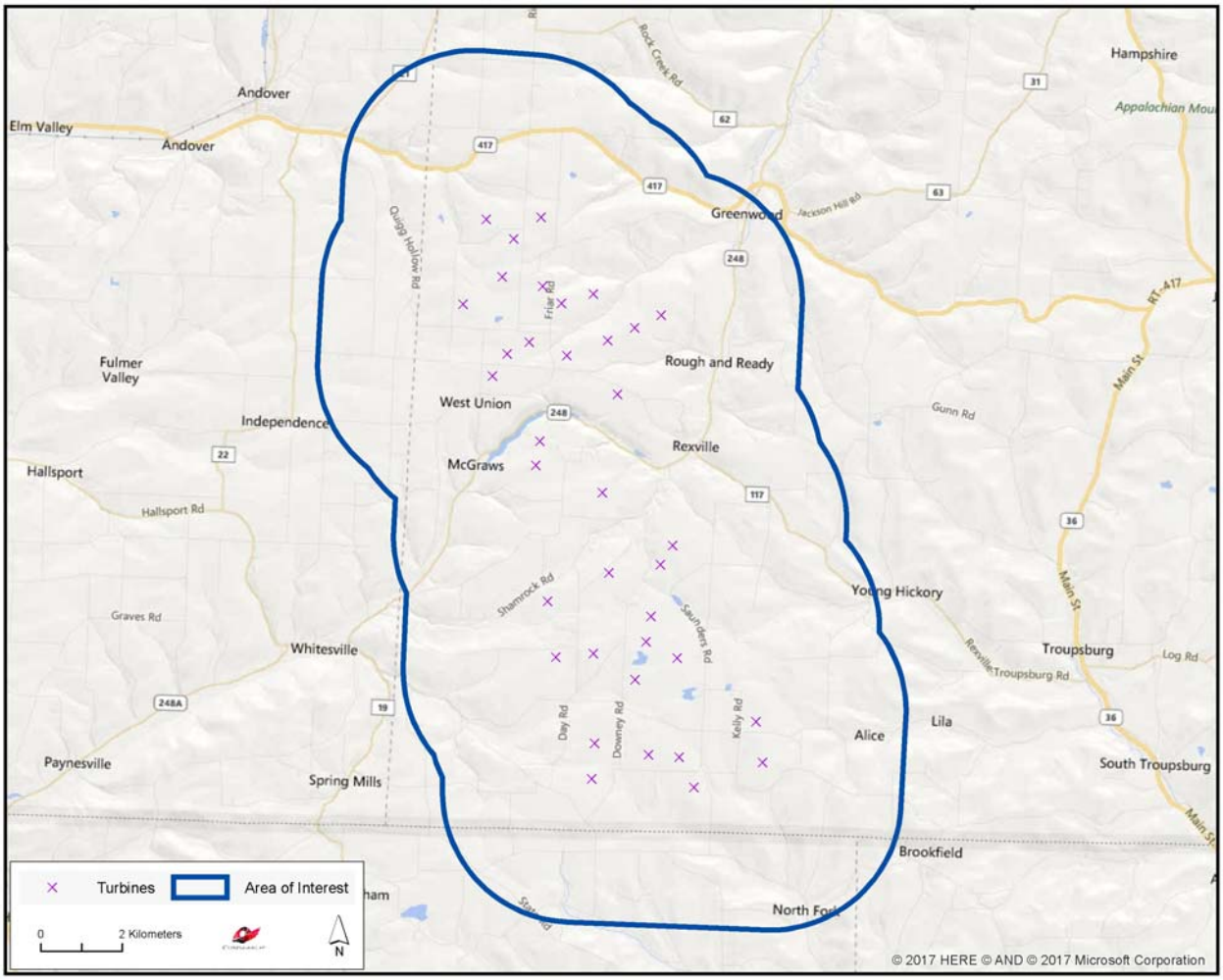

Figure 2: Location of Turbines within Eight Point Wind Energy Center Project

Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Ground Elevation (m)	Maximum Blade Height Above Mean Sea Level (m)
1	42.133641	-77.725570	688.2	866.9
2	42.134541	-77.709343	719.0	897.6
3	42.129500	-77.717239	701.0	879.7
4	42.114696	-77.731675	719.3	897.9
5	42.121002	-77.720303	698.9	877.5
6	42.119183	-77.708184	720.9	899.5
7	42.115586	-77.702457	714.5	893.1
8	42.117846	-77.693023	695.9	874.5
9	42.098991	-77.722288	715.4	894.0
10	42.106704	-77.711676	716.6	895.2

Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Ground Elevation (m)	Maximum Blade Height Above Mean Sea Level (m)
11	42.104053	-77.700395	694.6	873.3
12	42.107663	-77.688411	706.2	884.8
13	42.110653	-77.680516	716.3	894.9
14	42.113664	-77.672684	701.6	880.3
15	42.095783	-77.684993	709.6	888.2
16	42.084826	-77.707570	688.8	867.5
17	42.079439	-77.708520	730.0	908.6
18	42.073903	-77.688459	693.1	871.7
19	42.049532	-77.703750	695.6	874.2
20	42.056263	-77.685779	713.2	891.8
21	42.046891	-77.672876	694.6	873.3
22	42.037202	-77.700802	702.3	880.9
23	42.038218	-77.689703	715.1	893.7
24	42.037878	-77.664763	714.5	893.1
25	42.032787	-77.677037	694.6	873.3
26	42.018373	-77.688507	691.3	869.9
27	42.016231	-77.672318	689.2	867.8
28	42.015894	-77.663281	690.4	869.0
29	42.024244	-77.640757	691.0	869.6
30	42.010506	-77.688984	689.8	868.4
31	42.009269	-77.658621	682.1	860.8
32	42.015262	-77.638422	689.2	867.8
Alt 1	42.103979	-77.718113	722.1	900.7
Alt 2	42.062809	-77.667119	702.0	880.6
Alt 3	42.058435	-77.670558	663.9	842.5
Alt 4	42.041217	-77.674127	698.3	876.9

Table 1: Wind Turbine Coordinates

3. Technical Data

Based on a preliminary analysis of the terrain within the vicinity of the project and taking into account the precise location and elevation of turbines listed in Section 2, a reasonable search radius for radar systems was established at 250 kilometers from the center of the project area.

Tables 2 and 3 contain the technical parameters of the commercial Doppler radar systems located within 250 kilometers of the project, including ownership and geographical data[1]. A depiction of the location of the Doppler radar systems with respect to the project boundaries appears in Figure 3.

ID	Call Sign	Frequency (MHz)	Ground Elevation (m)	Antenna Height (m)	Output Power (Watts)	Distance to Nearest Turbine (km)
1	WPKW657	5500-5600	413.0	30.0	320000.0	94.75
2	WNQJ338	5350-5460	162.0	44.0	175.0	121.31
3	KNNP370	5350-5360	185.0	14.0	175.0	131.35
4	WPPY879	5575	483.0	33.0	250000.0	163.87
5	KKI208	5350-5460	646.0	12.0	200.0	173.85
6	WPOZ488	9300-9500	399.0	35.0	300000.0	193.66
7	WPKW696	5550-5600	311.0	36.0	280500.0	236.12

Table 2: Technical Data for Commercial Interest and Television Station Doppler Radar Systems within 250 Kilometers of the Eight Point Wind Energy Center Project

ID	Call Sign	Owner- Operator	Location	Latitude (NAD83)	Longitude (NAD83)
1	WPKW657	Multimedia Entertainment, LLC	South Wales, NY	42.718667	-78.563361
2	WNQJ338	WHEC-TV, LLC	Brockport, NY	43.212556	-77.954722
3	KNNP370	WIVB Broadcasting, LLC	Buffalo, NY	42.953667	-78.877528
4	WPPY879	Nexstar Broadcasting, Inc.	Pompey, NY	42.944500	-76.024639
5	KKI208	Local TV Pennsylvania License, LLC	Hanover Twp., PA	41.182861	-75.872417
6	WPOZ488	Nexstar Broadcasting, Inc.	Erie, PA	42.040611	-80.069778
7	WPKW696	Hearst Properties, Inc.	Hellam, PA	40.034528	-76.617750

Table 3: Location and Ownership of Commercial Interest and Television Station Doppler Radar Systems within 250 Kilometers of the Eight Point Wind Energy Center Project

[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.

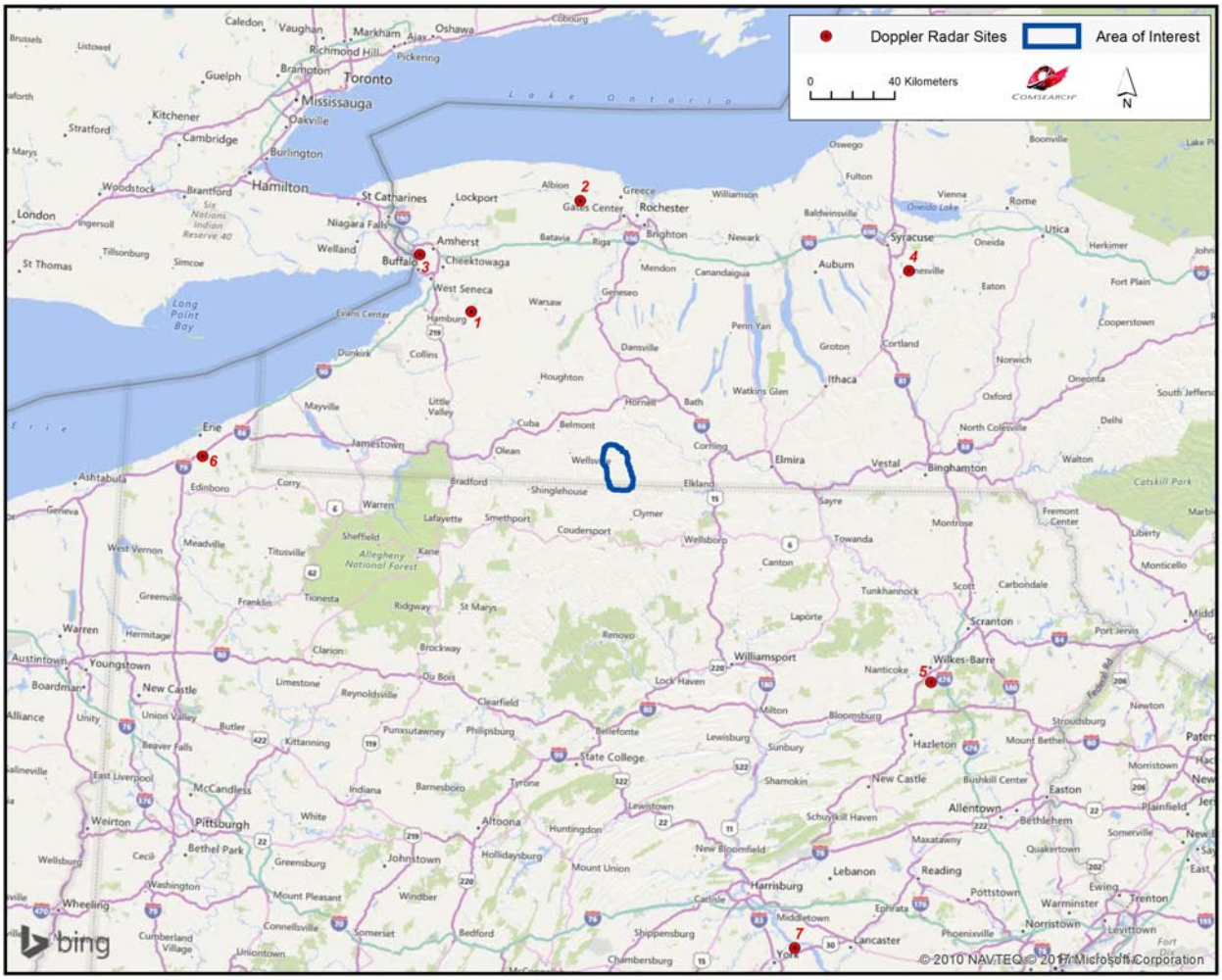

Figure 3: Location of Doppler Radar Systems within 250 Kilometers of the Eight Point Wind Energy Center Project

4. Impact Assessment

The technical approach to determine the potential impact of the turbines on the Doppler radar systems in the area is to calculate whether the wind turbines are in line-of-sight (LOS) of the radar systems. The wind turbines of the Eight Point Wind Energy Center project have the potential to block radar coverage and produce false targets if the turbines are in line-of-sight of the radar systems' transmitted signals.

To verify the presence or absence of LOS conditions between the Eight Point Wind Energy Center wind energy project and the Doppler radar systems identified in Section 3, LOS coverage plots were generated for each of the radar systems. These plots identify the geographical regions that have LOS to a given radar by taking into account the height of the radar antenna, the maximum height of the wind turbine blades, the curvature of the earth, and potential refractivity in the atmosphere. The plots may be referenced in the Appendix section of this report.

According to the LOS coverage plots, the effective terrain elevations would block LOS between the antennas of all seven radars and the wind project area. Therefore, LOS conditions would not exist between the radars and the wind turbines.

5. New York State Mesonet

The New York State Mesonet is a statewide network of weather stations developed and run by the University at Albany, which currently comprises a total of 118 stations, with seven additional deployments planned in the future. Mesoscale networks serve to collect data on mesoscale meteorological phenomena, such as dry lines, squall lines, and sea breezes, which is used to supplement data gathered by traditional automated surface observing systems (ASOS) and helps to support decision-making in agriculture, emergency management, energy, ground transportation, and aviation. To ensure the highest quality of data, each station in the New York State Mesonet must be located at least 300 feet from any tall obstacles, such as wind turbines. Table A-1, provided in the Appendix section of this report, lists the New York State Mesonet stations and their respective distances to the turbines in the Eight Point Wind Energy Center project. Table A-1 shows that the closest station to the project, "Hartsville", is more than 8.6 kilometers from the nearest proposed turbine location and well outside range of impact. Finally, it should be noted that the data from each station is transmitted via the Internet to a central ingest system located at the University of Albany, and is therefore not subject to telecommunications interference from the Eight Point Wind Energy Center project as defined in the scope of this report.

6. Conclusions

Based on the analysis described in this report, none of the seven Doppler radar systems in the vicinity of the Eight Point Wind Energy Center wind energy project could be impacted by the project's planned wind turbines. The New York State Mesonet system is also not subject to impact due to the large separation distance between the component weather stations and the project turbines.

7. Contact

For questions or information regarding the Doppler Radar Study, please contact:

Contact person:	Denise Finney
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Email:	dfinney@comsearch.com
Web site:	www.comsearch.com

Appendix

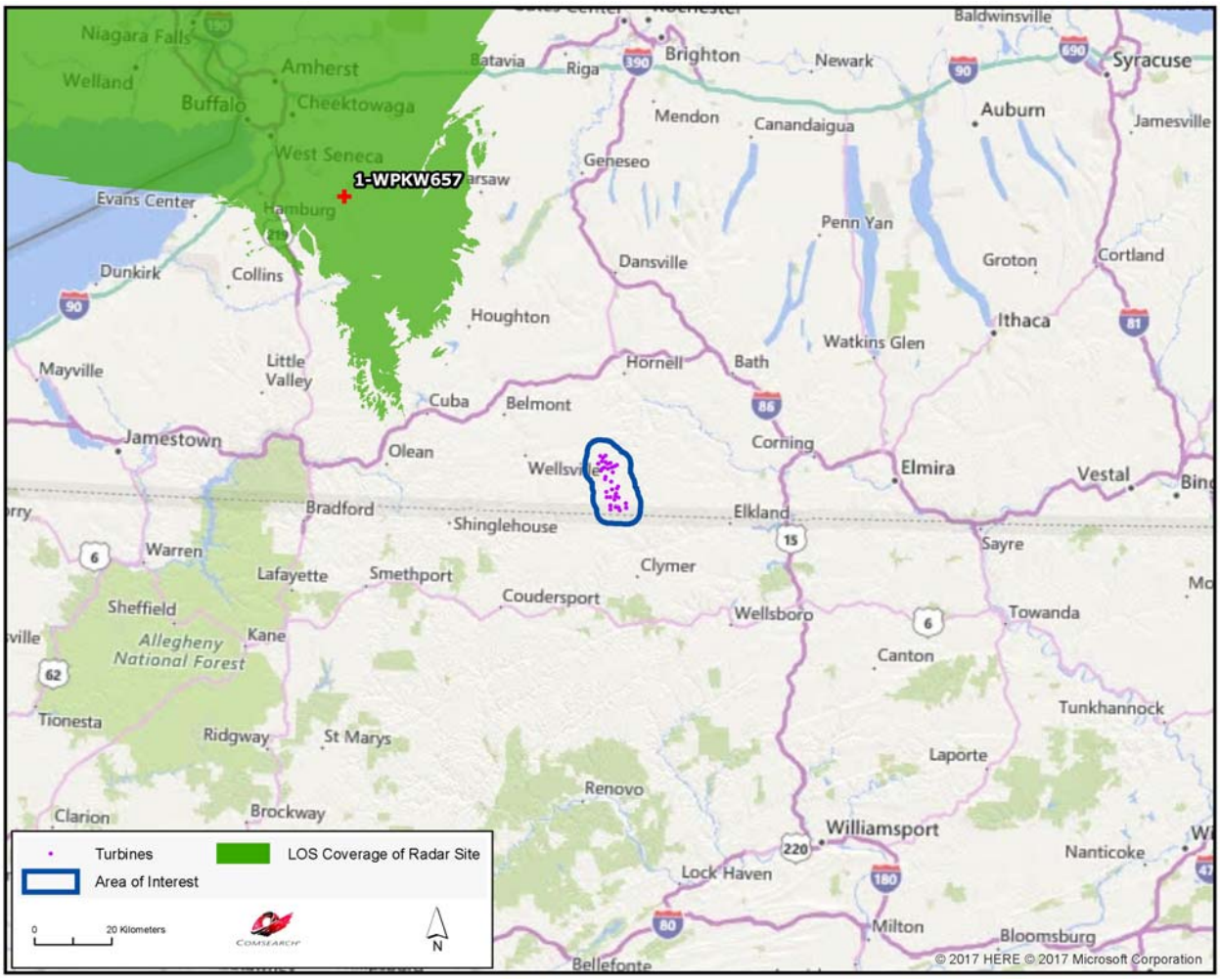

Figure A-1: Line-of-Sight Coverage of WPKW657 with Respect to Eight Point Wind Energy Center Project

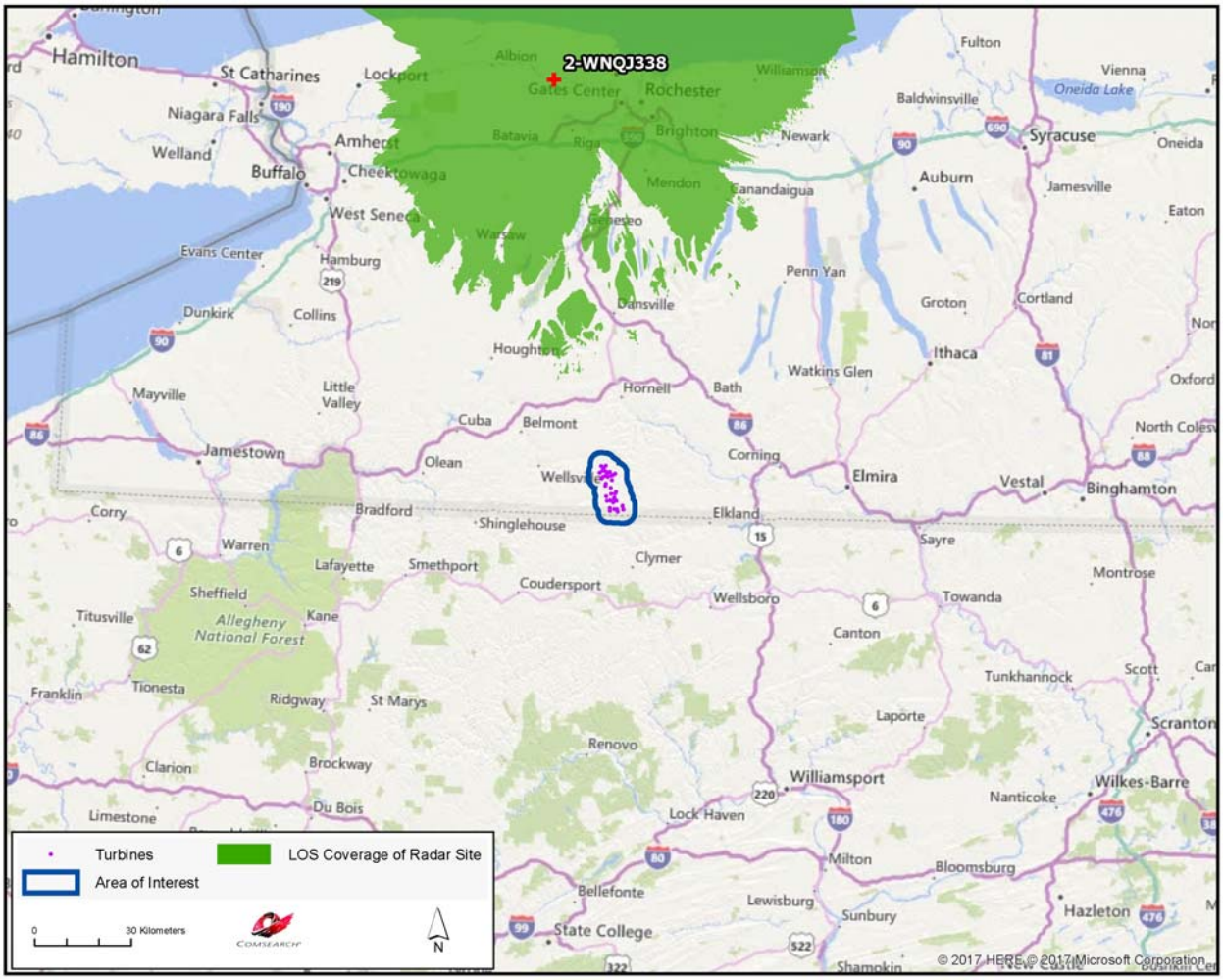

Figure A-2: Line-of-Sight Coverage of WNQJ338 with Respect to Eight Point Wind Energy Center Project

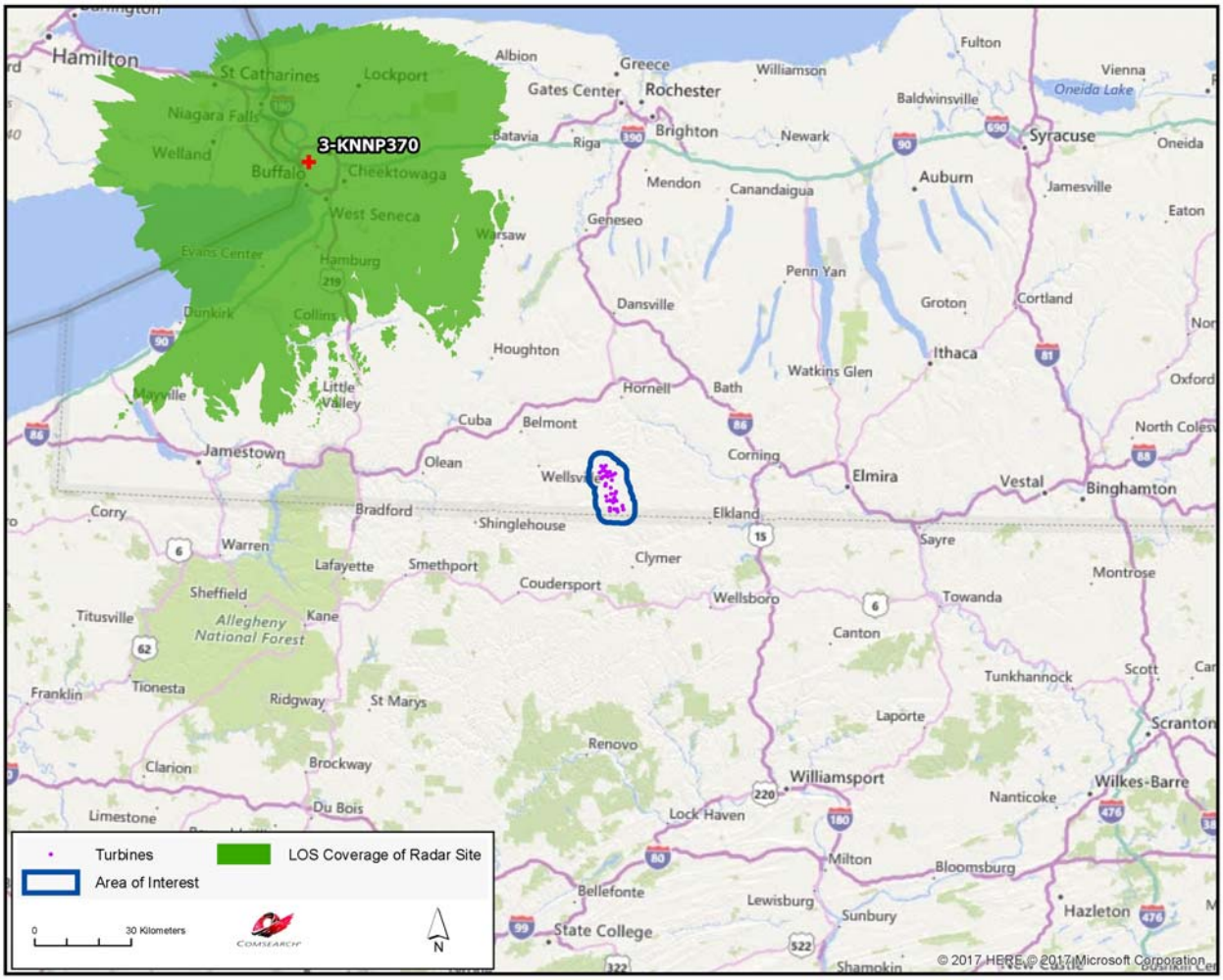

Figure A-3: Line-of-Sight Coverage of KNNP370 with Respect to Eight Point Wind Energy Center Project

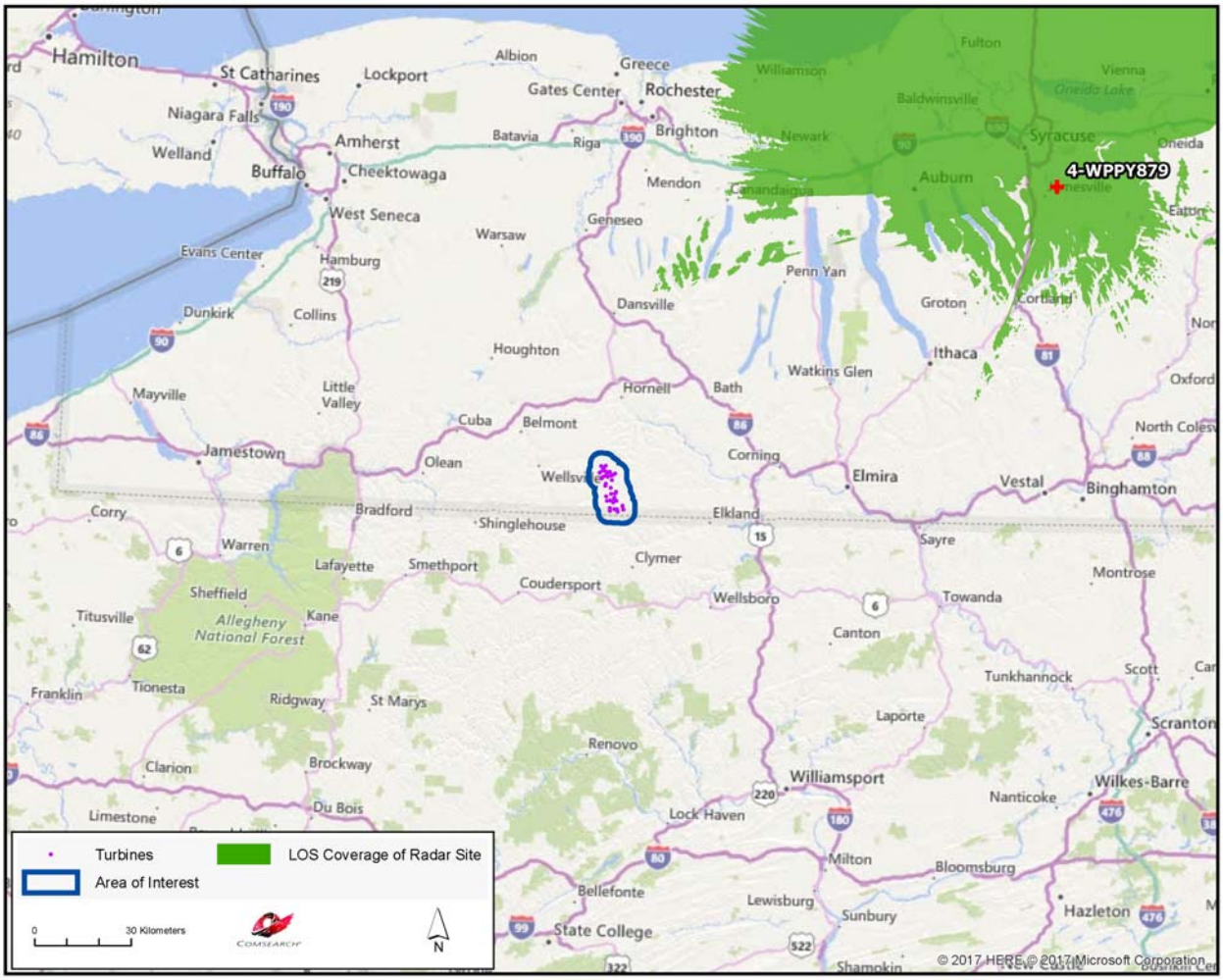

Figure A-4: Line-of-Sight Coverage of WPPY879 with Respect to Eight Point Wind Energy Center Project

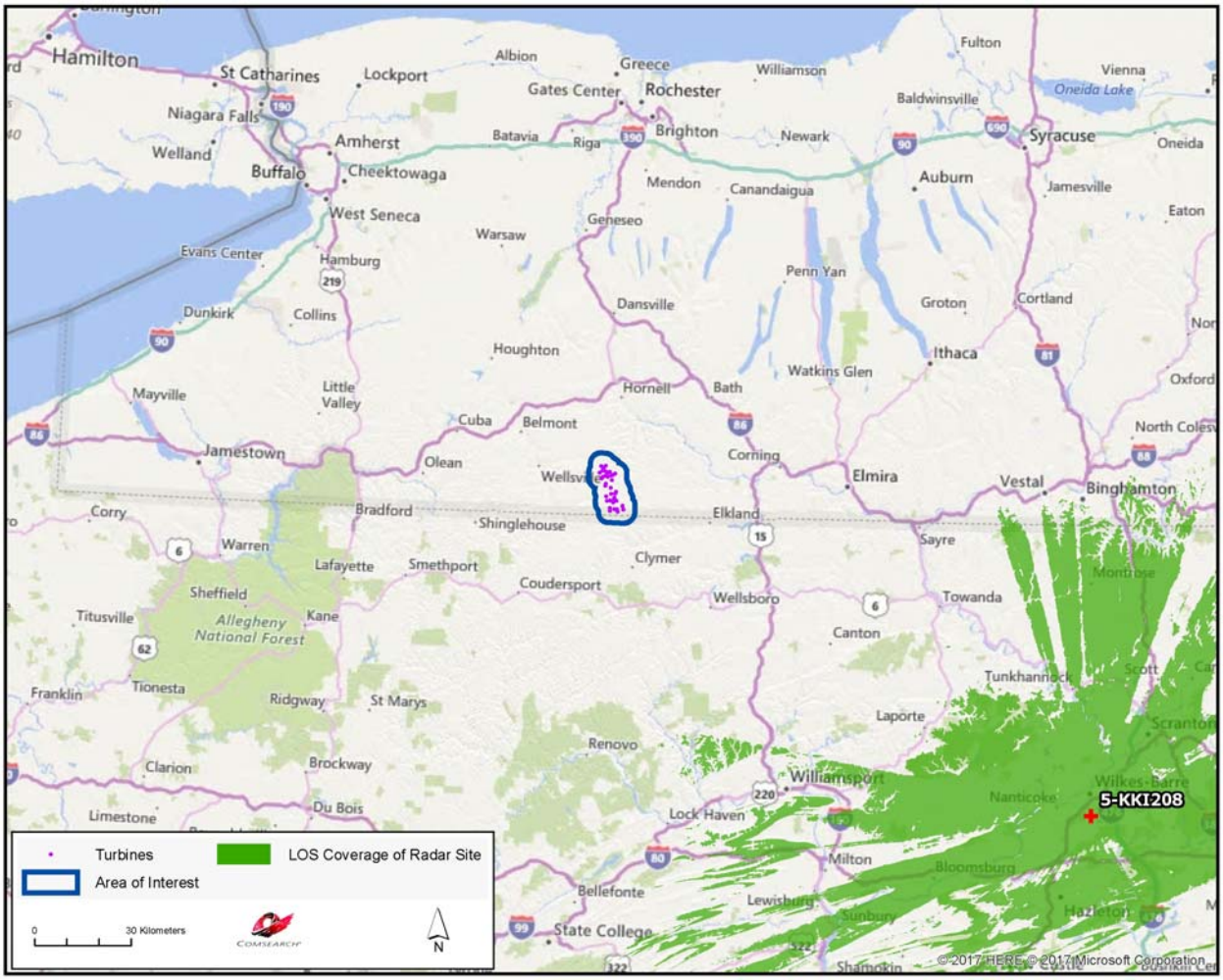

Figure A-5: Line-of-Sight Coverage of KKI208 with Respect to Eight Point Wind Energy Center Project

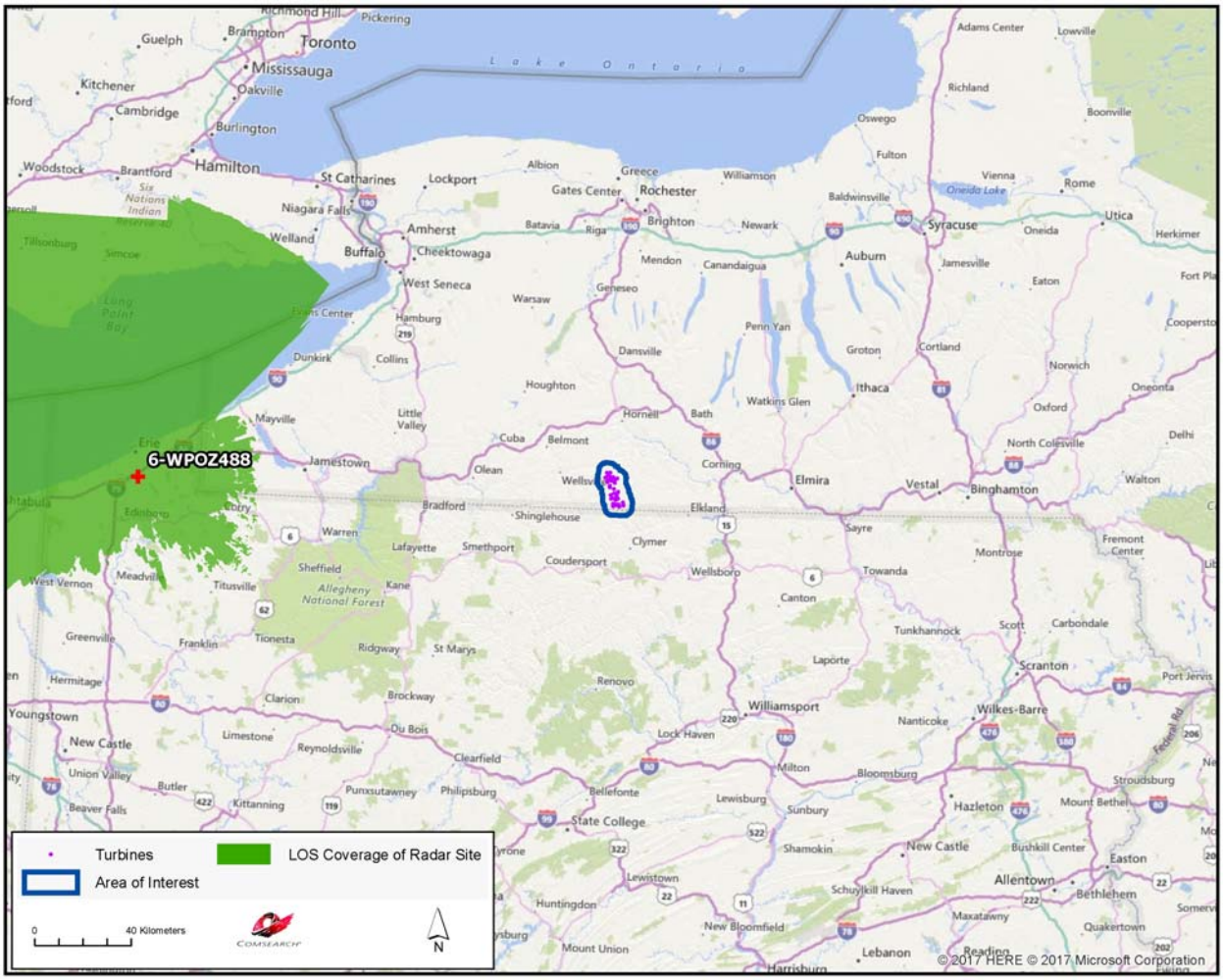

Figure A-6: Line-of-Sight Coverage of WPOZ488 with Respect to Eight Point Wind Energy Center Project

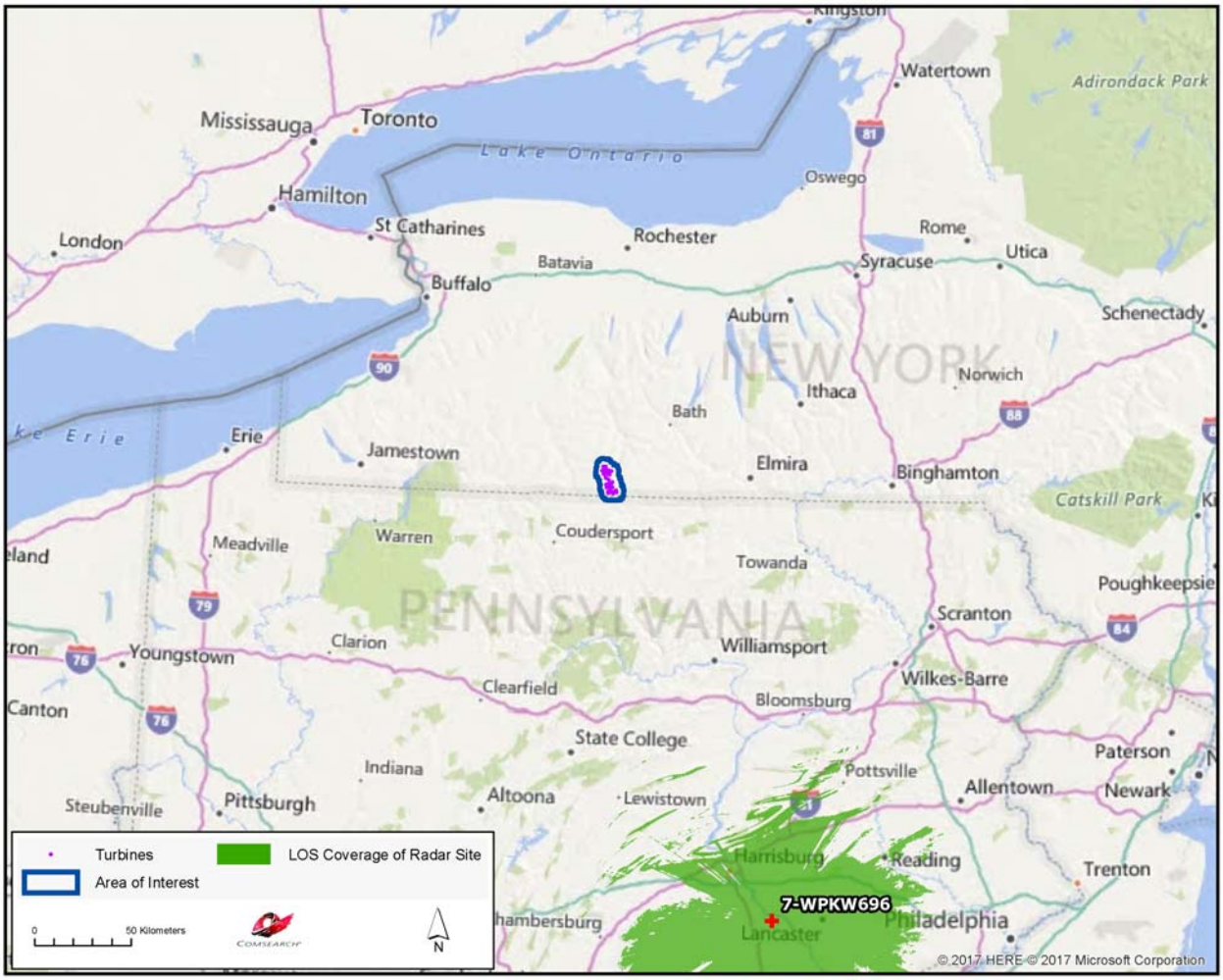

Figure A-7: Line-of-Sight Coverage of WPKW696 with Respect to Eight Point Wind Energy Center Project

Station ID	Station Name	Date Commissioned	County	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
HART	Hartsville	8/9/2016	Steuben	42.211221	-77.689733	8.67
BELM	Belmont	5/16/2016	Allegany	42.242490	-78.039580	28.62
ADDI	Addison	8/10/2016	Steuben	42.040360	-77.237260	33.34
GROV	Grove	7/20/2016	Allegany	42.489510	-77.949460	43.63
COHO	Cohocton	5/17/2016	Steuben	42.511780	-77.437620	47.51
OLEA	Olean	6/2/2016	Cattaraugus	42.091410	-78.407430	55.96
TYRO	Tyrone	5/23/2016	Schuyler	42.406110	-77.053900	60.52
DELE	Delevan	3/8/2016	Cattaraugus	42.418464	-78.423200	65.67
ELMI	Elmira	6/30/2016	Chemung	42.113320	-76.836640	67.25
SBRI	South Bristol	2/19/2016	Ontario	42.752170	-77.359310	74.41
YORK	York	8/9/2016	Livingston	42.855040	-77.847760	80.76
BURD	Burdett	5/23/2016	Schuyler	42.410420	-76.771760	81.32
WARS	Warsaw	5/16/2016	Wyoming	42.779930	-78.208890	82.06
PENN	Penn Yan	5/24/2016	Yates	42.655780	-76.987460	82.53
RUSH	Rush	7/12/2016	Monroe	43.000990	-77.637390	96.43
RAND	Randolph	6/2/2016	Cattaraugus	42.149280	-78.900960	96.75
EAUR	East Aurora	8/8/2016	Erie	42.713490	-78.631730	98.54
BATA	Batavia	2/18/2016	Genesee	43.019940	-78.135660	104.05
CLIF	Clifton Springs	7/13/2016	Ontario	43.014790	-77.185180	106.83
WATE	Waterloo	11/4/2015	Seneca	42.879660	-76.812550	110.63
OWEG	Owego	7/20/2016	Tioga	42.025710	-76.255430	114.55
GROT	Groton	12/21/2016	Tompkins	42.548550	-76.375340	117.34
SCIP	Scipio Center	9/22/2016	Cayuga	42.756216	-76.534035	117.78
BRAN	Brant	4/23/2016	Erie	42.594940	-79.021540	118.42
BROC	Brockport	6/16/2016	Monroe	43.208350	-77.965920	121.00
BERK	Berkshire	11/19/2015	Tioga	42.320300	-76.203190	123.25
ONTA	Ontario	11/1/2016	Wayne	43.259410	-77.373310	127.95
BUFF	Buffalo	3/9/2017	Erie	43.000170	-78.767170	128.77
MEDI	Medina	7/19/2016	Orleans	43.226680	-78.309270	130.51
FRED	Fredonia	4/23/2016	Chautauqua	42.418170	-79.366600	139.02

Station ID	Station Name	Date Commissioned	County	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
BING	Binghamton	10/4/2016	Broome	42.058430	-75.951040	139.81
WOLC	Wolcott	3/9/2016	Wayne	43.228680	-76.842610	140.78
JORD	Jordan	11/17/2015	Onondaga	43.069800	-76.470060	145.00
CINC	Cincinnatus	4/21/2016	Cortland	42.522424	-75.975622	147.09
TULL	Tully	3/30/2016	Onondaga	42.794630	-76.115550	148.76
BURT	Burt	6/15/2016	Niagara	43.316990	-78.749030	155.91
CLYM	Clymer	6/1/2016	Chautauqua	42.024470	-79.624080	156.94
BELD	Belden	11/30/2015	Broome	42.223220	-75.668520	164.54
FAYE	Fayetteville	7/14/2016	Onondaga	43.054226	-75.990041	173.19
OSWE	Oswego	7/7/2016	Oswego	43.443183	-76.553233	173.44
DEPO	Deposit	8/23/2016	Delaware	42.068551	-75.392193	186.08
CSQR	Central Square	11/5/2015	Oswego	43.326130	-76.104450	186.12
MORR	Morrisville	6/27/2016	Madison	42.883917	-75.642447	187.55
SHER	Sherburne	2/23/2016	Chenango	42.640250	-75.483445	189.56
WALT	Walton	4/18/2016	Delaware	42.239500	-75.178790	204.90
CAMD	Camden	6/29/2016	Oneida	43.339850	-75.742990	208.65
BROO	Brookfield	8/5/2016	Madison	42.795910	-75.299290	209.43
WEST	Westmoreland	11/18/2015	Oneida	43.106470	-75.461460	212.33
LAUR	Laurens	1/15/2016	Otsego	42.525260	-75.136900	213.92
NBRA	North Branch	7/21/2016	Sullivan	41.827920	-74.996890	220.11
OSCE	Osceola	6/22/2016	Lewis	43.499150	-75.711750	222.30
REDF	Redfield	6/21/2016	Oswego	43.622180	-75.877690	222.71
BELL	Belleville	4/28/2016	Jefferson	43.789620	-76.113730	225.29
ELDR	Eldred	8/25/2016	Sullivan	41.539610	-74.879920	235.35
ANDE	Andes	8/4/2016	Delaware	42.182270	-74.801390	235.42
HERK	Herkimer	8/10/2016	Herkimer	43.036620	-75.009570	241.49
SPRI	Springfield	8/15/2016	Otsego	42.843150	-74.889610	242.77
CAPE	Cape Vincent	4/27/2016	Jefferson	44.104520	-76.326860	246.08
HARP	Harpersfield	8/4/2016	Delaware	42.472800	-74.698490	247.88
HARR	Harrisburg	6/21/2016	Lewis	43.803520	-75.688530	247.90

Station ID	Station Name	Date Commissioned	County	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
COLD	Cold Brook	11/11/2015	Herkimer	43.261268	-74.978778	254.94
WBOU	Woodbourne	9/1/2016	Sullivan	41.745050	-74.588330	254.96
GFLD	Glenfield	8/29/2016	Lewis	43.716800	-75.409250	256.66
CLAR	Claryville	10/20/2016	Ulster	41.979200	-74.517100	258.65
WGAT	Woodgate	8/29/2016	Oneida	43.532408	-75.158597	259.05
COPE	Copenhagen	2/5/2016	Lewis	43.920564	-75.607866	261.97
ROXB	Roxbury	8/24/2016	Delaware	42.329640	-74.467460	264.33
OTIS	Otisville	12/10/2015	Orange	41.482490	-74.503680	267.37
COBL	Cobleskill	1/25/2016	Schoharie	42.676267	-74.507967	267.97
OPPE	Oppenheim	7/29/2016	Fulton	43.062600	-74.665437	268.42
SPRA	Sprakers	11/6/2015	Montgomery	42.869763	-74.509978	273.24
WELL	Wellesley Island	4/27/2016	Jefferson	44.307820	-76.008580	278.19
PHIL	Philadelphia	7/8/2016	Jefferson	44.193540	-75.715910	280.37
WARW	Warwick	4/14/2016	Orange	41.240360	-74.390560	284.01
OLDF	Old Forge	9/2/2016	Herkimer	43.741570	-74.977860	284.79
CROG	Croghan	11/2/2016	Lewis	43.974960	-75.201000	288.65
MEDU	Medusa	8/24/2016	Albany	42.468900	-74.165600	291.03
TANN	Tannersville	2/1/2017	Greene	42.170710	-74.113430	292.14
WALL	Wallkill	6/23/2016	Ulster	41.634090	-74.153700	292.59
HFAL	High Falls	11/17/2016	Ulster	41.798800	-74.123120	292.67
JOHN	Johnstown	3/22/2016	Montgomery	42.984283	-74.301767	293.28
DUAN	Duanesburg	7/22/2016	Schenectady	42.803190	-74.173610	297.84
VOOR	Voorheesville	8/16/2016	Albany	42.652420	-73.975620	310.01
REDH	Red Hook	8/2/2016	Dutchess	42.001680	-73.883910	311.04
BEAC	Beacon	8/22/2016	Dutchess	41.528750	-73.945270	311.80
SUFF	Suffern	8/17/2016	Rockland	41.130380	-74.089870	311.86
RAQU	Raquette Lake	11/10/2016	Hamilton	43.822752	-74.625091	312.84
HAMM	Hammond	8/16/2016	St. Lawrence	44.513020	-75.617290	314.04
EDWA	Edwards	8/16/2016	St. Lawrence	44.321500	-75.243790	314.82
EDIN	Edinburg	7/15/2016	Saratoga	43.228190	-74.112930	317.00

Station ID	Station Name	Date Commissioned	County	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (km)
KIND	Kinderhook	8/30/2016	Columbia	42.410010	-73.715570	326.89
BSPA	Ballston Spa	8/18/2016	Saratoga	43.022800	-73.874980	327.78
SCHO	Schodack	1/11/2017	Rensselaer	42.506310	-73.685840	330.67
SOME	Somers	2/28/2017	Westchester	41.310370	-73.767110	331.81
ILAK	Indian Lake	7/26/2016	Hamilton	43.790670	-74.239330	336.47
DOVE	Dover Plains	12/9/2016	Dutchess	41.773670	-73.575420	338.25
COPA	Copake	8/3/2016	Columbia	42.136590	-73.519880	341.09
SCHA	Schaghticoke	6/20/2016	Rensselaer	42.896970	-73.614050	344.76
NEWC	Newcomb	10/18/2016	Essex	43.973290	-74.222730	348.87
TUPP	Tupper Lake	7/13/2016	Franklin	44.221280	-74.438260	352.15
SCHU	Schuylerville	8/9/2015	Saratoga	43.116996	-73.578284	353.95
POTS	Potsdam	7/8/2016	St. Lawrence	44.656867	-74.974433	357.25
STEP	Stephentown	12/8/2015	Rensselaer	42.526200	-73.359060	357.58
GFAL	Glens Falls	3/10/2017	Warren	43.340870	-73.602020	360.19
CHES	Chestertown	12/6/2015	Warren	43.653900	-73.777360	361.32
LOUI	Louisville	3/26/2016	St. Lawrence	44.871690	-75.056080	372.19
WANT	Wantagh	11/10/2016	Nassau	40.655100	-73.506160	377.46
WHIT	Whitehall	8/26/2015	Washington	43.485073	-73.423071	379.57
GABR	Gabriels	1/20/2016	Franklin	44.417420	-74.178670	382.08
NHUD	North Hudson	9/13/2016	Essex	44.013100	-73.705160	385.98
TICO	Ticonderoga	1/28/2016	Essex	43.874690	-73.418790	398.27
WFMB	Whiteface Mtn. Base	1/29/2016	Essex	44.393236	-73.858829	400.07
MALO	Malone	8/15/2016	Franklin	44.852869	-74.328874	407.18
ESSX	Essex	12/5/2015	Essex	44.313604	-73.371896	426.46
SARA	Saranac	7/12/2016	Clinton	44.707585	-73.671150	433.71
ELLE	Ellenburg	8/30/2016	Clinton	44.895500	-73.845020	437.43
SOUT	Southold	11/10/2016	Suffolk	41.040081	-72.465864	445.09
CHAZ	Chazy	7/8/2016	Clinton	44.895650	-73.464610	459.73

Table A-1: New York State Mesonet Weather Stations and Distance to the Eight Point Wind Energy Center Project