

Wind Power GeoPlanner™

Microwave Study

Bluestone Wind Project



Prepared on Behalf of
Bluestone Wind, LLC

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COMSEARCH
A CommScope Company

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1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Bluestone Wind Project

County: Broome

State: New York

Number of Turbines: 33

Blade Diameter: 150 meters

Hub Height: 130 meters

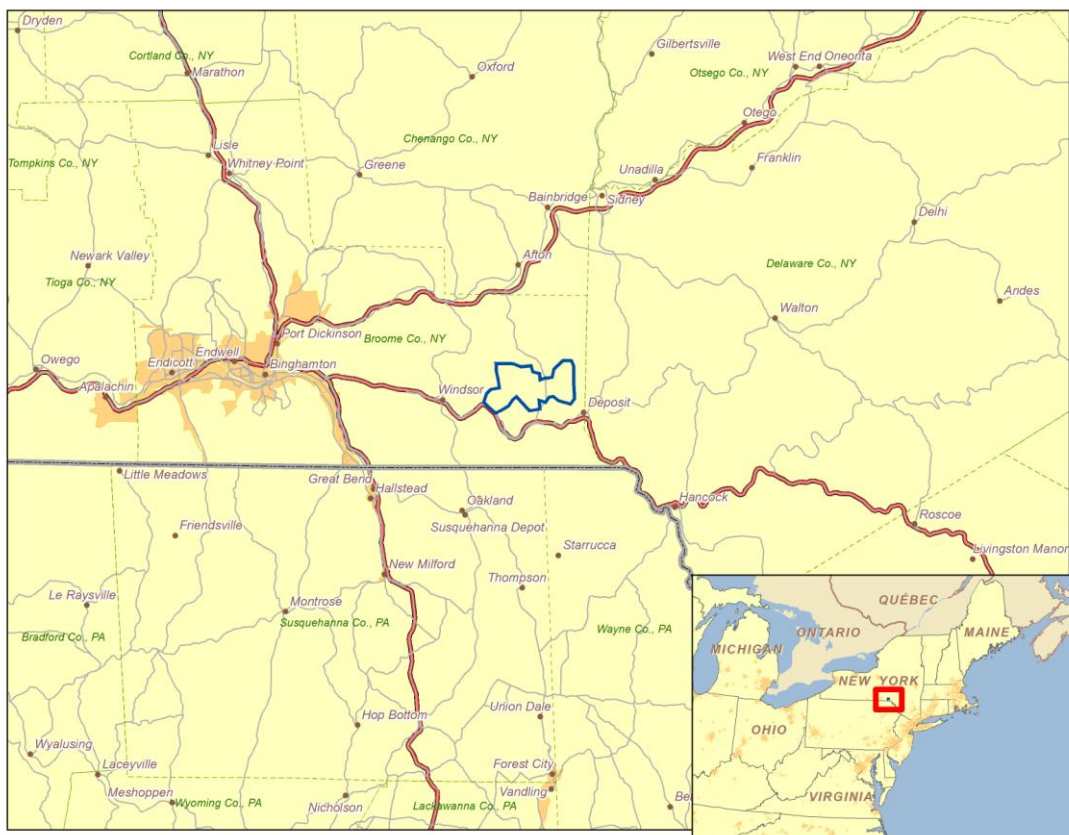
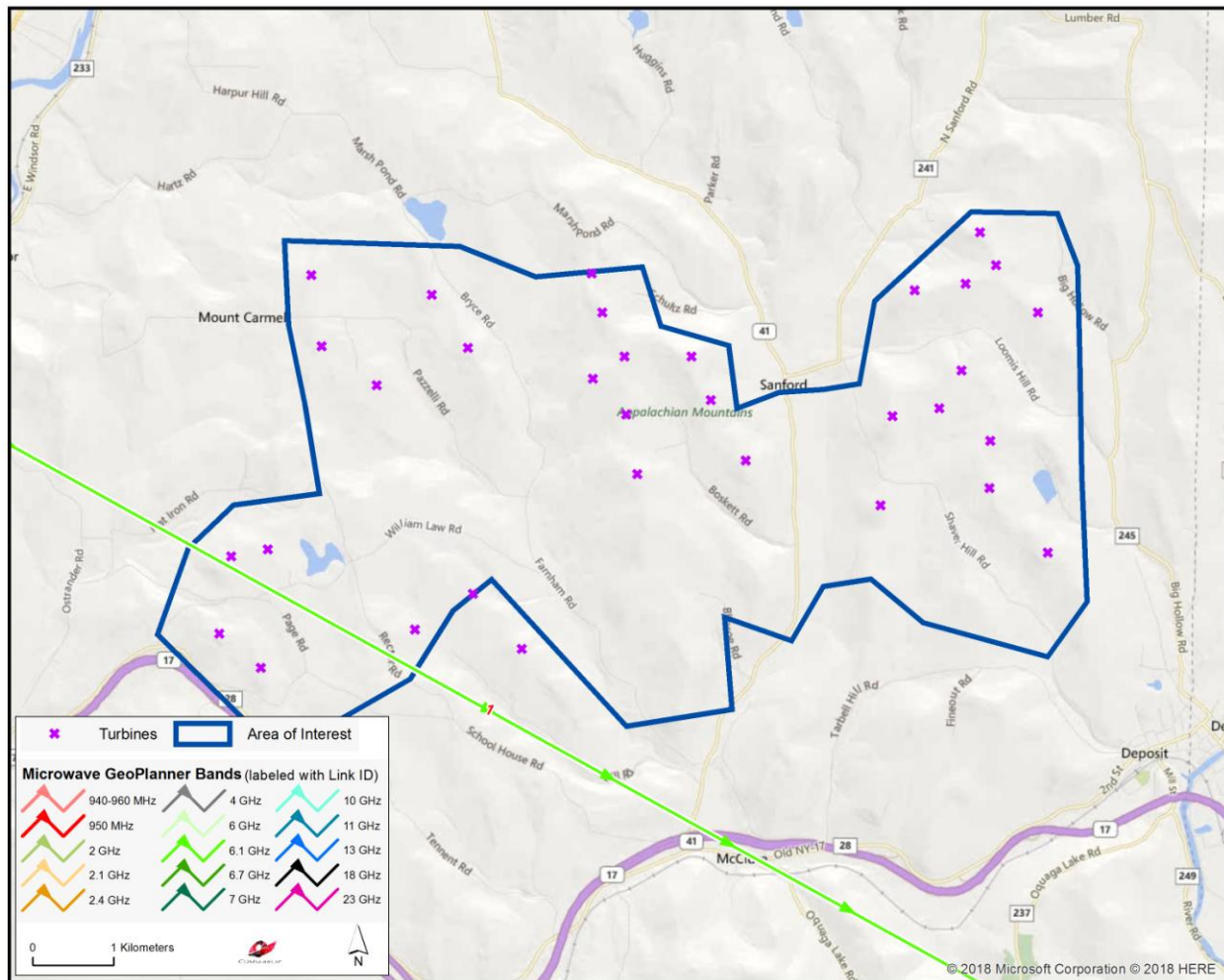


Figure 1: Area of Interest

3. Two-Dimensional 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 GHz¹. First, we determined all microwave paths that intersect the area of interest² and listed them in Table 1. This path and the area of interest that encompasses the planned turbine locations are shown in Figure 2.



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

² 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	WMM872	WQPI219	Lower 6 GHz	14.49	Binghamton MSA Limited Partnership(NY)

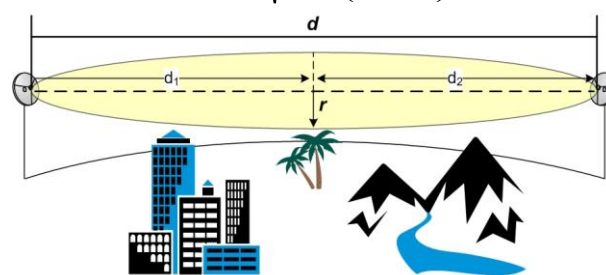
Table 1: Summary of Microwave Paths that Intersect the Area of Interest

(See enclosed *mw_geopl.xlsx* for more information and
GP_dict_matrix_description.xls for detailed field descriptions)

Verification of Coordinate Accuracy

It is possible that as-built coordinates may differ from those on the FCC license. For this project, the path crosses within close proximity of the proposed turbines and the tower locations for this path will have a critical impact on the result. Therefore, we verified these locations using aerial photography. Both of them were found to be consistent with the locations shown on the aerial photos.

Next, we calculated a Fresnel Zone for this 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_{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

In general, this is the area where the planned wind turbines should be avoided, if possible. A depiction of the Fresnel Zone for the microwave path listed can be found in Figure 3, and is also included in the enclosed shapefiles^{3,4}.

³ The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 18 projected coordinate system.

⁴ 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.

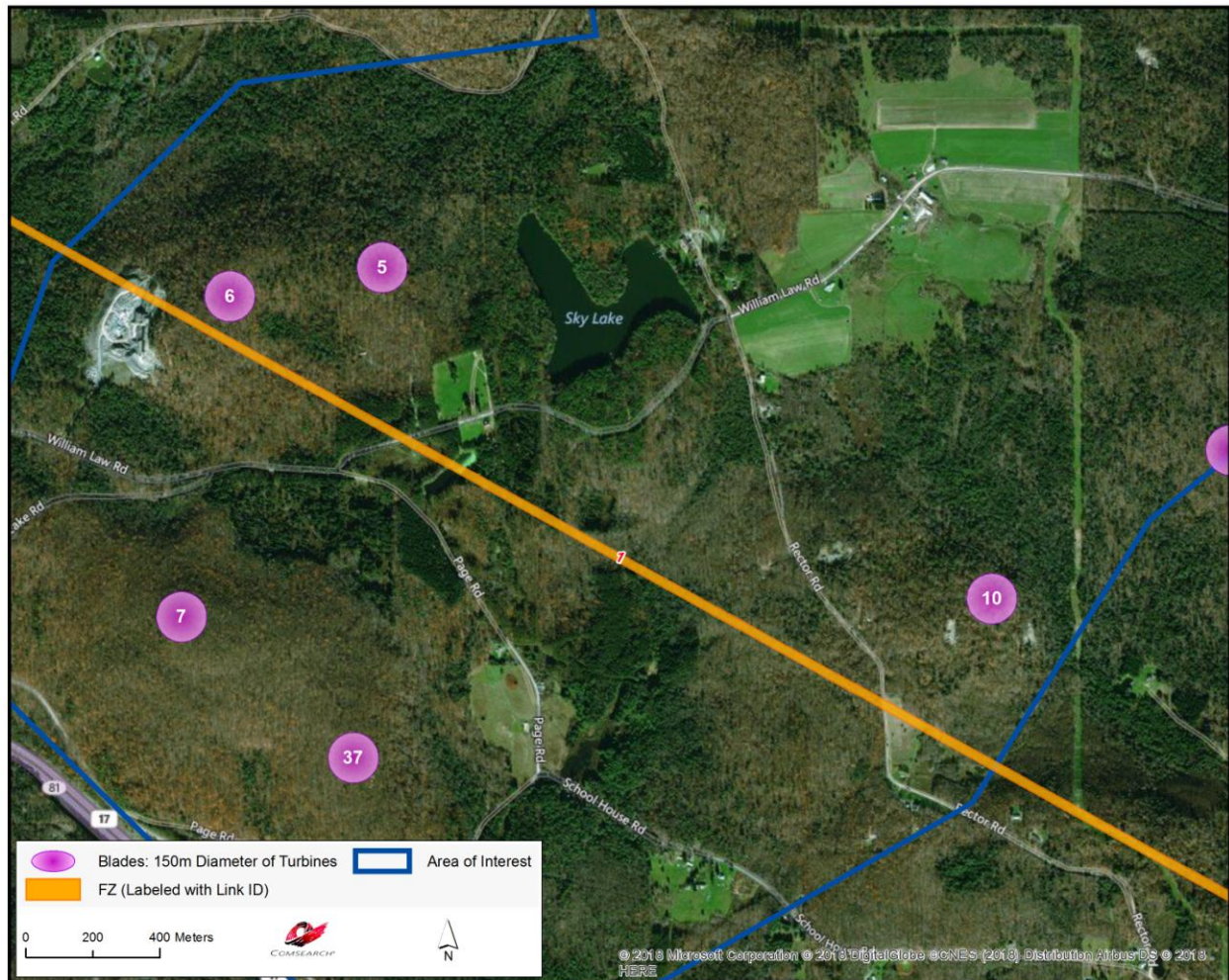


Figure 3: Microwave Paths with Fresnel Zones

4. Conclusion

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting the Fresnel Zones
1	0	33	0

Table 2: Fresnel Zone Analysis Result

Our study identified one microwave path intersecting the Bluestone Wind Project area of interest. The Fresnel Zone for this microwave path was calculated and mapped in order to assess the potential impact from the turbines. A total of 33 turbines were considered in the analysis, each with a blade diameter of 150 meters and a hub height of 130 meters. Of those turbines, none were found to have potential obstruction with the microwave systems in the area.

5. Contact

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

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