Proposed

Dan’s Mountain Wind Farm

Allegany County, MD

Electromagnetic Interference Analysis III

June 15, 2023

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CONTENTS

FIGURES

TABLES

ABBREVIATIONS

AGL	Above Ground Level
AMSL	Above Mean Sea Level
AOI	Area of Interest (5-mile radius of the wind farm)
ARSR	Air Route Surveillance Radar
ASR	Airport Surveillance Radar
AWS	Advanced Wireless Service (1.7/2.1 GHz)
dBµV	decibel micro-volts per meter
DHS	Department of Homeland Security
DMWF	Dan's Mountain Wind Force, LLC
DOD	Department of Defense
EIA	Electromagnetic Interference Analysis
EMF	Electromagnetic Fields
EMI	Electromagnetic Interference
ERP	Effective Radiated Power (Transmitter)
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GHz	Gigahertz
IWECS	Industrial Wind Energy Conversion System
IRAC	Inter-Department Radio Advisory Committee
Km	kilometer
KV	Kilovolt
LMR	Land Mobile Radio
LOS	Line-of-sight
m	Meter
mG	Milligauss, a unit of measurement of the density of a magnetic field
MHz	Megahertz
MIEMSS	Maryland Institute for Emergency Medical Services Systems
MW	Megawatt
NAD83	Latitude and Longitude as defined by the North American Datum of 1983
NWS	Weather Service
NEXRAD	Next Generation Radar WSR-88D systems of the National Weather Service (NWS)
NLOS	Non-line-of-sight
NOAA	National Oceanic and Atmospheric Administration
NTIA	National Telecommunications and Information Administration
NWS	National Weather Service
OTA	Over-the-air (Television signals)
PCS	Personal Communication Service (1.9 GHz)
PJM	PJM Interconnection, LLC - Regional (electricity) transmission organization
RF	Radio Frequency
RLOS	Radar Line-of-sight
ULS	The FCC's Universal Licensing System
VOR	Very High-Frequency Omnidirectional Range navigational aid sites
WBS	Wireless Broadband Service
WISP	Wireless Internet Service Provider
WTG	Wind Turbine Generator

I. EXECUTIVE SUMMARY

The Code of Allegany County Maryland requires an applicant for a wind farm permit to submit an Electromagnetic Interference Analysis (EIA). Dan's Mountain Wind Force, LLC (DMWF) is developing a wind farm on Dan's Mountain. Two earlier versions of this document were prepared in 2014 and 2015 but delays in project timing due to permitting challenges and litigation necessitate that the 2015 EIA be updated for 2023. This version, EIA III, is the updated version.

Accordingly, DMWF engaged the services of Broadcast Wind, LLC to prepare an EIA to:

1. Assess the potential for the proposed Dan's Mountain wind farm to cause interference with existing broadcasting and telecommunication infrastructures,
2. Identify how potential interference might be avoided through careful turbine placement, and
3. Identify post-construction mitigation, if required.

Broadcast Wind, LLC is an engineering consulting company that provides interference analysis for the wind and broadcasting industries. Other contributors to the EIA include Meintel, Sgrignoli & Wallace, LLC (MSW) for electromagnetic wave propagation modeling, Comsearch for telecommunications interference analysis, CME Engineering LP for geolocation and coordinate verification of beam paths and structures on Dan's Mountain and surrounding areas and Bennett Brewer and Associates (BBA) for turbine locations and beam path interference analysis.

A. Findings

Summary of findings

Point-to-Point Microwave Systems	There will be no impairment to point-to-point services. Predicted interference to one licensed beam path will be remedied by replacing the link with a fiber optic link or by relocating the equipment to an alternate communication tower. Predicted interference to 1 short-hop unlicensed beam path will be remedied by replacing the link with a fiber connection.
Point-to-Multipoint Microwave Systems	There will be no impairment to point-to-multipoint services. No licensed beam paths pass through or near the wind farm. Eight unlicensed beam paths are predicted to intersect one turbine. If one or more of these beams experiences impairment of the carrier's coverage, many options are available to restore coverage.
Land Mobile and Emergency Services	There will be no impairment to emergency services. All the proposed turbine locations exceed the FCC-recommended minimum separation distance from any existing fixed emergency service base stations. In addition, systems are designed to operate in non-line-of-sight environments utilizing multiple redundant overlapping cells. If a signal were blocked from reaching the base station of one cell, it would be automatically handed to another.
Electromagnetic Interference	No Electromagnetic Interference (EMI) from the turbines, transformers, buried cables, or other system components will interfere with the operation of communications equipment.
Mobile Phone & Personal Communication Systems	There will be no impairment to mobile phone services. All the proposed turbine locations exceed the FCC-recommended minimum separation distance from any existing fixed cellular base stations. In addition, systems are designed to operate in non-line-of-sight environments utilizing multiple overlapping redundant cells. If a signal were blocked from reaching the base station of one cell, it would be automatically handed to another.

AM Radio Broadcasting	There will be no signal impairment. No AM broadcast antennas are near the wind farm.
FM Radio Broadcasting	There is the potential for interference to FM radio reception in some areas near the wind project. If instances of impaired reception actually occur, well-established and available techniques will be implemented to mitigate impacts. Broadcast Wind has recommended that field measurements of signal strength and reception in areas of potential interference be taken before and after construction to establish a baseline against which to enable verification of impairment to signals.
Off-Air TV Stations	No loss of over-the-air television reception service will be experienced. In some areas, there is potential for impairment to signals from transmitters located outside the area. The estimated population affected would be 22. If needed, well-established and available mitigation techniques will be implemented to restore or replace service. *Cable TV Off-Air Pickup.* No head-end signal pickup points are in areas that could be affected by signal impairment due to wind turbines.
Government Radar Systems	No interference with air safety, navigation, surveillance, or weather information services is expected.
Doppler Radar	No Doppler radar systems will have line-of-site intersections with the wind farm.
Telecommunications	No other services on towers within 5 miles of the wind farm will be impacted.
Other Government Communication Systems	No interferences to other systems regulated by the Government are known or expected. The FAA has issued Determinations of No Hazard to Air Navigation for the project as recently as December 2022 and is currently studying the final layout. No adverse impacts are anticipated. The NTIA issued a letter stating there are no concerns. All other potentially affected agencies have been notified through the FAA and NTIA processes and no concerns from these agencies have been expressed.

1. Point-to-Point Microwave Systems

One of the 74 *licensed* point-to-point microwave beam paths identified will potentially be impaired by the project. The potential impairment will be preemptively remedied by replacing the link with a fiber optic link or by relocating the equipment to an alternative communication tower. The owners of this link and the project owners have agreed on this approach for mitigation.

One of 11 *unlicensed* point-to-point microwave beam paths will need to be realigned or replaced to avoid potential interference. It will be replaced with a fiber optic link. The owners of this link and the project owners have agreed on this approach for mitigation.

2. Point-to-Multipoint Microwave Systems

No licensed point-to-multipoint beam paths cross through the planned wind farm.

Eight unlicensed point-to-multipoint microwave beam paths operate within the project area that are predicted to intersect with turbine WTG-9. In the event that a mobile phone carrier's coverage is compromised by the presence of the wind energy facility, there are many options available to improve their signal coverage to the area, for example, through changing the height of their antenna, optimization of a nearby base transmitter, adding a new sector or cell site, or utilizing a utility or meteorological tower. The tubular tower of turbine nine directly interferes with three of the point-to-multipoint beam paths. Dan's Mountain is in contact with the owners of those beam paths to develop a mitigation strategy.

3. Land Mobile & Emergency Services

Facilities within a 5-mile radius of the proposed project, including police, fire, emergency medical services, emergency management, hospitals, public works, transportation, other state, county, and municipal agencies, commercial E911 operators, and business land mobile radio (LMR) systems, were assessed. No harmful impacts to these facilities are anticipated from the wind farm.

4. Electromagnetic Interference

All known possible sources of interference from electromagnetic fields (EMF) originating from the wind farm were examined. These included long-range fields that propagate from their source through space (from radio transmitters, arcing, and corona discharges) and short-range non-propagating current-induced fields that attenuate within a short distance from their source (in buried cables, inside wind turbines, inside transformers, and in the substation). In all cases, fields that could be produced either would be too weak to affect anything or would have attenuated before they reached any electronic equipment with which they might have interfered.

5. Mobile Phone & Personal Communication Systems

Mobile Phone and Personal Communication Systems reception is expected to be unaffected by the presence of the wind farm.

6. AM Broadcast Radio Stations

Five local AM stations operate within 30 km of the proposed project site. There will be no impairment to their signals because none of the transmitter antennae is nearer to a proposed wind turbine than the standard exclusion distance of 3 km[1]. The exclusion distance defines an area around an AM broadcast antenna or array of antennas outside of which the presence of a large metal structure will not affect its radiation pattern or coverage area. Since no impact on the licensed and operational AM broadcast stations was identified, no additional recommendations or mitigation techniques are required for AM stations as a result of this project.

7. FM Broadcast Radio Stations

Pattern Distortion. Twenty-Five local FM stations operate within 30 km of the proposed project site. Seven of the twenty-five FM stations are located within 2 km of a turbine. Based on antenna data from FCC license records, each of these 7 FM stations meets the required minimum separation distance of a transmitter from the nearest turbine to avoid signal impairment due to emission pattern distortion.[2] All other FM stations are located 6.7 km or further from the proposed turbine locations so they would not experience emission pattern distortion caused by the wind project.

Attenuation. Seven FM radio stations were identified whose signals could experience attenuation in areas downstream from the wind farm. The signal strength of each station was simulated with and without the wind farm. The simulations predict that there is potential for impairment to the signal in

[1] The exclusion Distance is defined in Appendix A by Comsearch (page 33, Impact Assessment)

[2] Recommended minimum separation distance of each turbine, including the tower and rotor, is based on the far field distance of the antenna or 1.5 km if no antenna data is available.

some areas but not whether the attenuation would affect the actual reception of the signal by a radio receiver. To determine the areas with potential for reception impairment, field tests of signal strength and reception before construction are recommended. Preconstruction measurements establish a baseline against which post-construction field tests can be compared.

8. Off-Air TV Stations

Cable TV and direct broadcast satellite (DBS) are the dominant modes of service delivery for TV programming in the area. These services are generally not affected by the presence of wind turbines.

Little impairment to television reception is predicted as a consequence of constructing the wind farm on Dan's Mountain, and any impairment that may occur after turbines are in place can be readily remedied at the receiving site.

Ten active television stations have FCC coverage areas that include the Dan's Mountain project area. If any of the estimated 22 individuals (per census count), meaning just a handful of homes with potential for impairment to their signals actually experience impaired reception, straightforward mitigation steps are available to restore full reception, ranging from adjusting or upgrading their receiving antennas to providing direct-broadcast satellite (DBS) service.

Two Cable TV companies, Comcast and Breezeline Cable (formerly Atlantic Broadband), serve Allegany County. Neither of the companies' head-end receiving facilities is located in an area that could be affected by the wind farm.

9. Government Radar Systems

No interference is anticipated to any radar systems that provide air safety, navigation, surveillance, or weather information services within the area of influence of the project. Research conducted confirmed the Dan's Mountain Wind Farm is not anticipated to cause adverse impacts to radar sites, Very High-Frequency Omnidirectional Range (VOR) navigational aid sites, Air Route Surveillance Radar (ARSR), Airport Surveillance Radar (ASR), or Next Generation Radar (NEXRAD) WSR-88D systems of the National Weather Service (NWS).

10. Commercial Doppler Radar

Of the eight radar systems identified in the vicinity of the Dans Mountain Wind Farm, none will have a line-of-sight condition with the proposed wind turbines, thus there are no resulting interference issues anticipated.

11. Telecommunication Towers

There are 42 tower structures, 143 FCC-licensed antennas, and 21 unlicensed microwave antennas within five miles of the project area that were identified. They are used for microwave, cellular, FM, TV, paging, and land mobile services in the area. No additional facilities beyond those referenced elsewhere in this executive summary and report are expected to be impacted by the proposed wind farm.

12. Other Government Communication Systems

No objections are foreseen by Government communications agencies with regulatory jurisdiction over wind farms.

As of December 12, 2022, the Federal Aviation Administration (FAA) has issued Determinations of No Hazard to Air Navigation for the project. The FAA has conducted aeronautical studies under the provisions of 49 U.S.C., Section 44718, and, if applicable, Title 14 of the Code of Federal Regulations, Part 77, concerning the proposed Dan's Mountain project. These aeronautical studies established that the structures will have "no substantial adverse effect on the safe and efficient utilization of the navigable air space by aircraft or on the operation of air navigation facilities". The FAA requires that its studies be updated once final turbine locations have been established. Due to a recent change in turbine technology to be used on the Project, a new request for aeronautical studies was filed with the FAA in February 2022 for the 9-turbine layout.

Other federal agencies with radar assets, such as the Department of Defense (DoD), the Department of Homeland Security (DHS), and the National Oceanic and Atmospheric Administration (NOAA), have been notified of the proposed project through the FAA process.

The National Telecommunications and Information Administration (NTIA), which oversees telecommunications systems operated by the Federal Government and consults with the federal agencies represented in the Interdepartmental Radio Advisory Committee (IRAC), issued a letter on April 11, 2023, identifying no adverse impacts to federal telecommunication systems.

13. Title 47, Chapter 1 of the Code of Federal Regulations

The project will comply with Federal Communication Commission (FCC) interference regulations under Title 47, Chapter 1 of the Code of Federal Regulations.

B. Conclusions

This EIA III concludes that the wind farm can operate at its proposed location without negatively impacting existing and proposed electromagnetic services. For the few potential concerns that have been identified have established, there are available technical solutions that will be implemented as needed. The project is committed to working with the tower owners and colocation tenants to identify and resolve issues that may arise.

Additionally, under §360-107.C(7) of the Code of Allegany County, Dan's Mountain Wind Force is required to post a $100,000 bond to ensure that any electromagnetic interference issues that might arise are resolved.

II. INTRODUCTION – GENERAL DESCRIPTION OF THE PROJECT

Dan’s Mountain Wind Force, LLC proposes constructing and operating a 9-turbine wind farm on Dan’s Mountain, about 4 miles southeast of Frostburg, in Allegany County Maryland. In Allegany County, utility-scale wind farms are a “permitted use”, by special exception. As required by County Code, the project has applied for, and received, a Special Exception and certain variances necessary for its construction. The Special Exception and Variances were issued in October 2019 by the Board of Zoning appeals as case numbers 942 and 943.

The Code of Allegany County Maryland, §360-107.C, as amended June 4, 2009, by Code Home Rule 2-09, requires parties who intend to construct a wind farm to submit an Electromagnetic Interference Analysis (EIA)[3] and distribute it widely for comment.

A. Location of the Project

The proposed wind turbines will be located on Dan’s Mountain, approximately 4 miles southeast of the Frostburg Post Office in Allegany County Maryland as shown in Figure 1.

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[3] Allegany Co. Code §360-107. Wind Energy Conversion Systems Regulations:
“C. Electromagnetic Interference:
(1) All applicants for industrial wind energy conversion systems shall be required to prepare and submit an Electromagnetic Interference Analysis (EIA), which shall be performed at the applicant’s expense and in accordance with guidelines established by Zoning Administrator.”

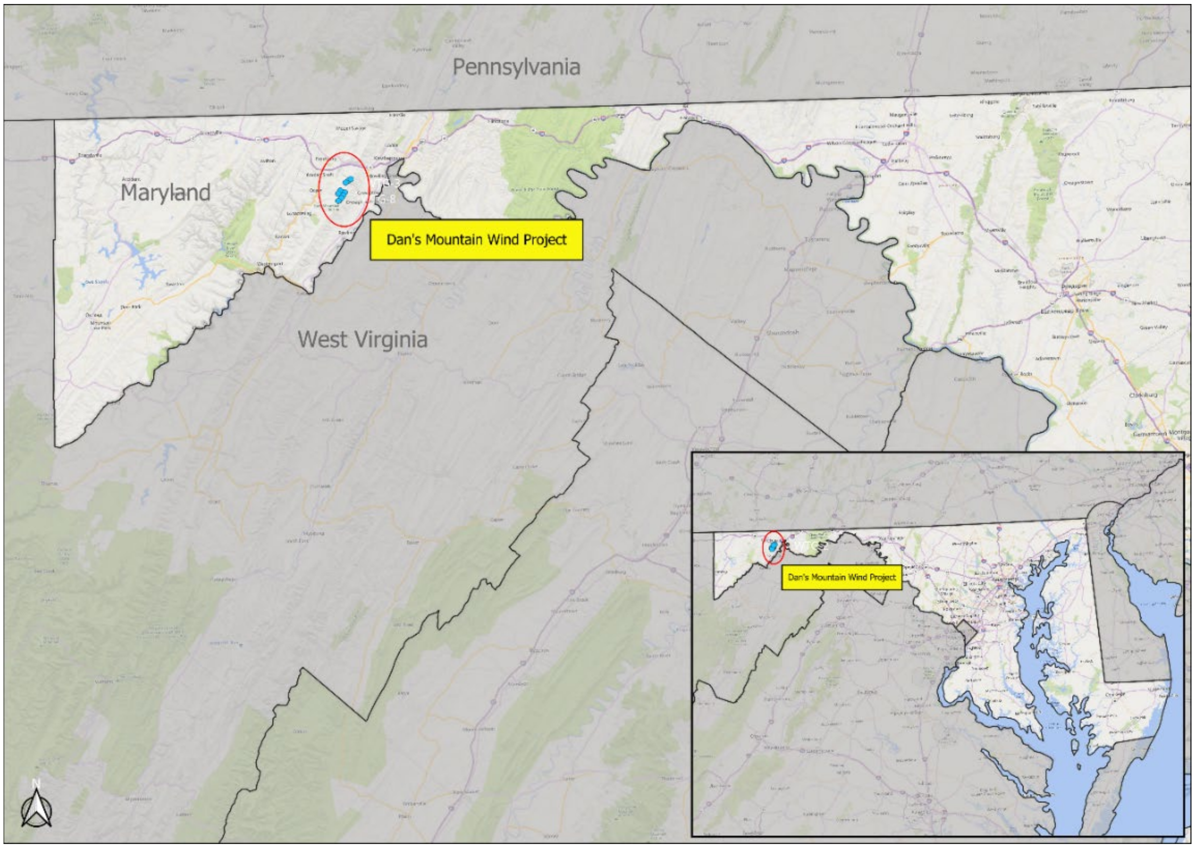

Figure 1. Regional Map

The red oval encircles the part of Dan's Mountain where the wind farm will be located.

The site's location is shown with more local detail in Figure 2. A more detailed site plan can be found in the Site Plan, Section III.

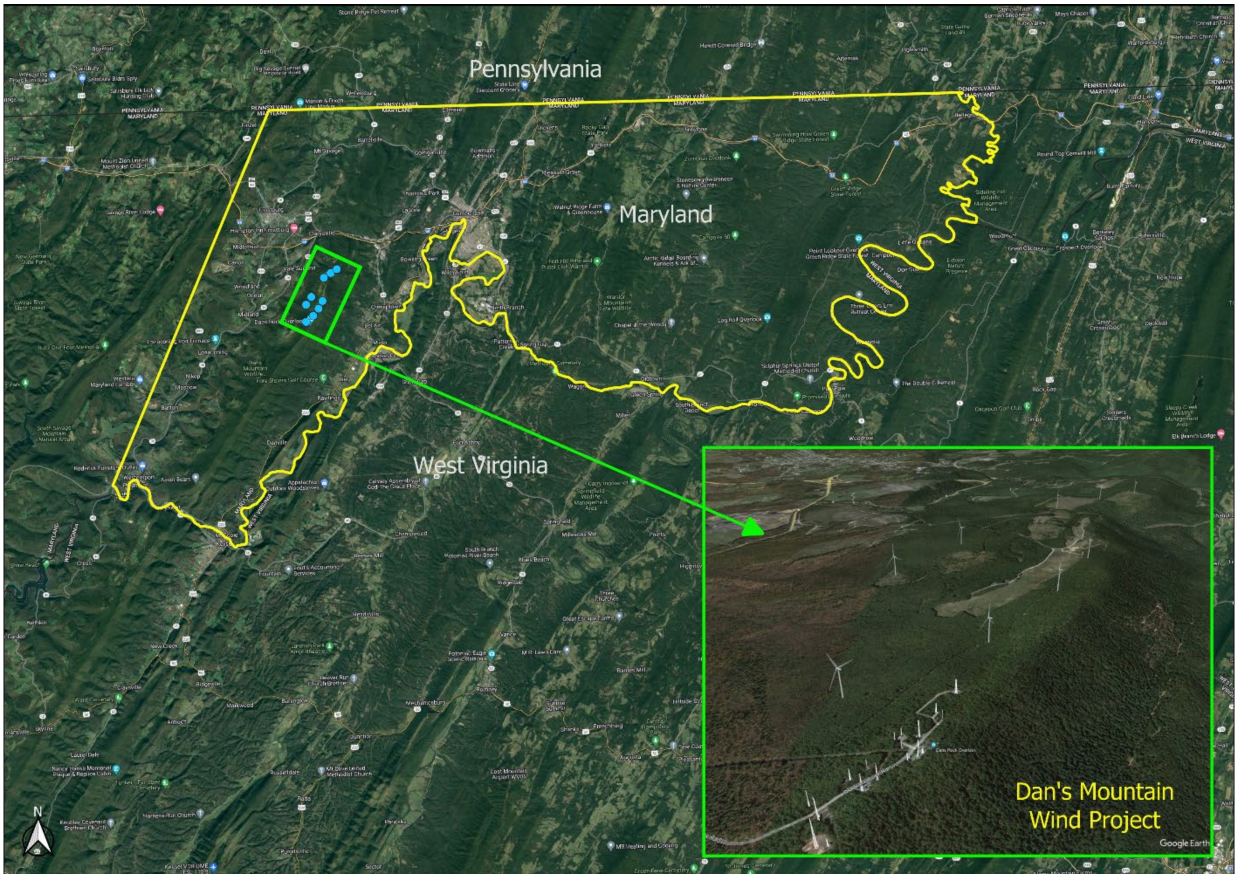

Figure 2. Area Map

The wind farm will consist of 9 turbines located in three arrays generally extending in a NE to SW orientation along Dan's Mountain.

Nineteen communication towers and one fire tower are currently on Dan's Mountain, most of which are supporting antennas that are used for a variety of purposes.

Figure 3. Dan's Rock Communication Towers

The communication towers on Dan's Mountain are concentrated near the southern end of the turbine arrays.

The analyses presented in the tables and figures within this report were performed on radio frequency systems in an Area of Interest (AOI) that is within 5 miles of the proposed wind turbines unless otherwise specified.

Figure 4. Area of Interest

The blue oval line encircles the Area of Interest (5 miles from the nearest wind turbine).

B. Existing Geographic Conditions

The project site can be characterized as a fairly well-defined ridge line approximately 2.5 miles long with a northeast-to-southwest orientation, roughly perpendicular to the prevailing westerly and northwesterly winds. The top of the mountain, known as Dan's Mountain, is fairly broad, with elevations ranging from 2500 feet to 2800 feet AMSL. The terrain drops off steeply on the eastern side of the mountain, with an elevation drop of approximately 500 to 600 feet over one-half mile. On the western side of the mountain, the elevation drops much more moderately at approximately 300 to 400 feet over one-half mile, giving the mountain an excellent wind resource profile.

Much of the site has been previously used for timbering operations, coal extraction (both deep mining and surface or strip mining), as well as farming, and hunting. In addition, there are both seasonal and full-time residential properties scattered throughout the project area.

C. Access to the Site

The core of the project site can be accessed from Maryland Route 36, then east on Maryland Route 55, then right on to Burning Mines Road. The project is generally located at the top of Burning Mines Road.

D. Identification of Transmission Lines

Also present on the site is the Carlos Junction to Ridgeley 138 KV transmission line into which the project will interconnect and access the PJM grid. The Carlos Junction to Ridgeley transmission line and various distribution lines on the site are owned and operated by Potomac Edison, a subsidiary of FirstEnergy Corporation.

E. Identification of Substations

There are no existing substations on the site, but a 34.5 KV to 138 KV substation and 138 KV switchyard are proposed as the project's point of interconnection into the PJM grid. The substation and switchyard are to be located adjacent to one another, just south of and adjacent to the Carlos Junction to Ridgeley transmission line. They will be located north of Burning Mines Road and west of Ken's Lane. The substation will be owned and operated by Dan's Mountain Wind Force, LLC on behalf of the project, and the switchyard will be owned and operated by Potomac Edison.

F. Description of IWECS Units

1. Number, Height, and Rotor Diameter of IWECS Units

The nine turbines, or industrial wind energy conversion systems (IWECS), as described in the Code of Allegany County, planned for the project will be 2024 model year GE 6.1-158 turbines mounted on 117 m towers. The unit height (top of the nacelle) will be 118.11 m above grade.

GE's nomenclature for turbine models includes the capacity of the machine in megawatts (6.1 MW), followed by the rotor diameter (158 m). The tower height refers to "hub height", as shown in Figure 5.

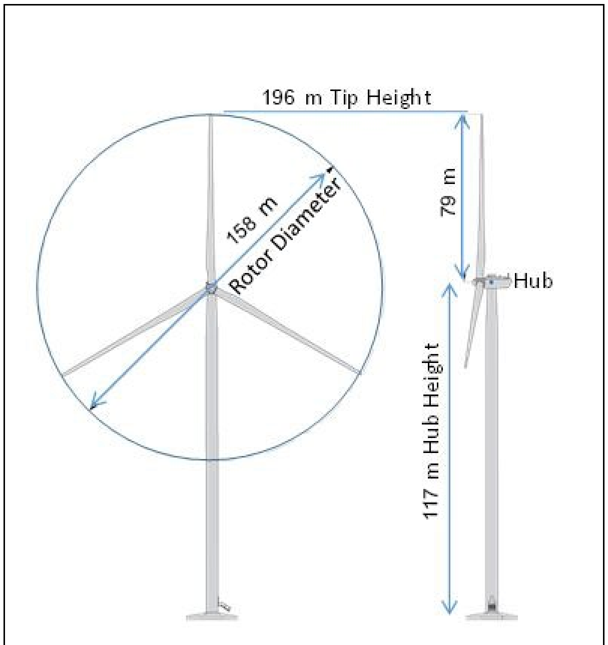

Figure 5. Dimensions of GE 6.1-158 turbine

2. Style of IWECS Units

This turbine model is a three-blade, upwind, horizontal axis style wind turbine. The turbine rotor and nacelle are mounted on top of a tubular steel tower. The machine uses active yaw control to keep the rotor pointed into the wind. Rotor speed is regulated by a combination of blade pitch angle adjustment and generator/converter torque control. The rotor spins in a clockwise direction under normal operating conditions when viewed from an upwind location. The full blade pitch angle range is approximately 90°, with the zero-degree position being with the blade flat to the prevailing wind. Pitching the blades to a full feather pitch angle of approximately 90° accomplishes aerodynamic breaking of the rotor, thus reducing the rotor speed.

Additional details for the GE 6.1-158 turbines turbine can be found in Appendix D. Technical and installation specifications and maintenance schedules are considered confidential and proprietary to the manufacturer and may be made available at GE's sole discretion upon request and execution of an acceptable non-disclosure agreement.

3. Array Configuration

The turbines will be configured in three arrays designed to conform to the Code of Allegany County, meet the manufacturer's requirements for spacing, optimize production, and conform to other internal and external requirements. The layout, through consultation with both state and federal wildlife agencies, also respects habitat and potential habitat for threatened and endangered plants and wildlife species.

4. Lighting

No artificial exterior lighting will be installed on the wind turbines except lighting that is specifically required by the Federal Aviation Administration (FAA), or by other regulatory bodies for the protection of aircraft and/or the protection of human health and safety, as well as security. The FAA has recently issued Determinations of Hazard to Air Navigation for wind turbines on the Dan's Mountain site and is currently evaluating the potential impact of the 9-turbine layout. Its requirement for aircraft warning lighting is not expected to include the installation of any high-intensity strobe lights.

If the FAA requires daytime high-intensity strobe lighting, a set of red or amber marking lights will be installed for nighttime use. The red or amber lights will replace daytime strobe lights from dusk until dawn. Any high-intensity strobe lights shall be turned off at twilight, subject to FAA requirements.

5. Favorable Characteristics of Properties for IWECS Development

A number of factors make Dan's Mountain attractive for wind energy development. They include:

- adequate wind resource;
- access to the transmission system;
- a robust market for the energy produced;
- the Maryland Renewable Portfolio Standard[4];
- cooperative private landowners;
- highway systems suitable for component delivery;
- availability of a capable workforce, and;
- much of the site has been previously disturbed (i.e., mining, logging).

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[4] The objective of Maryland's Renewable Portfolio Standard (RPS) is to recognize and develop the benefits associated with a diverse collection of renewable energy supplies. The State's RPS Program does this by recognizing the environmental and consumer benefits associated with renewable energy. The RPS Program requires electricity suppliers to meet a prescribed minimum portion of their retail electricity sales with various renewable energy sources. In the case of Dan's Mountain, the energy produced by the project will be sold to Constellation Energy under a long-term Power Purchase Agreement, satisfying a PSC merger condition for Constellation's merger with Exelon.

G. Current Public Service Commission Status

The state of Maryland requires utility-scale generation projects to obtain either a Certificate of Public Convenience and Necessity (CPCN) from the Maryland Public Service Commission (PSC), or in certain cases, an "exemption" of the CPCN requirement. On June 10, 2020, the PSC issued a CPCN Exemption for the Dan's Mountain project in accordance with §7-207.1 of the Public Utility Companies Article, *Annotated Code of Maryland* and pursuant to an application filed on January 14, 2020, by Dan's Mountain Wind Force, LLC. The exemption certificate remains in effect.

H. Current Federal Communications Commission (FCC) Position

The FCC licenses broadcasters and telecommunication service providers to operate at approved frequencies, power levels, and radiation patterns. Since wind turbines do not generate or emit RF signals, the FCC does not have jurisdiction over the owners of these structures. Instead, the FCC leaves responsibility for matters involving signal interference avoidance to broadcasting and telecommunications companies, wind farm developers, local zoning authorities, state and federal authorities, and other regulatory agencies that have jurisdiction over specific communication services.

I. Current Federal Aviation Administration (FAA) Position

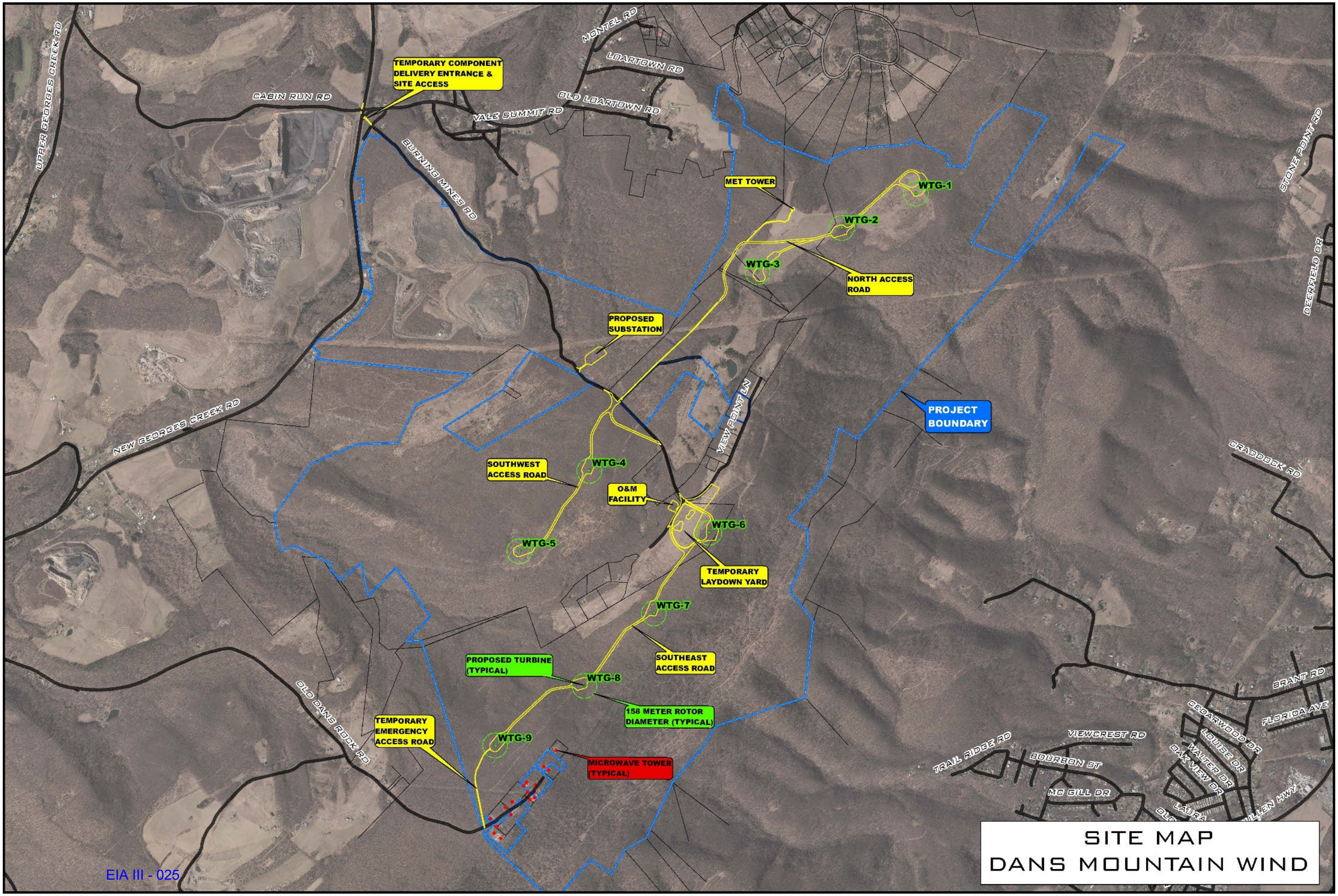
The FAA has issued Determinations of No Hazard to Air Navigation on multiple occasions for the project. These determinations expire after 18 months if construction is not started. As recently as December 12, 2022, the FAA issued Determinations of No Hazard to Air Navigation, confirming that its aeronautical studies determined that structures would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Dan's Mountain filed for new determinations for the final turbine locations in February 2023.

J. Construction and Completion Schedule

The project is expected to begin construction in late 2023 and go into commercial operation by the end of 2024.

III. SITE PLAN

Figure 6. A site plan overview drawing is shown on the following fold-out page.



TEMPORARY COMPONENT DELIVERY ENTRANCE & SITE ACCESS
MET TOWER
WTG-1
WTG-2
WTG-3
NORTH ACCESS ROAD
PROPOSED SUBSTATION
PROJECT BOUNDARY
SOUTHWEST ACCESS ROAD
WTG-4
O&M FACILITY
WTG-5
WTG-6
TEMPORARY LAYDOWN YARD
WTG-7
SOUTHEAST ACCESS ROAD
PROPOSED TURBINE (TYPICAL)
WTG-8
158 METER ROTOR DIAMETER (TYPICAL)
TEMPORARY EMERGENCY ACCESS ROAD
WTG-9
MICROWAVE TOWER (TYPICAL)
CABIN RUN RD
UPPER GEORGES CREEK RD
BURNING MINES RD
VALE SUMMIT RD
MONTEL RD
LOARTOWN RD
OLD LOARTOWN RD
NEW GEORGES CREEK RD
VIEW POINT LN
OLD DANS ROCK RD
STONE POINT RD
DEERFIELD DR
CRADDOCK RD
BRANT RD
FLORIDA AVE
CEDARWOOD DR
LOUISE DR
WALTER DR
OAK VIEW DR
VIEWCREST RD
TRAIL RIDGE RD
BOURBON ST
MC GILL DR
SITE MAP
DANS MOUNTAIN WIND
EIA III - 025

IV. INVENTORY OF IWECS/TURBINES

Table 1, below, provides information about each wind turbine proposed for the Dan's Mountain project. There are no existing wind turbines on the site. All of the proposed turbines will be owned by Dan's Mountain Wind Force, LLC.

The turbine locations were selected based on input from a number of sources, including the developer, Laurel Renewable Partners, LLC; the manufacturer, GE Wind Energy; the owner & future operator of the Project, Clearway Energy Group; wind analytics consultant, AWS Truewind; civil engineer, Bennet Brewer & Associates; and others as well as consultation with Maryland DNR and the US Fish and Wildlife Service. The EPC contractor for the project has not yet been selected.

Table 1. Proposed Wind Turbine Locations

Turbine ID	WGS84 UTM17N		Turbine Manufacturer, Model/Hub Height
	Easting	Northing	
1	682464.0043	4387538.4493	GE 6.1-158/117
2	682024.1961	4387261.7611	GE 6.1-158/117
3	681527.526	4386915.6109	GE 6.1-158/117
4	680623.0102	4385528.2605	GE 6.1-158/117
5	680245.504	4384965.4393	GE 6.1-158/117
6	681429.6322	4385233.8194	GE 6.1-158/117
7	681143.6545	4384680.3253	GE 6.1-158/117
8	680763.1185	4384167.0737	GE 6.1-158/117
9	680246.6893	4383719.8233	GE 6.1-158/117

V. POINT-TO-POINT MICROWAVE

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Point-to-point microwave systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication services, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services.

This section focuses on the potential impact of wind turbines on licensed, unlicensed, proposed, and applied-for non-federal government microwave systems.

A. Methodology

Comsearch maintains comprehensive technical databases containing information on all non-government licensed, proposed, and applied-for paths of microwave networks from 0.9 - 23 GHz throughout the United States. Typically, for each analysis of a wind farm, a survey is made in the field of all the communication towers and microwave antennas that may be affected by the proposed wind turbines. The purpose of the survey is to confirm the presence and position of systems listed in the FCC databases and to identify and locate unlicensed microwave systems and point-to-multipoint systems (reported in Section VI of this report) that may be present. For the proposed Dan's Mountain wind farm, the survey in the field was done by CME Engineering, LP. Antenna locations were field verified using a Total Station with a reflectorless laser, specifically a Nikon DTM-522. Field validation of antennas revealed that certain antennas contained in the Comsearch database were found not to exist[5] – whether never installed or removed. No additional analysis was necessary.

There are virtually no reliable data sources for unlicensed point-to-point microwave systems because they are not required to license or register their transmitter locations according to FCC rules. Unlicensed point-to-point microwave systems are analyzed herein based on field survey and interview data provided by CME Engineering, LP.

B. Results

1. Licensed Point-to-Point Microwave Beam Paths

Using Comsearch's proprietary microwave database in conjunction with CME's field survey data, 74 licensed microwave paths[6] were identified and examined. They are listed in Table 2 and are shown in Figure 6[7]and Figure 8.

[5] Beam path #27 did not exist in 2015 for EIA II, or when surveyed by CME for EIA III. The owners of Beam Path #27 confirmed that the licensed path was never installed.

[6] FCC-licensed coordinates were initially used to determine which paths intersect the area of interest. However, all figures depicting these microwave paths reflect the adjusted coordinates as surveyed by CME Engineering, LP.

[7] Note that this analysis does not include federal government paths that are not registered with the FCC.

Table 2. Licensed point-to-point microwave beam paths

ID	Status	Callsign 1[8]	Callsign 2[1]	Band	Path Length (km)	Licensee
1	Licensed	WBX365	WNTJ750(1)	6.7 GHz	15.03	State of Maryland, MIEMSS
2	Licensed	WHB707	RXONLY(4)	950 MHz	14.58	FM Radio License, LLC
3[9]	Non-Operational	WLD321	RXONLY(4)	950 MHz	21.44	He's Alive Inc.
4	Licensed	WLG299	RXONLY(9A)	950 MHz	8.37	Frostburg State University
5	Licensed	WLJ^{6}64	RXONLY(6B)	950 MHz	14.98	WITF, Inc.
6	Licensed	WMR416(12)	WQKA700	6.1 GHz	11.35	USCOC of Cumberland, Inc.
7	Licensed	WMT232	WMR416(12)	6.1 GHz	26.89	USCOC of Cumberland, Inc.
8	Licensed	WNEN347(5A)	WNEN348	6.7 GHz	35.32	FELHC, Inc.
9	Licensed	WNEN347(5)	WNEN360P	6.7 GHz	16.68	FELHC, Inc.
10	Licensed	WNEN347(5A)	WNEX908	6.7 GHz	37.31	FELHC, Inc.
11	Licensed	WNEN347(5)	WQNA362P	6.7 GHz	9.20	FELHC, Inc.
12	Licensed	WNEN355	WNEN347(5A)	6.1 GHz	52.80	FELHC, Inc.
13	Licensed	WNEN360P	WNEN347(5A)	6.7 GHz	16.68	FELHC, Inc.
14	Licensed	WNTI291(5)	WNTI290	940-960 MHz	66.42	FELHC, Inc.
15	Licensed	WNTI291(5)	WNTI290	940-960 MHz	66.42	FELHC, Inc.
16	Licensed	WNTJ750(1)	WNTM695	6.7 GHz	11.70	State of Maryland, MIEMSS
17[10]	Non-Operational	WPYJ824	RXONLY	950 MHz	15.52	WITF, Inc.
18	Licensed	WQCW375(3)	WQCW374	18 GHz	8.70	Allegany County Government
19	Licensed	WQCW375(3)	WQCW383	18 GHz	12.15	Allegany County Government
20	Licensed	WQJT762	WQJT598(6B)	11 GHz	15.07	West Virginia Radio Corporation
21	Licensed	WQJT763	WQJT598(6B)	11 GHz	11.70	West Virginia Radio Corporation
22	Licensed	WQJT764	WQJT598(6B)	11 GHz	18.66	West Virginia Radio Corporation
23	Licensed	WQQA260	WMR416(12)	11 GHz	6.83	USCOC of Cumberland, Inc.
24	Licensed	WQQC524	WMR416(12)	11 GHz	6.17	USCOC of Cumberland, Inc.
25	Licensed	WQQI930(6A)	WQQM666	11 GHz	14.56	Two Way Radio Inc.

[8] Tower IDs on Dan's Mountain are shown in parenthesis

[9] This path has been abandoned per a telephone conversation with the current owner on April 10, 2023.

[10] This path is no longer operational per CME Engineering December 2021 Dan's Mountain survey data.

ID	Status	Callsign 1[8]	Callsign 2[1]	Band	Path Length (km)	Licensee
26	Licensed	WQQL435(11)	WQQL347	6.7 GHz	49.54	Thought Transmissions, LLC
27	Licensed	WQQL437	WQQL435(11)	11 GHz	33.19	Thought Transmissions, LLC
28	Licensed	WQUU265	WMR416(12)	11 GHz	5.21	USCOC of Cumberland, Inc.
29	Licensed	WQVX430(3)	WQVX433	18 GHz	12.05	Allegany County Government
30	Licensed	WQVX430(3)	WQXB565	11 GHz	15.11	Allegany County Government
31	Licensed	WQVX737	WRDT897(14A)	11 GHz	11.01	Allegany County Government
32	Licensed	WQXR845	RXONLY(4)	950 MHz	14.58	FM Radio License, LLC
33	Licensed	WQXR847	RXONLY(4)	950 MHz	14.58	FM Radio License, LLC
34	Licensed	WQXT395(4)	RXONLY	950 MHz	12.79	FM Radio License, LLC
35	Licensed	WQZI397	WQZI396(3)	11 GHz	5.45	Conxx, Inc.
36	Licensed	WQZR472(14A)	WNTY925	6.1 GHz	24.48	State of Maryland, MIEMSS
37	Licensed	WQZR472(14A)	WQBZ627	6.1 GHz	15.07	State of Maryland, MIEMSS
38	Licensed	WQZR472(14A)	WQBZ627	6.1 GHz	15.07	State of Maryland, MIEMSS
39	Licensed	WQZR472(14A)	WQZR489	6.1 GHz	24.65	State of Maryland, MIEMSS
40	Licensed	WQZY419	WQZR472(14A)	6.1 GHz	53.83	State of Maryland, MIEMSS
41	Licensed	WRCK206	WRCL314(2)	6.1 GHz	18.77	T-Mobile License LLC
42	Questionable	WRCL314(2)	WRCL315	11 GHz	8.40	T-Mobile License LLC
43	Licensed	WRFM318(14A)	WRFM317	6.1 GHz	22.29	FELHC, Inc.
44	Licensed	WQZR472(14A)	WQZY419	6.1 GHz	53.83	State of Maryland, MIEMSS
45	Licensed	WRDT897(14A)	WRDT898	11 GHz	7.36	Allegany County Government
46	Licensed	WQZR472(14A)	WRJD755	6.1 GHz	16.25	State of Maryland, MIEMSS
47	Questionable	69240	WRCN600	11 GHz	6.10	T-Mobile License LLC
48	Licensed	WLP783	RXONLY	950 MHz	18.15	Cumberland Broadcasting Company
49	Licensed	WPRV884	RXONLY	950 MHz	0.97	Frostburg State University
50	Licensed	WQCW372	WQCW374	18 GHz	7.17	Allegany County Government
51	Licensed	WQCW374	WQXD603	11 GHz	7.53	Allegany County Government
52	Licensed	WQCW374	WQXD603	11 GHz	7.53	Allegany County Government
53	Licensed	WQCW387	WQCW383	18 GHz	2.61	Allegany County Government
54	Licensed	WQCW387	WQCW390	18 GHz	2.38	Allegany County Government
55	Licensed	WQPM992	WQPM993	11 GHz	7.00	USCOC of Cumberland, Inc.

ID	Status	Callsign 1[8]	Callsign 2[1]	Band	Path Length (km)	Licensee
56	Licensed	WQPM994	WQPM993	11 GHz	9.41	USCOC of Cumberland, Inc.
57	Licensed	WQQC525	WQQC524	11 GHz	2.65	USCOC of Cumberland, Inc.
58	Licensed	WQQC526	WQQC524	11 GHz	2.67	USCOC of Cumberland, Inc.
59	Licensed	WQQC751	WQQC524	11 GHz	2.22	USCOC of Cumberland, Inc.
60	Licensed	WQTR919	WQTR920	6.1 GHz	21.19	New Cingular Wireless PCS - Maryland
61	Proposed	WQTR919	WQTR920	6.1 GHz	21.19	New Cingular Wireless PCS - Maryland
62	Licensed	WQVX737	WQVX433	18 GHz	2.61	Allegany County Government
63	Licensed	WQVX737	WQVX734	18 GHz	2.38	Allegany County Government
64	Licensed	WQXG674	WQXG803	11 GHz	28.81	T-Mobile License LLC
65	Licensed	WQXG674	WQXP920	11 GHz	33.88	T-Mobile License LLC
66	Licensed	WQXG674	WQXY359	11 GHz	3.62	T-Mobile License LLC
67	Licensed	WQXU874	WQXU293	18 GHz	4.27	Conxx, Inc.
68	Licensed	WQYB986	WQXY412	11 GHz	3.73	USCOC of Cumberland, Inc.
69	Licensed	WQYT905	WQTR920	23 GHz	2.67	New Cingular Wireless PCS - Maryland
70	Licensed	WRCK230	WRCN600	6.1 GHz	21.20	T-Mobile License LLC
71	Licensed	WRCN429	WRDJ363	11 GHz	10.87	Mountain View Communications, LLC
72	Licensed	WRCN996	WRCN429	11 GHz	13.41	Mountain View Communications, LLC
73	Licensed	WRMN200	WRMN201	11 GHz	10.36	T-Mobile License LLC
74	Proposed	WRMN200	WRMN201	11 GHz	10.36	T-Mobile License LLC

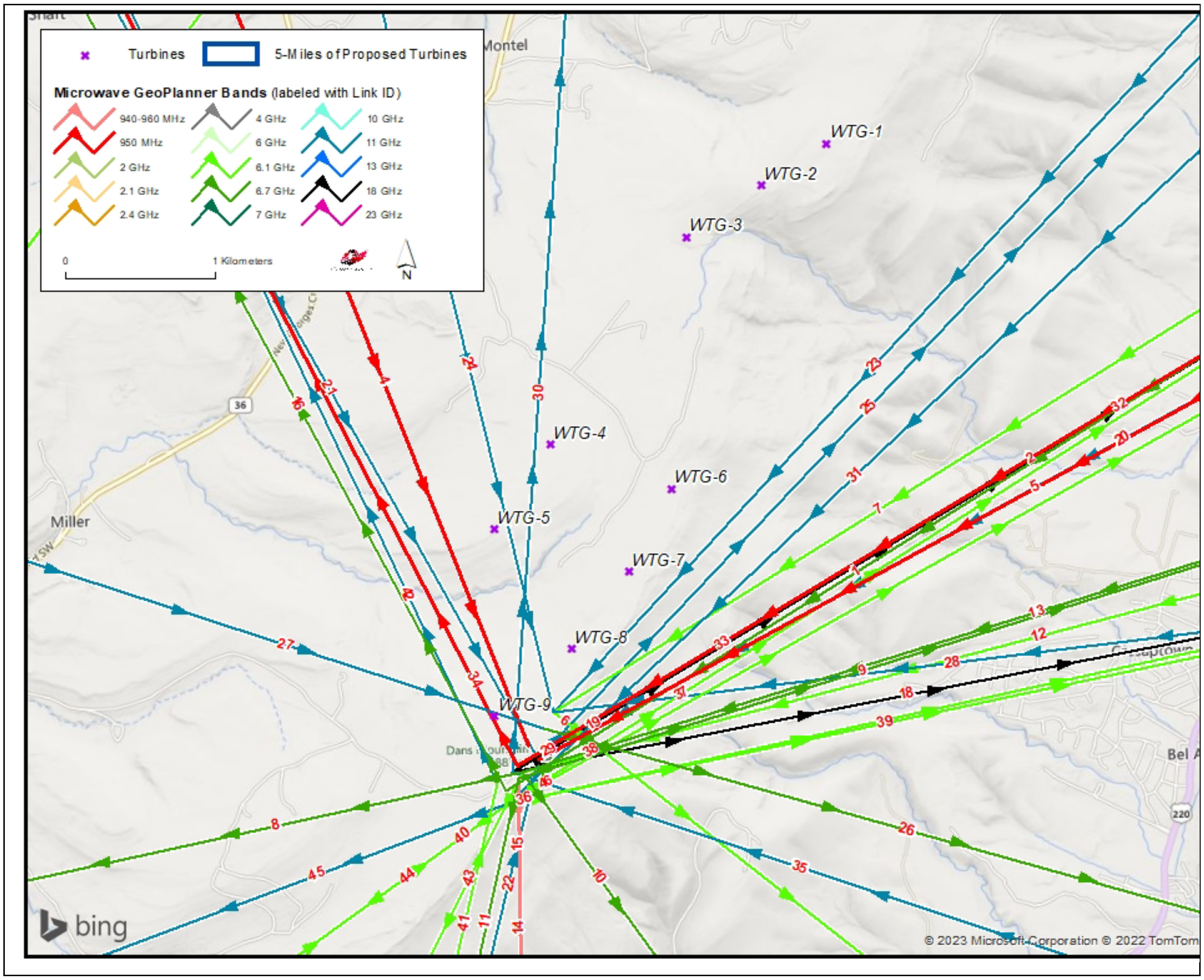


Figure 6. Licensed point-to-point microwave beam paths on Dan's Mountain

2. Unlicensed Point-to-Point Microwave Beam Paths

Comsearch used the survey data from CME Engineering to identify and examine 11 unlicensed microwave paths. These paths are listed in Table 3 and shown in Figure 7.

Table 3. Unlicensed point-to-point microwave beam paths

ID	Unlicensed Band	Path Length (km)	Owner
100	4.9 GHz	15.24	State of Maryland, MIEMSS
101	5.8 GHz	5.88	Allconet
102	5.8 GHz	7.46	Allconet
103	5.8 GHz	17.29	Allconet
105	5.8 GHz	50.94	Two-Way Radio, Inc.[11]
106	24.2 GHz	7.01	Oldies 107 Radio Station
107	5.8 GHz	14.15	Allegany College of Maryland
108[12]	5.8 GHz	2.43	Two-Way Radio, Inc.[9]
110	Unknown	5.49	Allconet
111	2.4 GHz	8.06	State of Maryland, MIEMSS
113	Unknown	12.06	Allconet

[11] Table 2 of Comsearch's Microwave Study lists the Owner as unknown, but Two-Way Radio, Inc. confirmed that this beam is owned by Two-Way Radio, Inc.

[12] Path #108 to be converted to fiber.

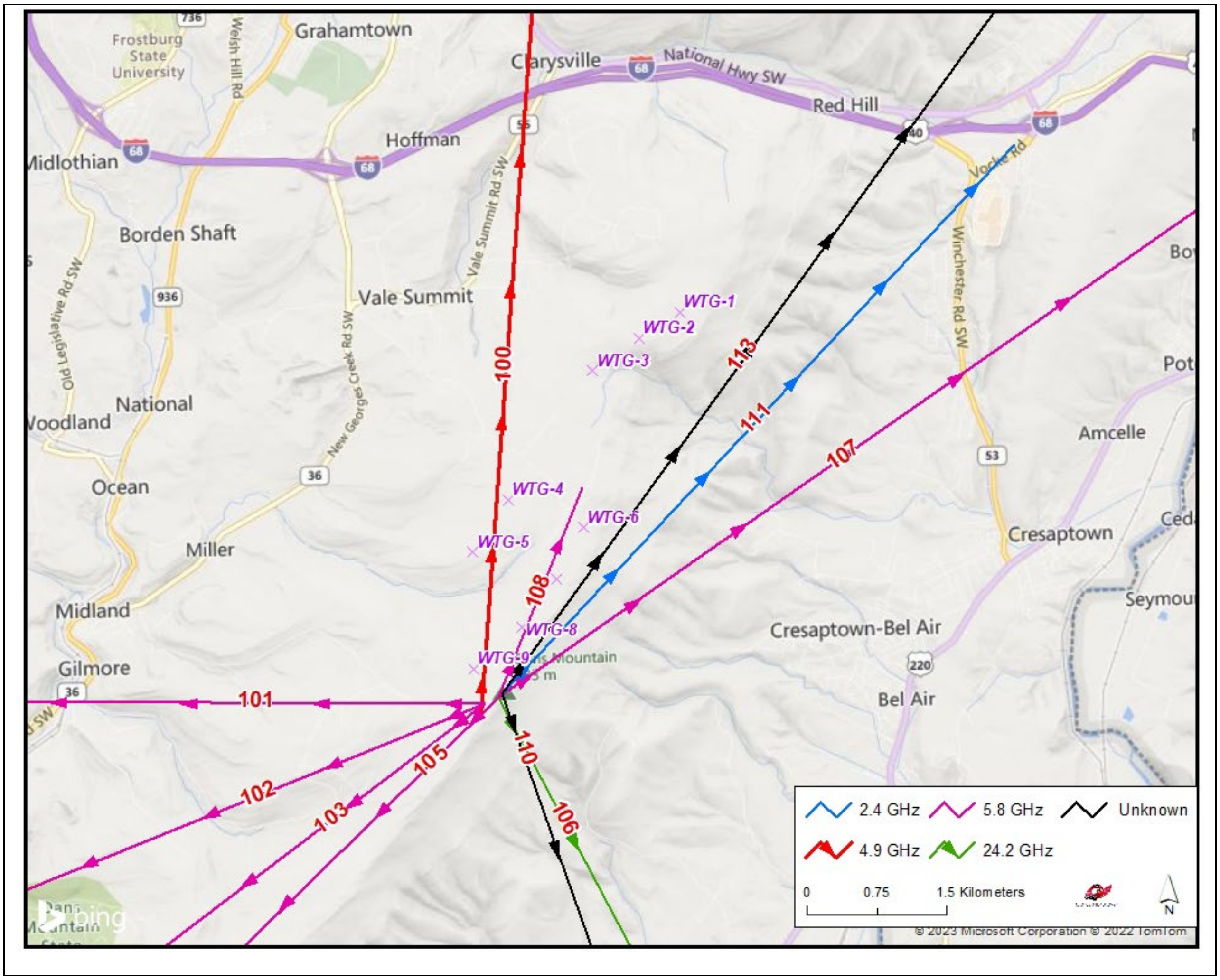
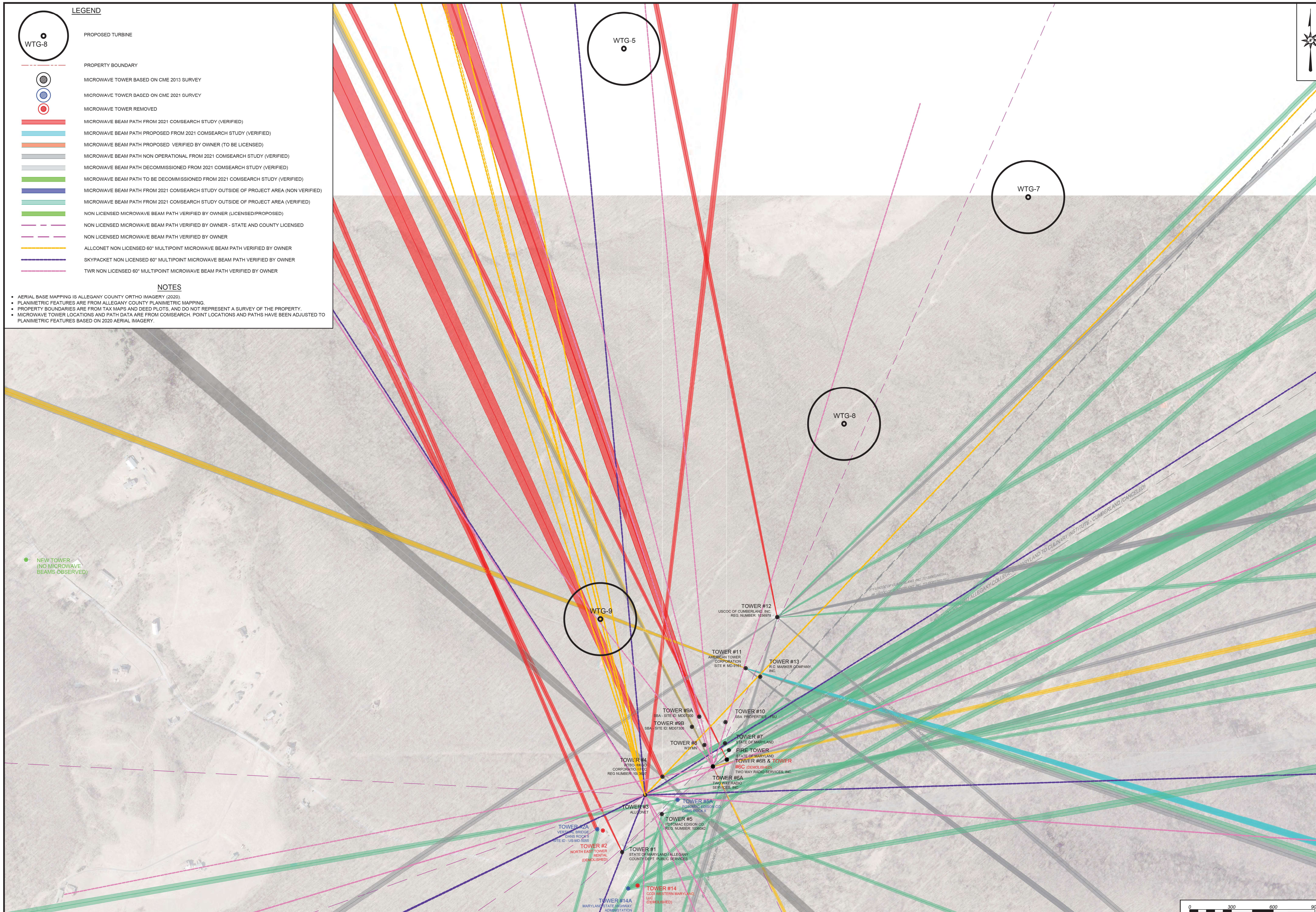


Figure 7. Unlicensed point-to-point microwave beam paths

The short beam path (# 108) belongs to Two-Way Radio, Inc ("TWR"). It connects TWR's tower #6A on Dan's Rock to its Tower #15 known as the New Dan's Tower, which is located along View Point Lane SW near the geographic center of the proposed Project area.

Figure 8. (following page) Licensed & Unlicensed point-to-point microwave beam paths

Zoomed-in view of licensed and unlicensed point-to-point paths in the vicinity of the communication towers near Dan's Rock at the southeast corner of the wind farm.



LEGEND

- PROPOSED TURBINE (WTG-8)
- PROPERTY BOUNDARY
- MICROWAVE TOWER BASED ON CME 2013 SURVEY
- MICROWAVE TOWER BASED ON CME 2021 SURVEY
- MICROWAVE TOWER REMOVED
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)
- MICROWAVE BEAM PATH NON OPERATIONAL FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER
- ALLCONET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

- AERIAL BASE MAPPING IS ALLEGANY COUNTY ORTHO IMAGERY (2020).
- PLANIMETRIC FEATURES ARE FROM ALLEGANY COUNTY PLANIMETRIC MAPPING.
- PROPERTY BOUNDARIES ARE FROM TAX MAPS AND DEED PLOTS, AND DO NOT REPRESENT A SURVEY OF THE PROPERTY.
- MICROWAVE TOWER LOCATIONS AND PATH DATA ARE FROM COMSEARCH. POINT LOCATIONS AND PATHS HAVE BEEN ADJUSTED TO PLANIMETRIC FEATURES BASED ON 2020 AERIAL IMAGERY.

APEX

Apex Companies, LLC
165 East Union St.,
Suite 100
Somerset, Pennsylvania 15501
Phone: (814) 443-3344
www.apexcos.com
(FORMERLY CME ENGINEERING LP)

Microwave Study
Overview Map Beam Paths
Dan's Mountain Wind Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781

Situate in
Allegany County, Maryland

NO.	DATE	REVISION
1	05-02-2023	UPDATED PROPOSED TURBINE LOCATIONS AND SIZES

PROFESSIONAL SEAL

of Apex Companies, LLC

DATE:	11/15/2021
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mountain - Microwave Verification - Base.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI
SCALE:	1" = 300'

SHEET TITLE

EXHIBIT 2

3. Fresnel Zone Analysis of Point-to-Point Beam Paths

Potential instances of interference with microwave beam paths by wind turbines are identified by calculating intersections of the beam's Fresnel zone with the turbine's rotor-swept areas. For computational efficiency the calculation is done in two steps[13]:

a) Two-dimensional (2-D) screening analysis that identifies potential intersections: Turbines are identified whose rotor swept area overlaps the Fresnel zone of a microwave beam path based solely on the projection on the ground of the rotor's swept area and the beam's Fresnel zone without considering height above ground, the third dimension.
b) Three-dimensional (3-D) cross-sectional analysis that identifies predicted intersections: Turbines and beams identified as having potential intersections are analyzed taking the height of beam paths and turbine rotors into account. (A beam path that goes under or over a rotor's swept area would appear in a 2-D analysis as a potential intersection, but in a 3-D analysis would not be a predicted intersection.)

2-D Fresnel Zone Analysis of Point-to-Point Beam Paths

The 2-D Fresnel zone analysis identified two (2) point-to-point beam paths that exhibit a potential intersection[14] with a turbine: one (1) of which is licensed and one (1) of which is unlicensed.

Table 4. 2-D analysis of licensed and unlicensed point-to-point beam paths in the 3.5 GHz band

Two beam paths have negative horizontal clearance with a turbine rotor, which indicates potential for intersection, therefore the need for additional analysis in 3-D.

Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Affected Microwave Path ID	Fresnel Zone Radius at Turbine Location (m)	Horizontal off-path Distance (m)	Distance along the path from site 1 (km)	Horizontal Clearance (m)
9	39.584258	-78.901149	34	10.64	21	0.37	-68.64
8	39.588177	-78.895018	108	5.26	46	0.80	-38.26

3-D Fresnel Zone Cross-Sectional Analysis of Point-to-Point Beam Paths

The 3-D cross-sectional analysis calculates the precise height and width of 100% of the first Fresnel zone at the turbine location based on the antenna heights of the two beam path endpoints and the earth curvature bulge at the specific turbine location. The horizontal off-path distance was calculated in the 2-D analysis in the previous section and the turbine hub height and blade length were provided by the client. The 3-D cross-sectional analysis uses these values to calculate the clearance between the blades and the microwave Fresnel zone as shown in Figure 9.

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[13] Details of Fresnel Zone calculations are presented in Appendix A, Comsearch Geoplanner

[14] Based on 100% of the first Fresnel zone at the turbine location.

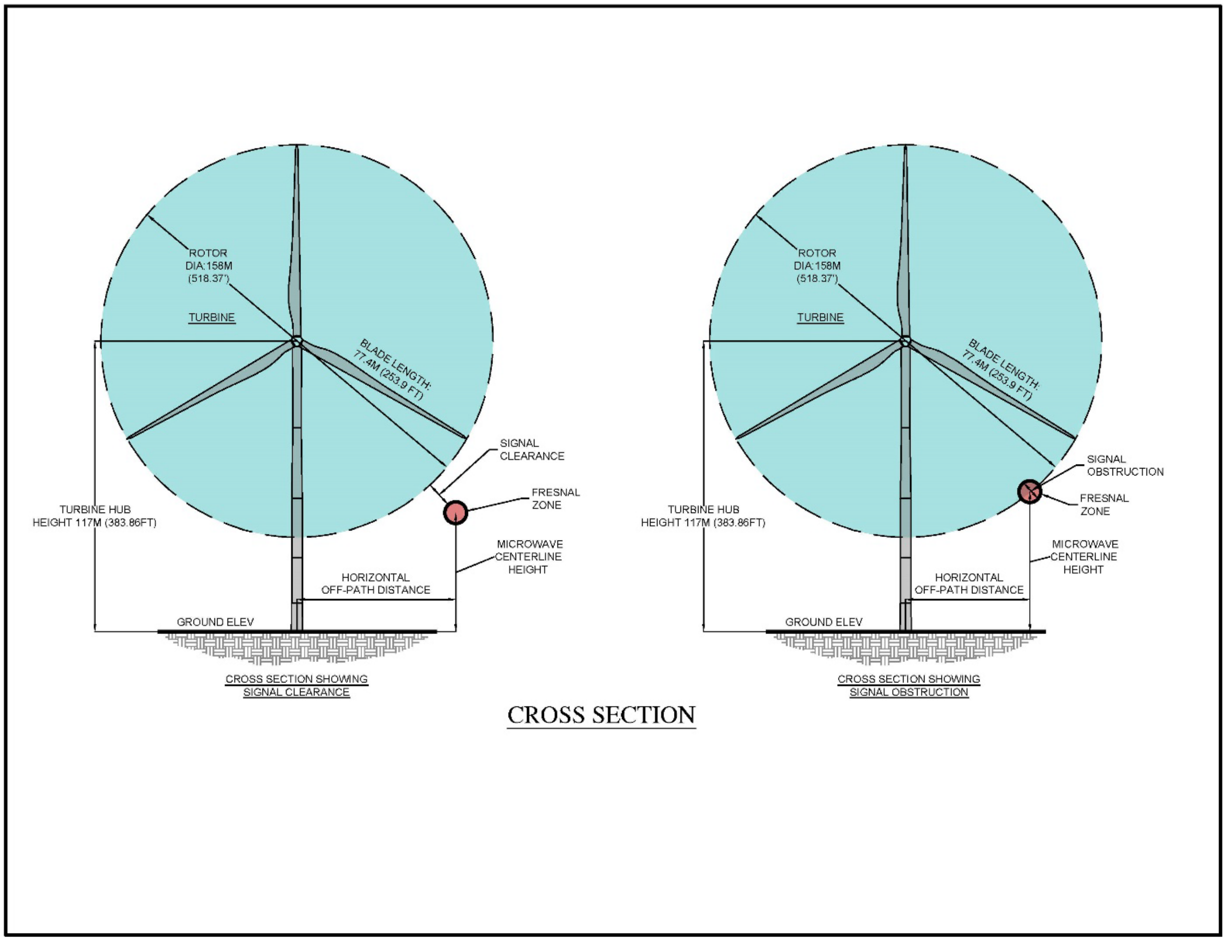


Figure 9. 3-D Illustration of clearance between a microwave beam and the turbine rotor's swept area

Both diagrams show conditions that appear as potential intersections in the 2-D analysis, but only the diagram on the right shows a predicted intersection of a turbine rotor's swept area with a beam path's Fresnel zone.

The results of the 3-D cross-sectional calculations for point-to-point beam paths that exhibited potential for intersection with a turbine's rotor in the 2D analysis are shown in Table 5[15]. Both paths show negative clearance values indicating obstruction of the Fresnel zones due to the intersection of the beams with the turbine rotors.

[15] The detailed 3-D Fresnel zone analysis is presented in the Comsearch report in Appendix A.

Table 5. 3-D analysis of licensed and unlicensed point-to-point beam paths

Microwave Path ID	Fresnel Zone Radius at Turbine Location (m)	Microwave Centerline Height at Turbine Location (m)	Turbine ID	Hub Height (m)	Blade Length (m)	Cross-sectional Clearance (m)
34	10.64	63.19	9	117	79	-31.88
108	5.26	67.54	8	117	79	-16.72

One beam path has a negative clearance indicating a predicted intersection with wind turbine 9 and one beam path has a negative clearance indicating a predicted intersection with wind turbine 8 [16].

Graphical illustrations of 2-D and 3-D analyses are presented in, Figure 10, Figure 11, and Figure 12

[16] Based on 100% of the first Fresnel zone at the turbine location.

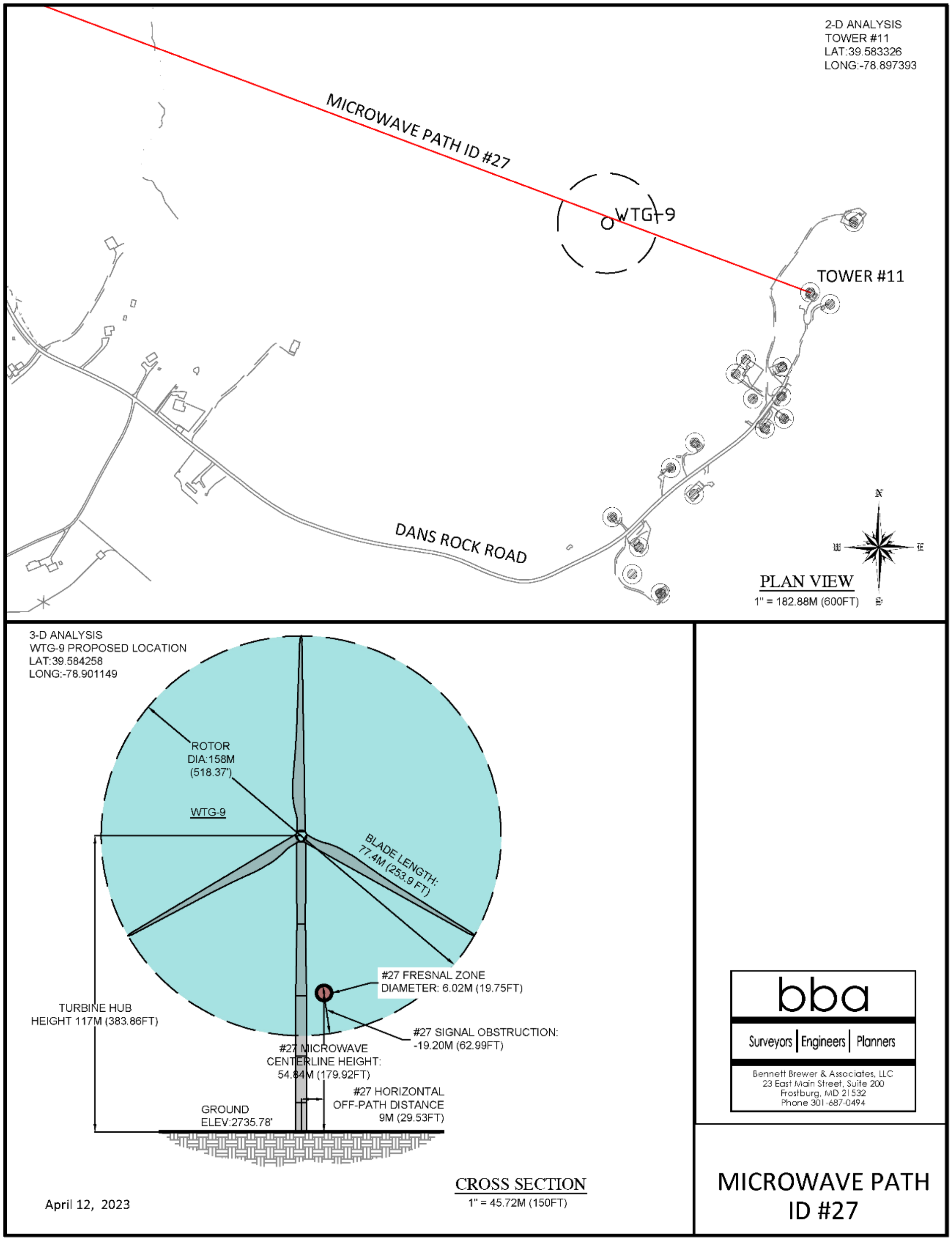


Figure 10. Licensed Point-to-Point Beam Path #27

In 2-D analysis the beam path appears to intersect WTG 9, 3-D analysis demonstrates that the beam path does intersect the turbine's rotor-swept area.

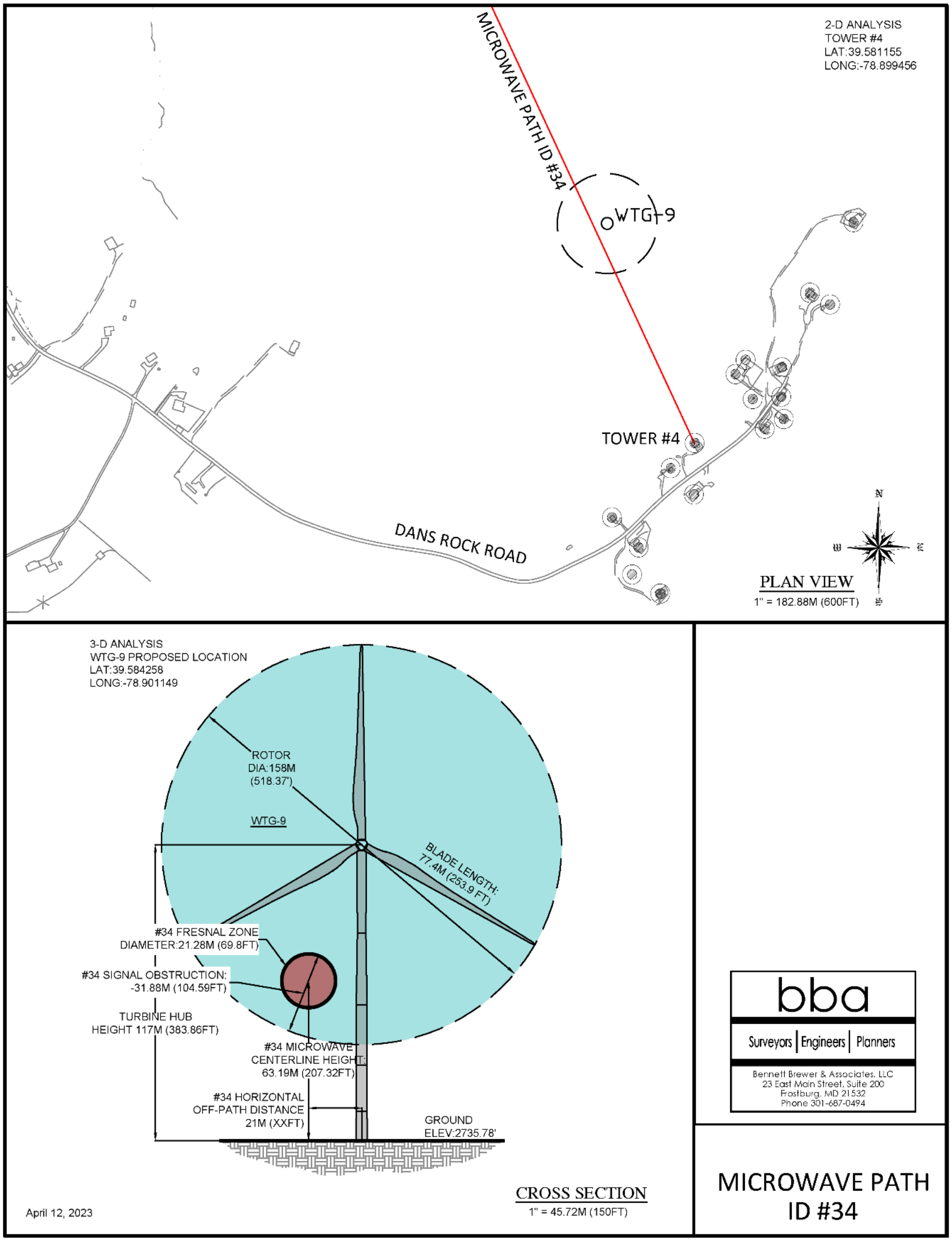


Figure 11. Licensed Point-to-Point Beam Path #34

In 2-D analysis the beam path appears to intersect WTG 9, 3-D analysis demonstrates that the beam path does intersect the turbine's rotor-swept area.

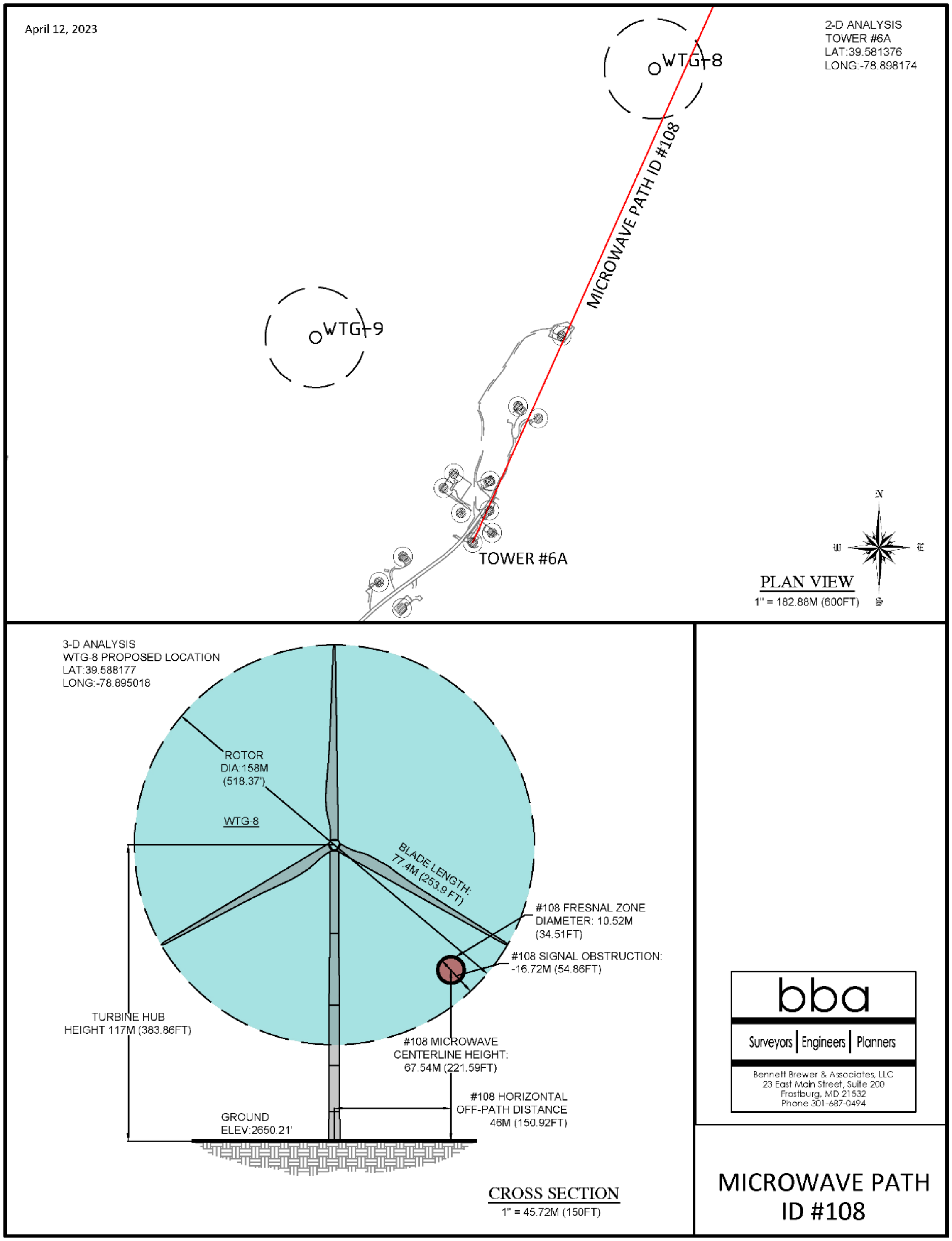


Figure 12. Unlicensed Point-to-Point Beam Path #108

In 2-D analysis the beam path appears to intersect WTG 8, 3-D analysis demonstrates that the beam path does intersect the turbine's rotor-swept area. It will be converted to a fiber-optic link.

C. Impact Assessment

Only one of the 74 *licensed* point-to-point microwave beam paths that intersect the project area may be impacted by the wind farm. Specifically, beam path 34 will be impacted[17]. After consulting with the owner of beam path #34, FM Radio License, LLC, Dan's Mountain Wind Force will replace the subject microwave beam path with a fiber optic link or by preemptively relocating the equipment to an alternative communication tower.

Only 1 of the 14 *unlicensed* point-to-point microwave beam paths that intersect the project area has been identified as being impacted by the wind farm. Specifically, beam path #108 is a short path, situated entirely within the wind farm, whose Fresnel zone intersects the rotor-swept area of turbine No. 8. Accordingly, in consultation with officials with the beam path owner, Two-Way Radio Services, Inc., Dan's Mountain will replace the subject microwave beam path with a fiber optic link.

[17] It was initially thought that beam path #27 would also intersect with a turbine, however after consulting with the owners of beam path #27's license, it was confirmed that the licensed path was proposed, but never installed. Therefore, no mitigation is necessary for beam path #27.

VI. POINT-TO-MULTIPOINT MICROWAVE

Wireless Internet Service Providers (WISPs) deliver Internet services via radio transmission to business and/or residential subscribers. They compete with wired Internet service providers such as local phone and cable companies. Wireless Internet service providers can use various frequency bands in both licensed and unlicensed spectrums. Many rural community WISPs operate in the unlicensed spectrum since there is a lower barrier to entry without the costs associated with acquiring licensed spectrum and building or acquiring wired infrastructure. The most common unlicensed bands for this purpose are the 900 MHz, 2.4 GHz, and 5.8 GHz bands. There is also some recent activity in the "lite-licensed" 3.65 GHz band.

This section identifies licensed and unlicensed wireless Internet service providers (WISPs) within close proximity to the Dan's Mountain Wind Farm project and evaluates the potential impact of wind turbines on their operations in and around the project area.

A. Methodology

The following analysis uses data retrieved from Comsearch's wireless databases and other reliable data sources such as the FCC's Universal Licensing System (ULS) database. However, most bands used for wireless Internet services (primarily the unlicensed bands) have no reliable data source available because, according to FCC rules, these systems are not required to license or register their transmitter locations. Therefore, the only band with a reliable data set for evaluation is the 3.65 GHz Wireless Broadband Systems (WBS) band, which, by FCC rule, requires registration of base and fixed transmitters. Due to the status of unlicensed systems and a lack of available data sources for these systems, we commissioned a field survey of unlicensed systems in close proximity to the wind project by CME Engineering, LP.

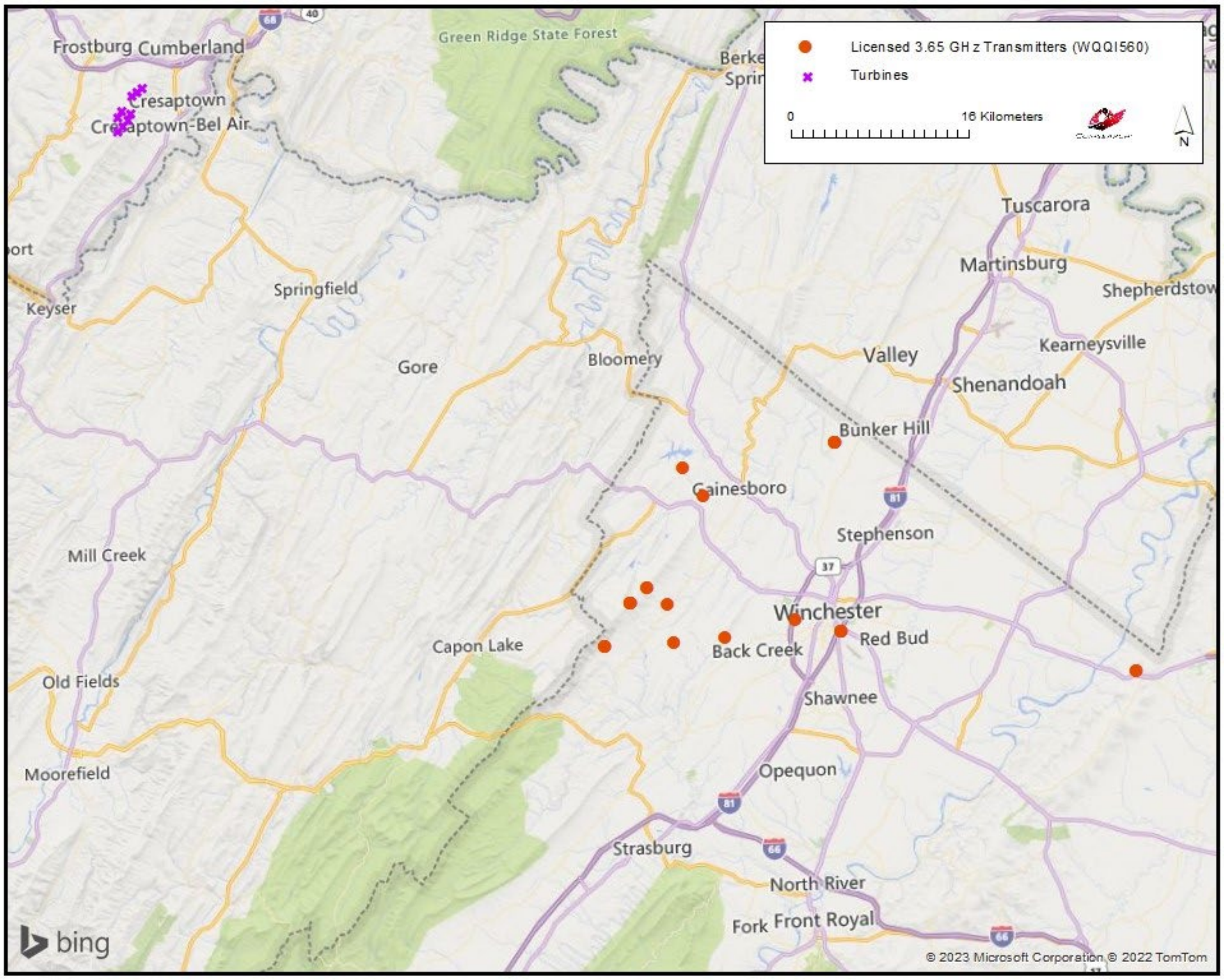
B. Results

1. Licensed Point-to-Multipoint Bands

The 3.65 GHz licensed band search identified no wireless Internet systems that service the Dan's Mountain Wind Farm project area. The closest licensed transmitter was found to be 59 km to the southeast and therefore not subject to obstruction analysis.

The search result details are shown in Figure 13.

Figure 13. Licensed point-to-multipoint microwave paths in the 3.65 GHz band near the Area of Interest



2. Unlicensed Point-to-Multipoint Bands

As mentioned previously, there are virtually no reliable data sources for unlicensed wireless Internet service systems because their transmitter locations are not required to be licensed or registered according to FCC rules. The obstruction analysis for the wireless Internet service systems identified in and around the Dan's Mountain project area is based on the field survey data gathered by CME Engineering. The data includes point-to-multipoint paths located in and around the project area of interest, all of which operate in the unlicensed 5.8 GHz band according to the survey report. A total of 29 such paths were surveyed, each served by one of two tower hub stations (towers 3 and 6A). These paths and their corresponding hub station and operator are listed in Table 6 and depicted in Figure 14.

Table 6. Unlicensed point-to-multipoint beam paths in the 5.8 GHz band

CME Path ID	Operator	CME Tower Hub ID	Tower Hub Height (meters)	Tower Hub LAT (NAD83)	Tower Hub LON (NAD83)	Subscriber LAT (deg)	Subscriber LON (deg)	Band (GHz)	Path Length (km)
104-1	AllCoNet	3	32.9	39.58079	-78.89989	39.65403	-78.93208	5.8	8.6
104-2	AllCoNet	3	32.9	39.58079	-78.89989	39.66064	-78.80540	5.8	12.0
104-3	AllCoNet	3	32.9	39.58079	-78.89989	39.62854	-78.91704	5.8	5.5
104-4	AllCoNet	3	32.9	39.58079	-78.89989	39.67121	-78.93028	5.8	10.4
104-5	AllCoNet	3	32.9	39.58079	-78.89989	39.65734	-78.93016	5.8	8.9
104-6	AllCoNet	3	32.9	39.58079	-78.89989	39.65708	-78.92721	5.8	8.8
104-7	AllCoNet	3	32.9	39.58079	-78.89989	39.65611	-78.92664	5.8	8.7
104-8	AllCoNet	3	32.9	39.58079	-78.89989	39.65923	-78.92054	5.8	8.9
104-9	AllCoNet	3	32.9	39.58079	-78.89989	39.62724	-78.94039	5.8	6.2
104-10	AllCoNet	3	32.9	39.58079	-78.89989	39.64335	-78.90879	5.8	7.0
104-11	AllCoNet	3	32.9	39.58079	-78.89989	39.63112	-78.80106	5.8	10.2
104-12	AllCoNet	3	32.9	39.58079	-78.89989	39.58923	-78.68567	5.8	18.4
104-13	AllCoNet	3	32.9	39.58079	-78.89989	39.51112	-78.93291	5.8	8.2
104-14	AllCoNet	3	32.9	39.58079	-78.89989	39.49182	-79.12328	5.8	21.6
104-15	AllCoNet	3	32.9	39.58079	-78.89989	39.49219	-79.12363	5.8	21.6
104-16	AllCoNet	3	32.9	39.58079	-78.89989	39.58923	-78.68567	5.8	18.4
104-17	AllCoNet	3	32.9	39.58079	-78.89989	39.52132	-78.86501	5.8	7.3
104-18	AllCoNet	3	32.9	39.58079	-78.89989	39.57771	-78.81554	5.8	7.3
104-19	AllCoNet	3	32.9	39.58079	-78.89989	39.52943	-78.85874	5.8	6.7
104-20	AllCoNet	3	32.9	39.58079	-78.89989	39.54454	-79.04463	5.8	13.1
104-21	AllCoNet	3	32.9	39.58079	-78.89989	39.64529	-78.68942	5.8	19.4
104-22	AllCoNet	3	32.9	39.58079	-78.89989	39.48157	-78.89930	5.8	11.0
104-23	AllCoNet	3	32.9	39.58079	-78.89989	39.61065	-78.92623	5.8	4.0
109-1	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.65552	-78.92456	5.8	8.5
109-2	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.66177	-78.93453	5.8	9.5
109-3	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.65819	-78.90912	5.8	8.6
109-4	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.63470	-78.95480	5.8	7.7
109-5	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.57859	-78.91462	5.8	1.5
109-6	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.5945	-78.8932	5.8	1.5

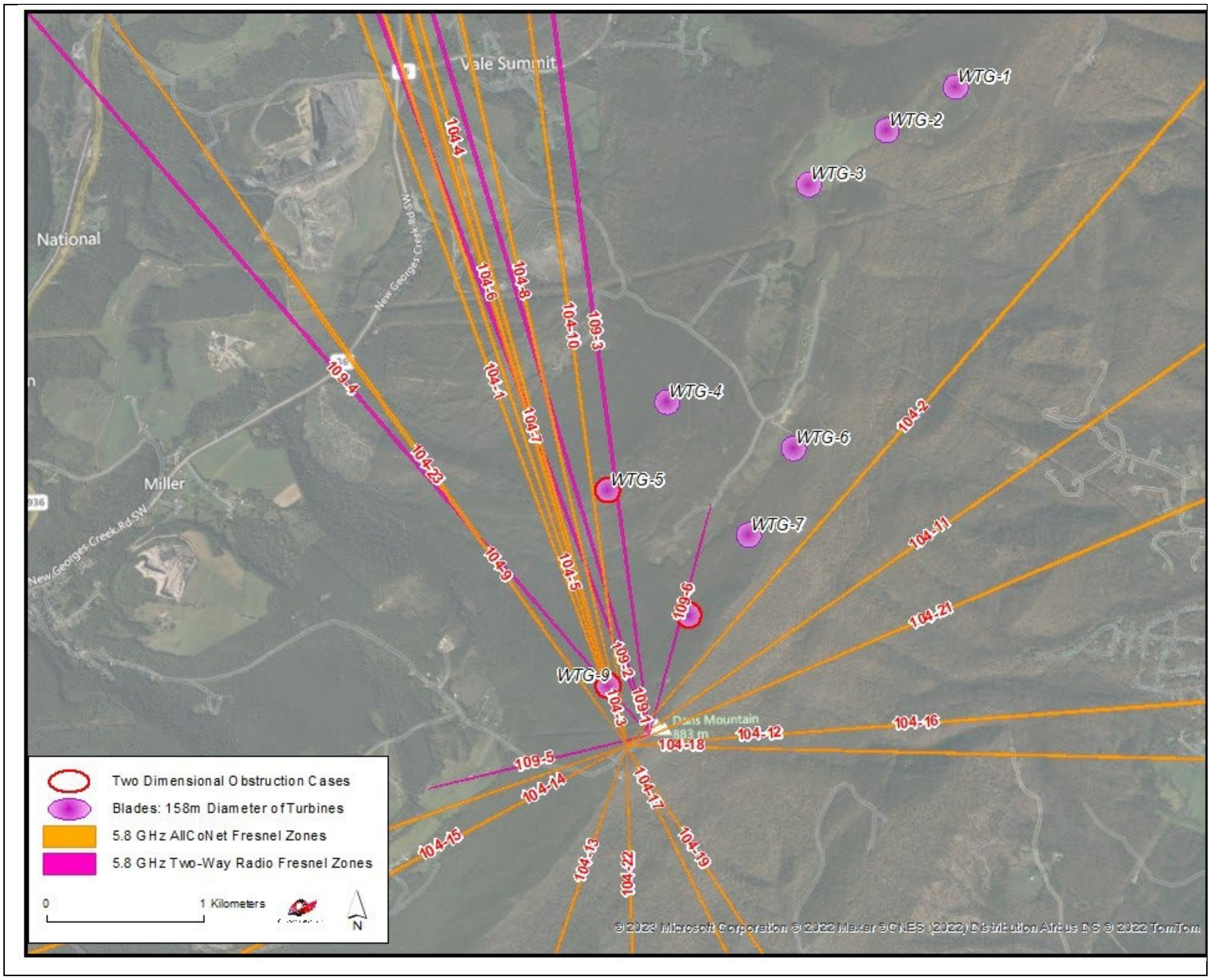


Figure 14. Unlicensed point-to-multipoint beam paths in the 5.8 GHz band

Figure 15. (Foldout on the following page) Zoomed-in view of the point-to-multipoint paths

Point-to-multipoint paths in the vicinity of the communication towers near Dan's Rock at the south east corner of the wind farm. All identified point-to-multipoint beams.

Front of Foldout Page

Enlarged Point-to-Multipoint Beam Paths

3. Fresnel Zone Analysis of Point-to-Multipoint Beam Paths

Potential instances of interference with microwave paths by wind turbines are identified by calculating intersections of the beam path's Fresnel zone with the turbine's rotor-swept areas. For computational efficiency the calculation is done in two steps:

a) 2-D screening analysis that identifies potential intersections: Turbines are identified whose rotor swept area overlaps the Fresnel zone of a beam path based solely on the projection on the ground of the rotor's swept area and the beam's Fresnel zone without considering height above ground.
b) 3-D cross-sectional analysis that identifies predicted intersections: Turbines and beam paths identified as having potential intersections are analyzed taking the height of beam paths and turbine rotors into account. (A beam path that goes under or over a rotor's swept area would appear in the 2-D analysis as a potential intersection, but in the 3-D analysis would not be an intersection.)

2-D Fresnel-Zone Analysis of Point-to-Multipoint Beam Path Analysis

The 2-D Fresnel zone analysis identified 11 unlicensed point-to-multipoint beam paths[18] that exhibit a potential intersection with a turbine[19].

Table 7. 2-D analysis of unlicensed point-to-multipoint beam paths in the 5.8 GHz band

Eleven beam paths exhibit negative horizontal clearance with a turbine rotor, which indicates potential for intersection, therefore the need for additional analysis in 3-D.

Turbine ID	Latitude (NAD83)	Longitude (NAD83)	CME Path ID Affected	Fresnel Zone Radius at Turbine Location (m)	Horizontal Off-Path Distance (m)	Distance Along Path from Hub (km)	Horizontal Clearance (m)
WTG-5	39.595475	-78.900825	109-3	8.16	55	1.58	-32.16
WTG-8	39.588177	-78.895018	109-6	4.42	48	0.80	-35.42
WTG-9	39.584258	-78.901149	109-4	4.47	7	0.41	-76.77
WTG-9	39.584258	-78.901149	104-1	4.42	22	0.40	-61.42
WTG-9	39.584258	-78.901149	104-3	4.36	0	0.40	-83.36
WTG-9	39.584258	-78.901149	104-4	4.44	7	0.40	-76.74
WTG-9	39.584258	-78.901149	104-5	4.42	10	0.40	-73.42
WTG-9	39.584258	-78.901149	104-6	4.42	1	0.40	-82.42
WTG-9	39.584258	-78.901149	104-7	4.42	1	0.40	-82.42
WTG-9	39.584258	-78.901149	104-8	4.42	28	0.40	-55.42
WTG-9	39.584258	-78.901149	104-10	4.40	64	0.40	-19.40

[18] The beam is defined as 100% of the first Fresnel zone at the turbine location.
[19] The detailed 2-D Fresnel zone analysis is presented in the Comsearch report in Appendix A.

3-D Fresnel-Zone Cross-Sectional Analysis of Point-to-Multipoint Beam Paths

As in Section IV, Point-to-Point Microwave, the 3-D cross-sectional analysis calculates the precise height and width of 100% of the first Fresnel zone at the turbine location based on the antenna heights at the tower and at the subscriber endpoints[20] and on the earth curvature bulge at the specific turbine location. The horizontal off-path distance was calculated in the 2-D analysis, and the turbine hub height and blade length were provided by the client. The 3-D cross-sectional analysis uses these values to calculate the clearance between the blades and the Fresnel zone as shown in Figure 9.

No 3-D cross-sectional analysis was done for licensed point-to-multipoint beam paths because no licensed wireless internet providers were found with service that covers our area of study. The results of the 3-D cross-sectional calculations for unlicensed point-to-multipoint beam paths that exhibited potential for intersection with a turbine's rotor are shown in Table 8 [21]. A positive cross-sectional clearance value indicates the beam will clear the rotor; a negative value indicates the predicted intersection of the beam with the rotor.

Table 8. 3-D analysis of unlicensed point-to-multipoint beam paths in the 5.8 GHz band.

Unlicensed point-to-multipoint beam paths in the 5.8 GHz band that exhibit a potential intersection with a turbine (from Table 7). Eight beam paths, #'s 109-4, 104-1, 104-3, 104-4, 104-5, 104-6, 104-7, 104-8, have negative clearances, indicating predicted intersection with turbine No. 9[22].

Microwave Path ID	Fresnel Zone Radius at Turbine Location (m)	Microwave Centerline Height at Turbine Location (m)	Turbine ID	Hub Height (m)	Blade Length (m)	Cross-sectional Clearance (m)
109-3	8.16	46.77	WTG-5	117	79	2.05
109-6	4.42	43.49	WTG-8	117	79	4.38
109-4	4.47	40.70	WTG-9	117	79	-6.88
104-1	4.42	50.10	WTG-9	117	79	-12.99
104-3	4.36	42.71	WTG-9	117	79	-9.07
104-4	4.44	54.26	WTG-9	117	79	-20.34
104-5	4.42	51.24	WTG-9	117	79	-16.91
104-6	4.42	50.80	WTG-9	117	79	-17.22
104-7	4.42	50.14	WTG-9	117	79	-16.56
104-8	4.42	47.58	WTG-9	117	79	-8.57
104-10	4.40	47.74	WTG-9	117	79	10.91

[20] Individual subscriber antenna heights were not surveyed by CME, however these heights are needed only if a subscriber requires further cross sectional analysis; all potentially affected subscribers appear to be houses according to aerial photography and therefore an antenna height of 10 meters (~33ft) above ground level was assumed for each.

[21] The detailed 3-D Fresnel zone analysis is presented in the Comsearch report in the Appendix A.

[22] The beam width is defined as the width of 100% of the first Fresnel zone at the turbine location.

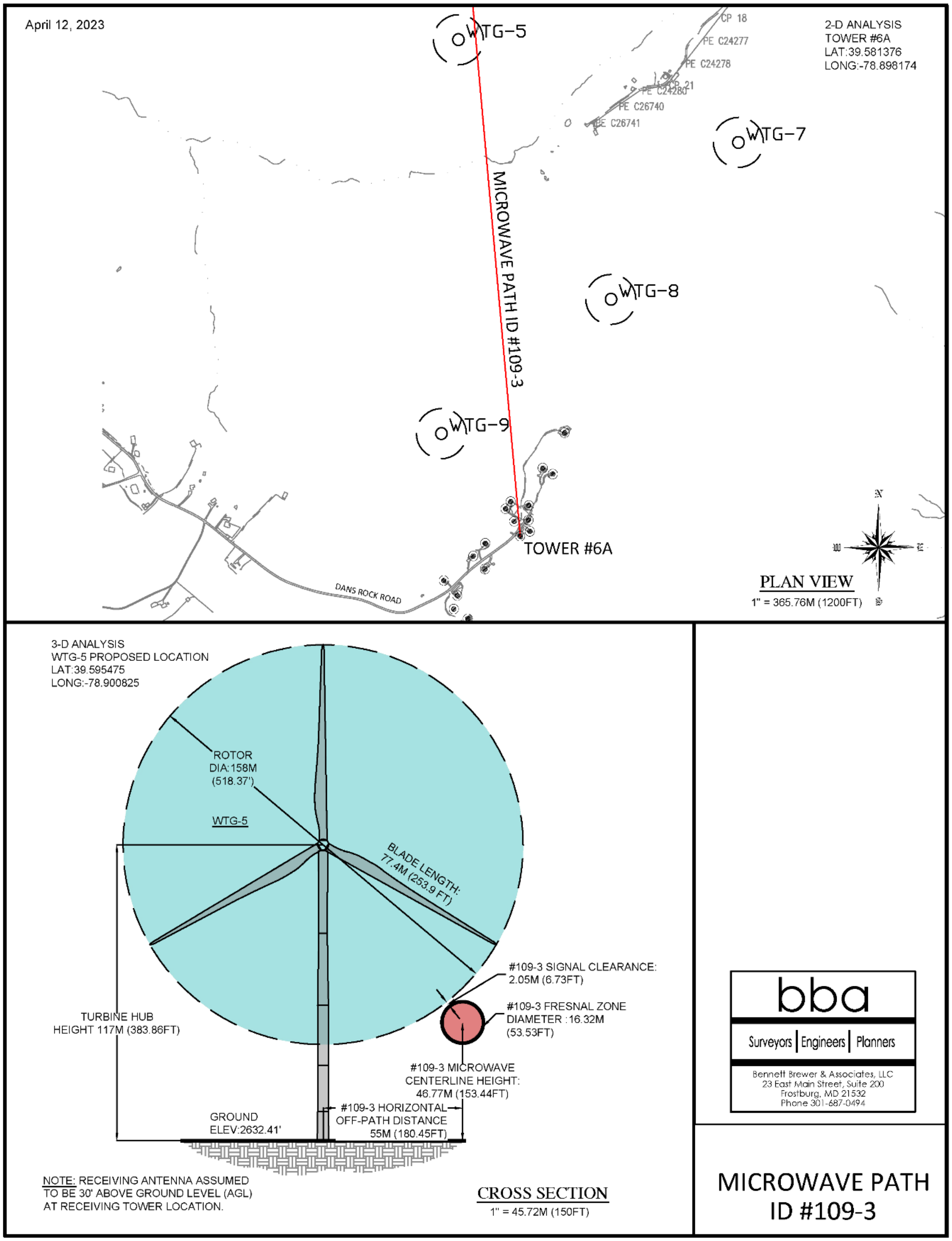


Figure 16. Unlicensed Point-to-Multipoint Beam Path 109-3

In 2-D analysis, the beam path appears to intersect WTG 5, but 3-D analysis demonstrates that the beam path passes under the turbine's rotor-swept area without touching it.

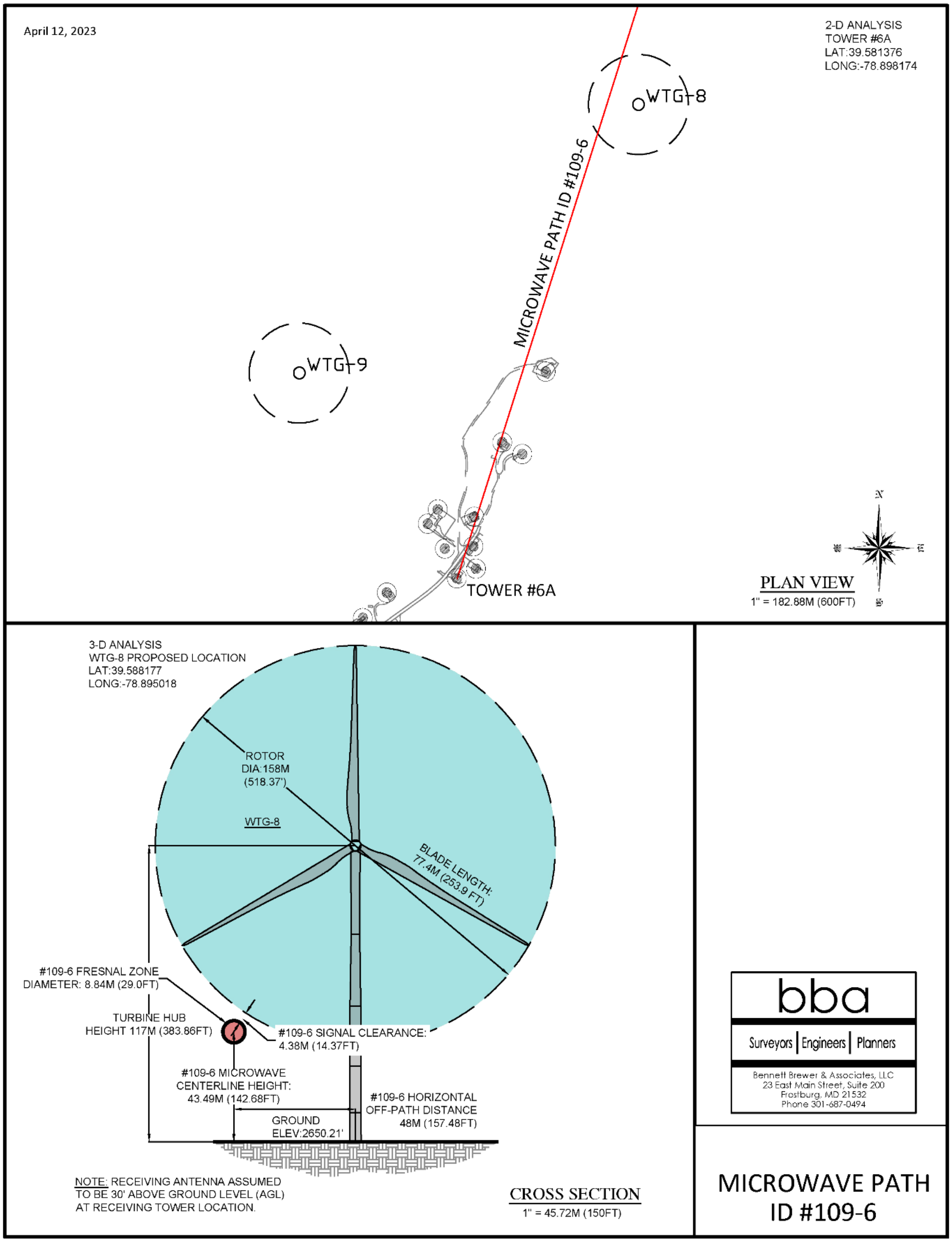


Figure 17. Unlicensed Point-to-Multipoint Beam Path 109-6

In 2-D analysis, the beam path appears to intersect WTG 8, but 3-D analysis demonstrates that the beam path passes under the turbine's rotor-swept area without touching it.

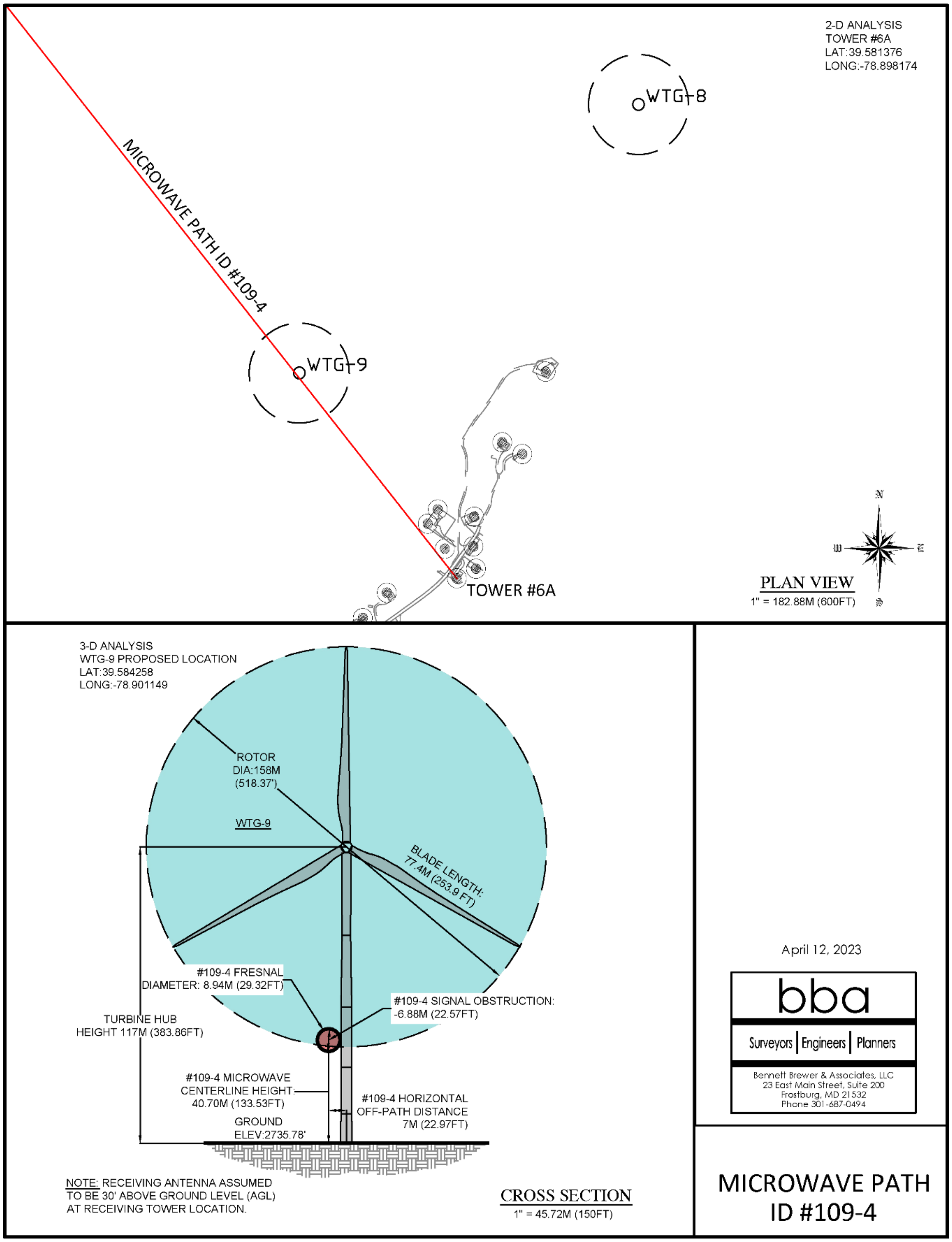


Figure 18. Unlicensed Point-to-Multipoint Beam Path 109-4

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

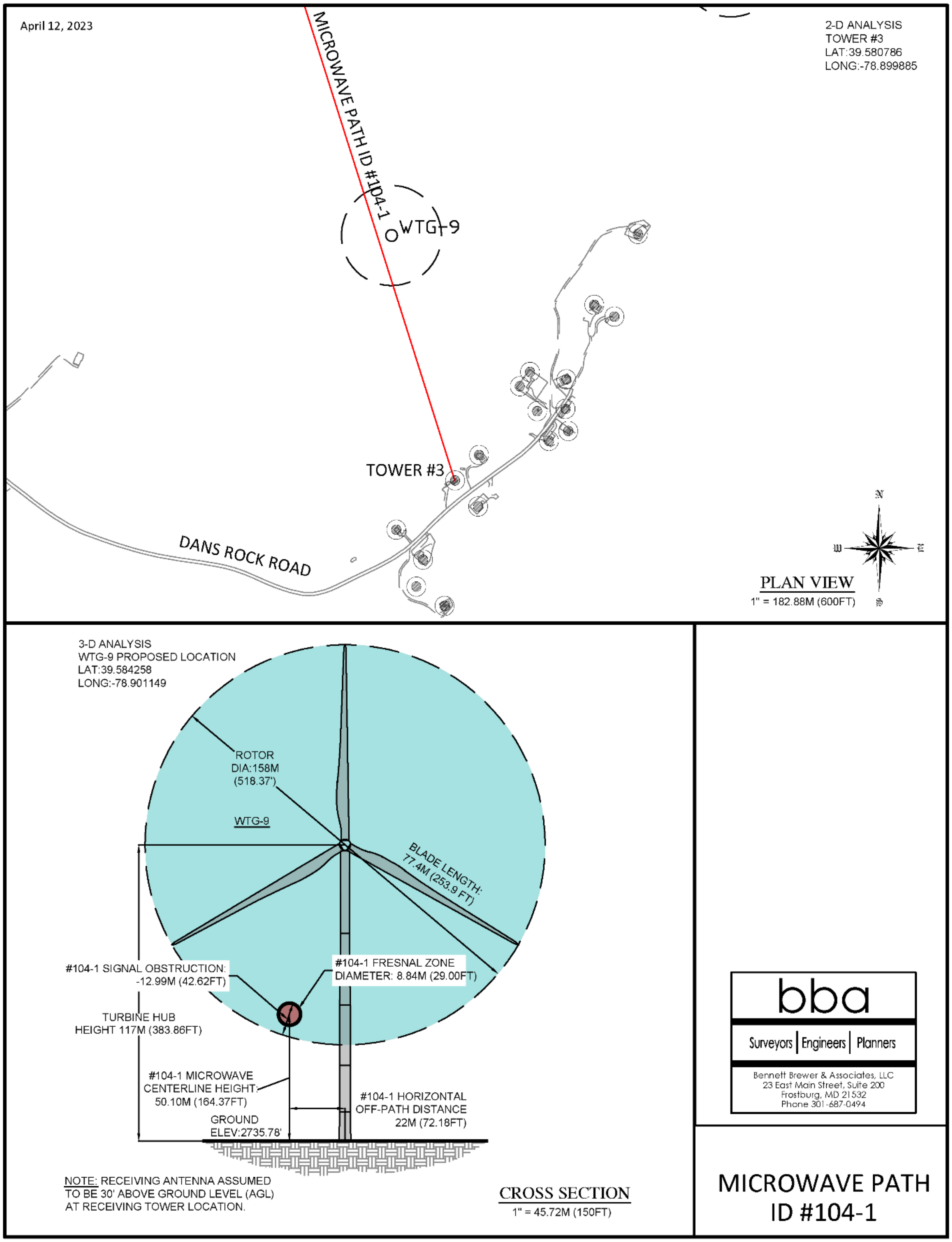


Figure 19. Unlicensed Point-to-Multipoint Beam Path 104-1

In 2-D analysis, the beam path appears to intersect WTG 9, and 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

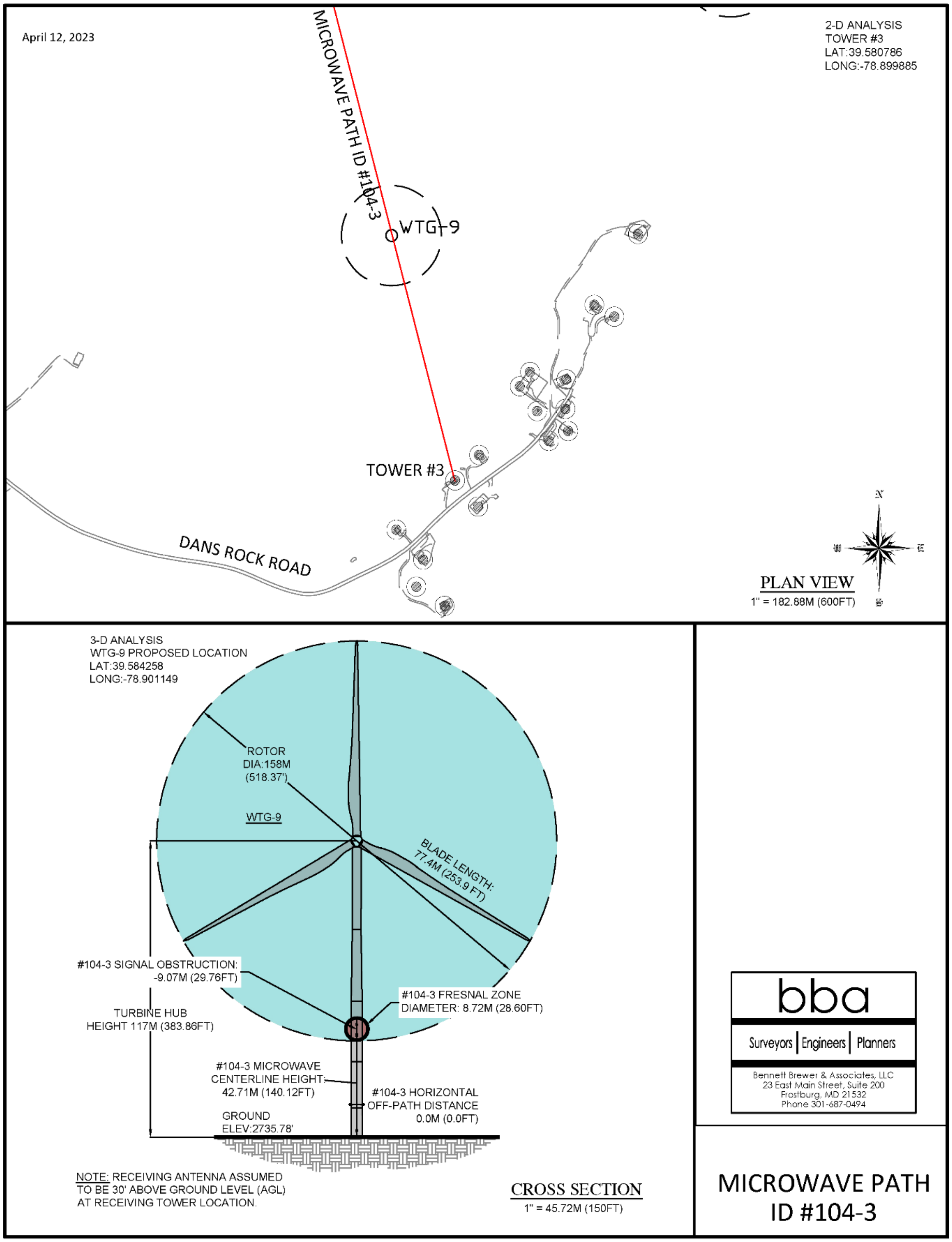


Figure 20. Unlicensed Point-to-Multipoint Beam Path 104-3

In 2-D analysis, the beam path appears to intersect WTG 9, and 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

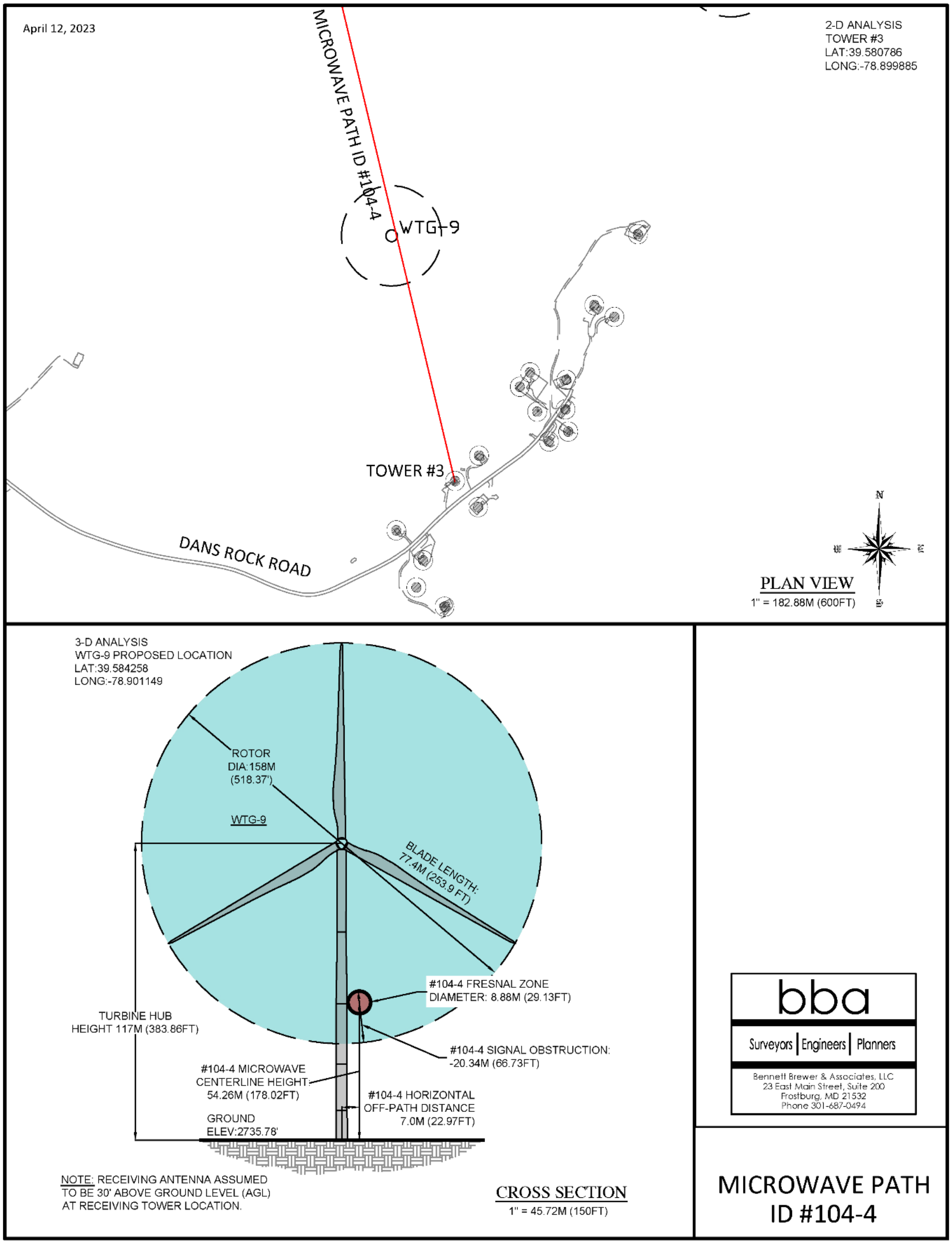


Figure 21. Unlicensed Point-to-Multipoint Beam Path 104-4

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

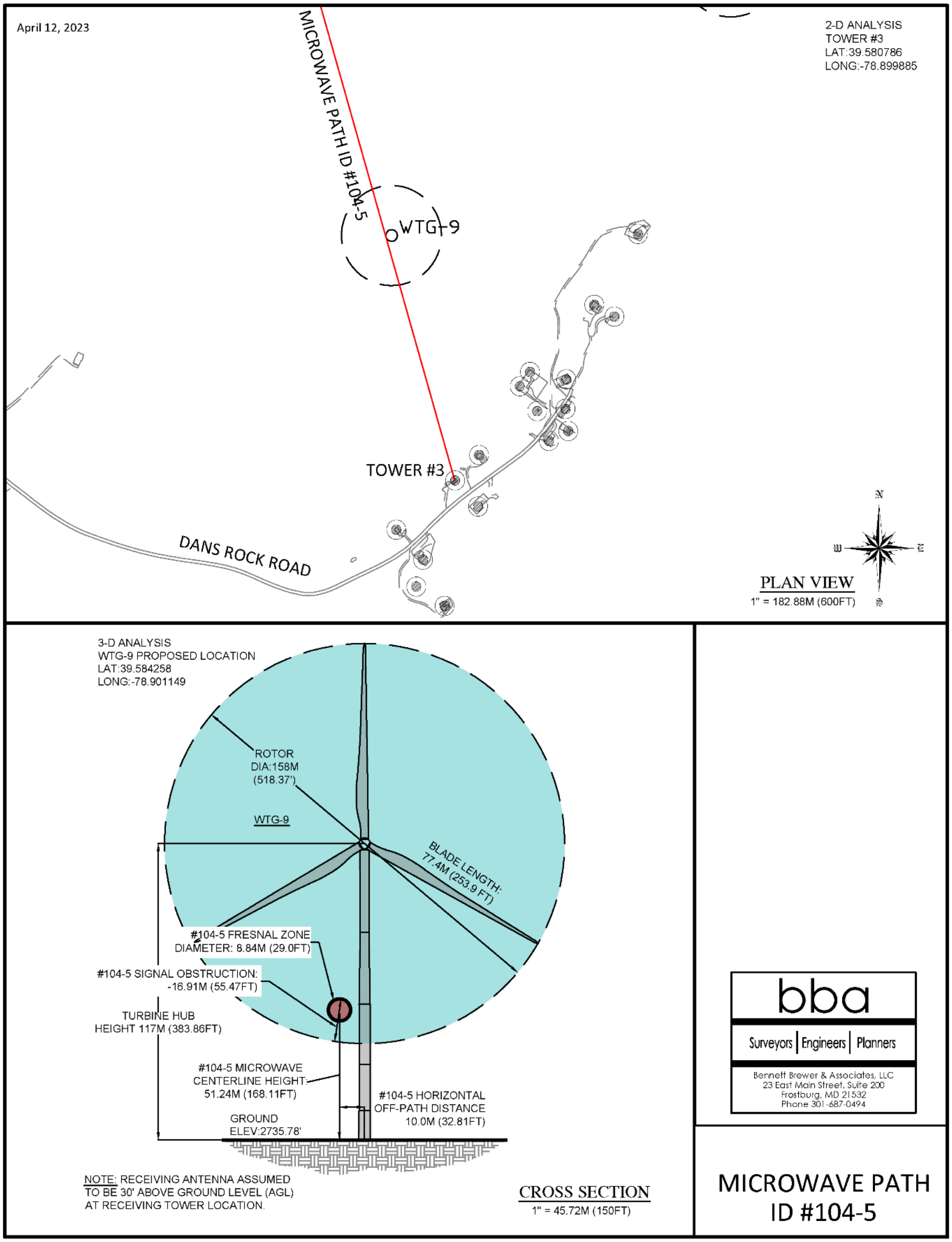


Figure 22. Unlicensed Point-to-Multipoint Beam Path 104-5

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

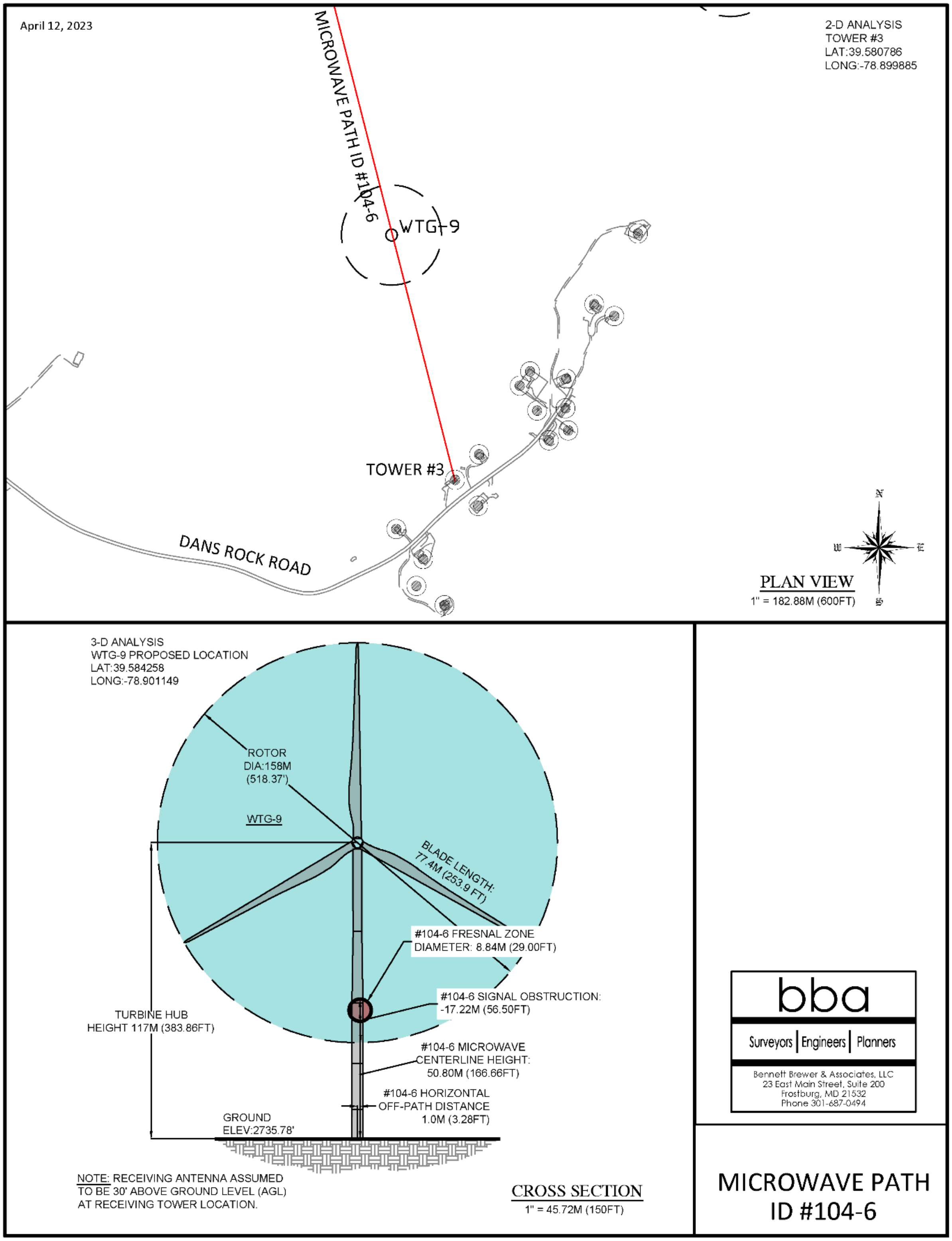


Figure 23. Unlicensed Point-to-Multipoint Beam Path 104-6

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

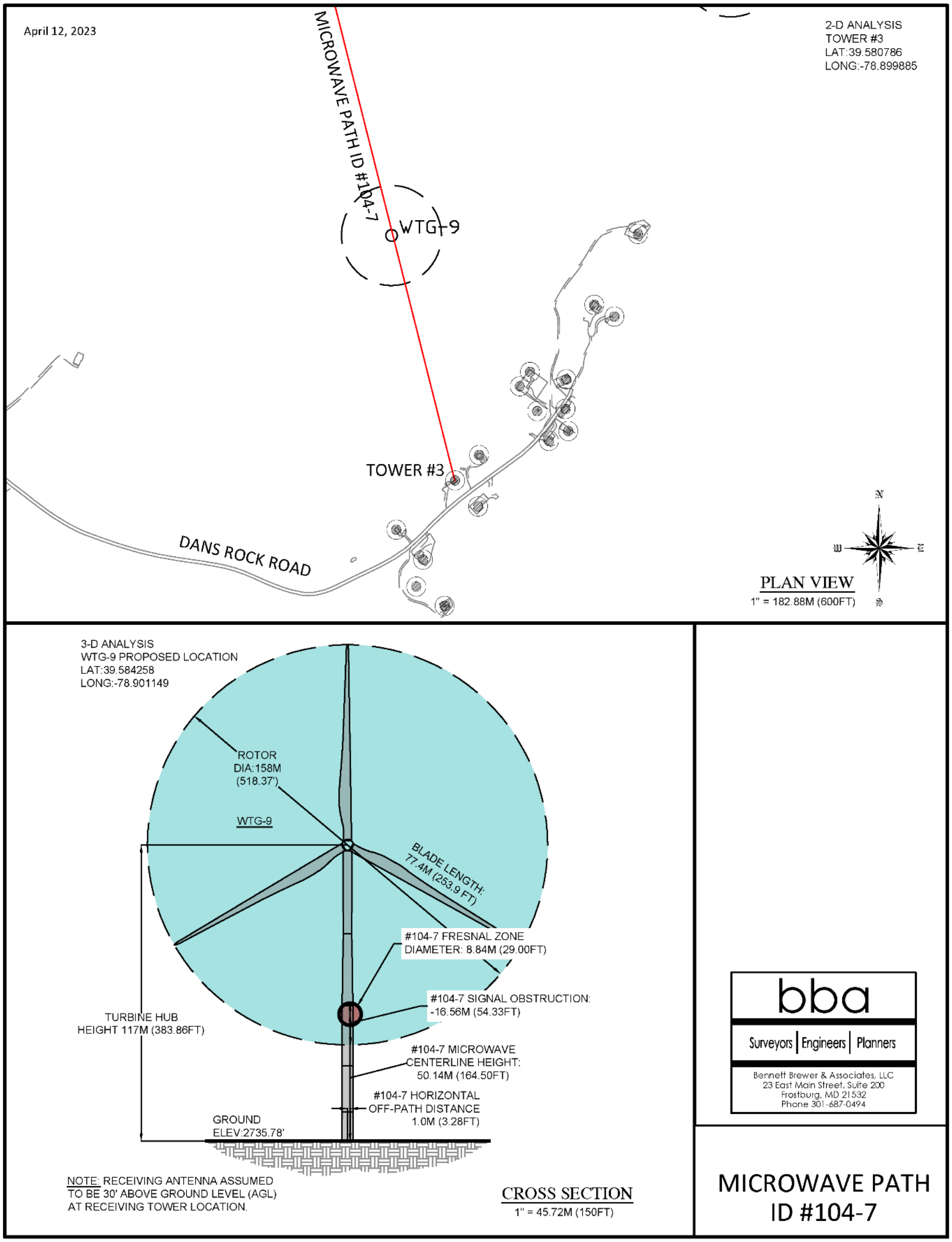


Figure 24. Unlicensed Point-to-Multipoint Beam Path 104-7

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

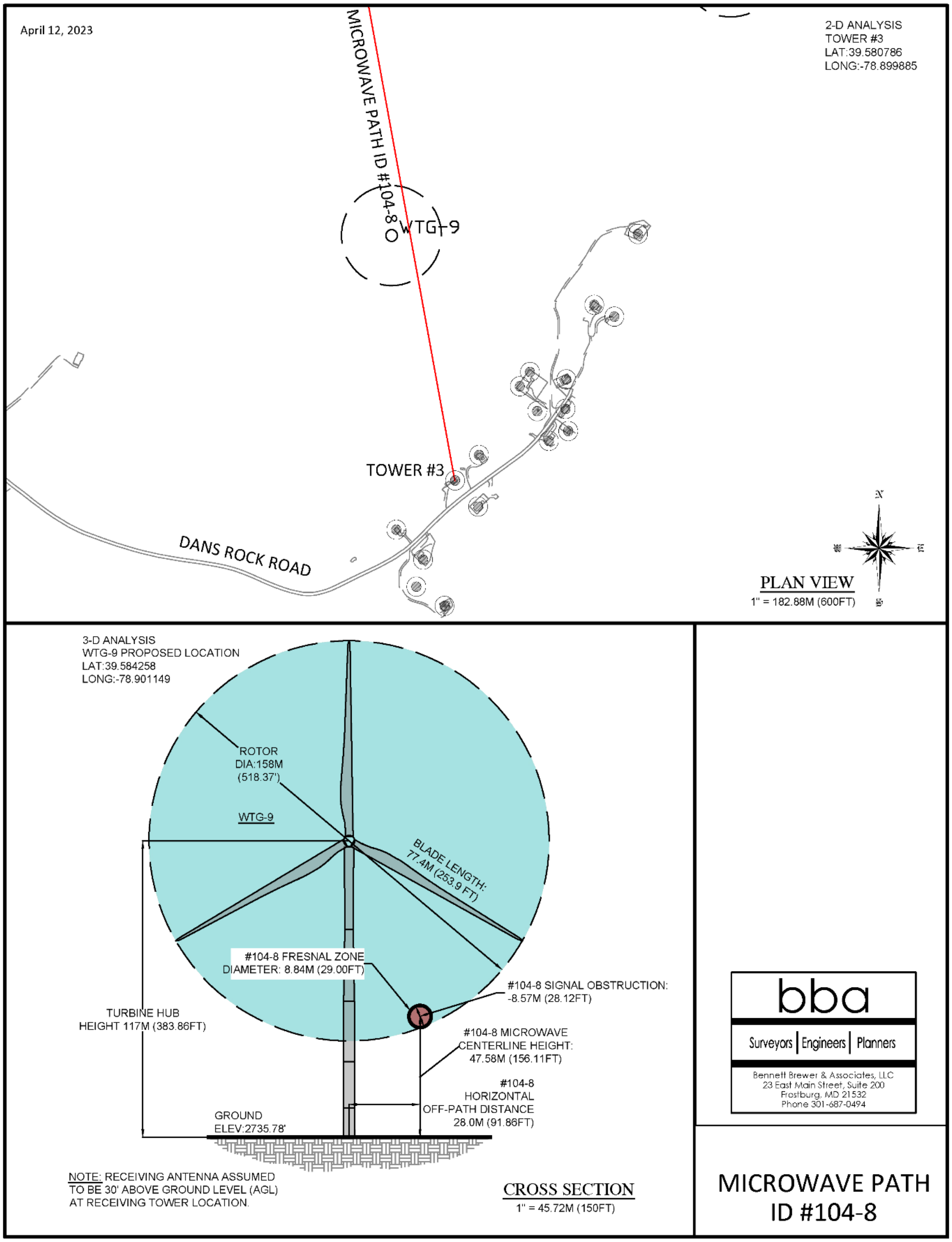


Figure 25. Unlicensed Point-to-Multipoint Beam Path 104-8

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path intersects the turbine's rotor-swept area.

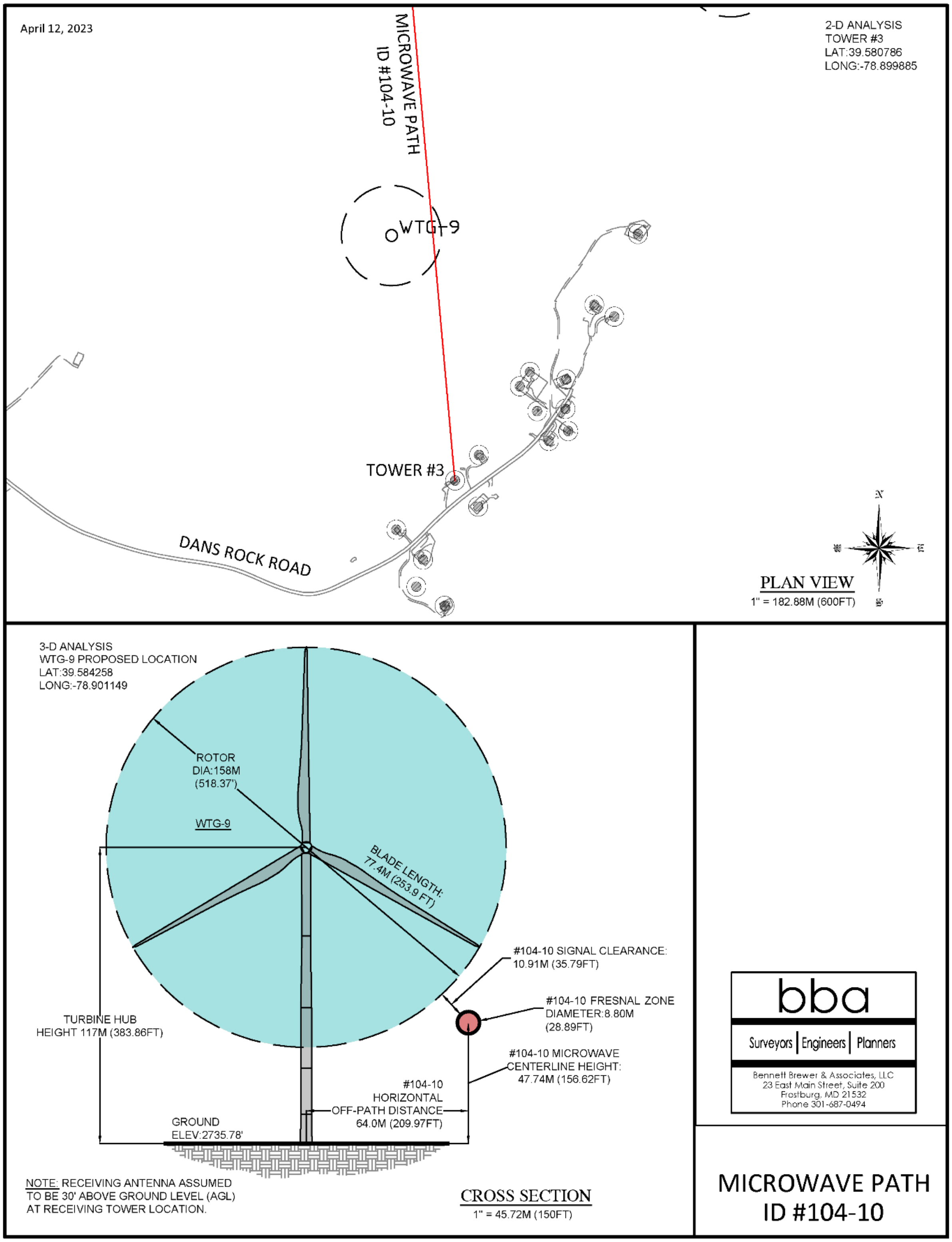


Figure 26. Unlicensed Point-to-Multipoint Beam Path 104-10

In 2-D analysis, the beam path appears to intersect WTG 9, but 3-D analysis demonstrates that the beam path passes under the turbine's rotor-swept area.

C. Impact Assessment of Point-to-Multipoint Microwave Study

Eight unlicensed point-to-multipoint wireless internet service paths (beam paths No. 109-4, 104-1, 104-3, 104-4, 104-5, 104-6, 104-7, 104-8) will be blocked by WTG 9. In the event that a WISP carrier believes that 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. These include the optimization of surrounding base stations or the addition of a new sector or cell site. Utility towers and other communications towers within the wind project area can serve as the platform for a new base station, cell enhancer, or repeater. Dan's Mountain will work with the carrier to remedy any signal issues caused by the wind farm.

The tower structure of wind turbine nine directly interferes with three of the unlicensed point-to-multipoint beam paths. Dan's Mountain is in contact with the owners of those beam paths to develop an appropriate mitigation strategy.

VII. LAND MOBILE & EMERGENCY

A. Methodology

An assessment of the emergency services within five miles of the Dan's Mountain Wind Farm was performed by Dan's Mountain Wind Force's subcontractor, Comsearch, to identify potential impacts from the planned turbines. Comsearch evaluated the registered frequencies for the following types of first responder entities: police, fire, emergency medical services, emergency management, hospitals, public works, transportation, as well as other state, county, and municipal agencies. They also identified all industrial and business-owned 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 appears below in Figure 27. The project area is defined as five miles from the proposed turbines. It includes parts of Allegany and Garrett Counties, Maryland, as well as Mineral County, West Virginia.

Figure 27. Project Area and Surrounding Counties

Its land mobile and emergency services incumbent data were derived from the FCC ULS database and the FCC Public Safety & Homeland Security bureau. Comsearch identified both site-based licenses as well as regional area-wide licenses designated for public safety use. The site-based licenses were imported into GIS software and geographically mapped. A map depiction of the fixed-site licenses in the project area appears in Figure 28. Each site on the map was given an ID number and associated with site information as listed in Table 9.

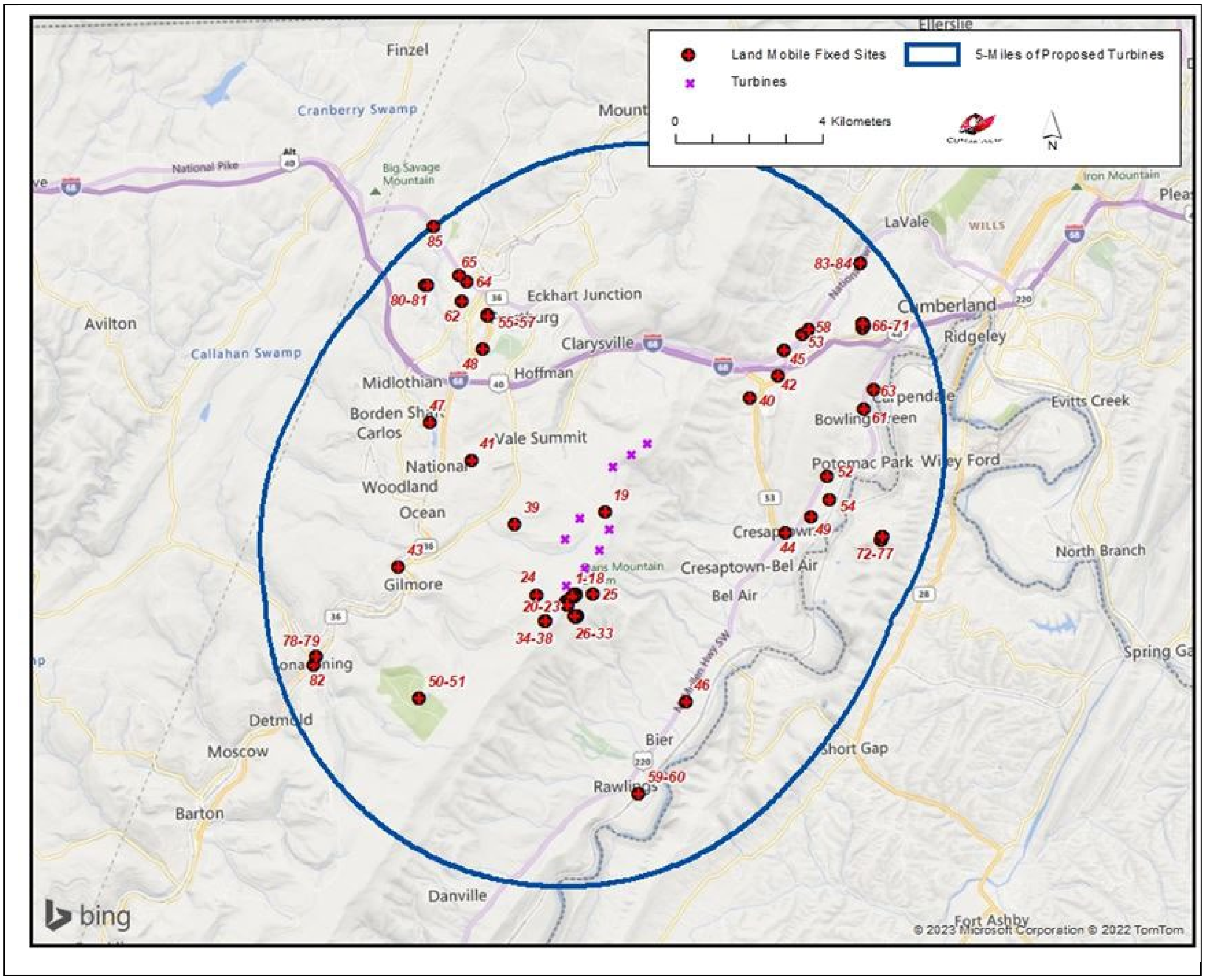


Figure 28. Land Mobile & Emergency Service Sites within Five Miles of Proposed Turbines.

B. Results

1. Site-Based Land Mobile and Emergency Licenses

Figure 28 shows the locations of 85 site-based licenses within five miles of the proposed turbines in the Dan's Mountain Wind Farm project. Some of these sites are licensed to first responder entities that provide critical public safety and emergency communications in and around the project area. Specific information about these sites including location coordinates, frequency band, antenna height, and licensee name is provided in Table 9.

Table 9. Land Mobile & Emergency Service Sites.

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
1	WQOW665	150-174	FELHC INC	64.6	39.581111	-78.898611	408
2	KAB226	150-174, 450-470	STATE OF MARYLAND, MIEMSS	52	39.580083	-78.900583	463
3	KPM488	450-470	FROSTBURG STATE UNIVERSITY	15	39.581750	-78.897806	396
4	KGG931	25-50	MARYLAND STATE HIGHWAY ADMINISTRATION	37	39.581194	-78.898083	427
5	WNDR708	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
6	WNJY543	150-174	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
7	WNVH555	450-470	NORTHROP GRUMMAN SYSTEMS CORPORATION	6	39.581472	-78.897806	419
8	WPET570	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
9	WPEY303	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
10	WPGB605	450-470	TWO WAY RADIO SERVICE INC	46	39.581472	-78.897806	419
11	WPGB739	450-470	TWO WAY RADIO SERVICE INC	46	39.581472	-78.897806	419
12	WPGG609	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
13	WPIE995	72-76	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
14	WPMF429	450-470	ALLEGANY, COUNTY OF	30	39.581472	-78.897806	419
15	WPOX749	450-470	TWR COMMUNICATIONS	38	39.581472	-78.897806	419
16	WPRS598	800/900	ALLEGANY, COUNTY OF	30	39.581472	-78.897806	419
17	WPWC727	450-470	TWR COMMUNICATIONS	38	39.581472	-78.897806	419
18	KTE668	150-174	STATE OF MARYLAND, DNR	27	39.581750	-78.897528	414
19	KVD573	150-174	ALLEGANY COUNTY 911 JOINT COMMUNICATIONS DIVISION	45	39.601472	-78.887806	431
20	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	34.7	39.578917	-78.900250	595
21	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40.2	39.578917	-78.900250	595
22	WRCN287	150-174	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	70.1	39.578917	-78.900250	595

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
23	WRCN287	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	74.7	39.578917	-78.900250	595
24	WNCM956	150-174	CARL BELT INC	30	39.581750	-78.910028	813
25	WPEG518	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.892250	781
26	WQEW534	150-174	MARYLAND, STATE OF	19.8	39.576194	-78.898083	930
27	WQEW534	450-470	MARYLAND, STATE OF	20.7	39.576194	-78.898083	930
28	KBU667	150-174	Maryland, State of - DNR	12	39.576194	-78.897528	944
29	KDG881	25-50	ALLEGANY, COUNTY OF	43	39.576194	-78.897528	944
30	KGA910	25-50	MARYLAND, STATE OF	36	39.576194	-78.897528	944
31	WAM29	150-174	MARYLAND, STATE OF - DNR	12	39.576194	-78.897528	944
32	WAM29	150-174	MARYLAND, STATE OF - DNR	20	39.576194	-78.897528	944
33	WNNN469	150-174	T & T PUMPCO.,INC	46	39.575917	-78.897806	966
34	KTG669	25-50	ALLEGANY, COUNTY OF	49	39.575361	-78.907528	1128
35	WNJM820	450-470	ALLEGANY, COUNTY OF	37	39.575361	-78.907528	1128
36	WQFD361	450-470	ALLEGANY COUNTY OF	49	39.575278	-78.907500	1135
37	WQHV525	450-470	ALLEGANY COUNTY BOARD OF EDUCATION	49	39.575278	-78.907500	1135
38	WQIR601	450-470	ALLEGANY COUNTY OF	49	39.575278	-78.907500	1135
39	WPDV708	450-470	ALLEGANY, COUNTY OF	46	39.598972	-78.916139	1372
40	WROM724	450-470	COUNTRY CLUB MALL REALTY, LLC	28	39.628417	-78.841250	3057
41	WQRZ888	450-470	VINDEX ENERGY LLC	10	39.614722	-78.929361	3252
42	WPFM943	25-50	MARYLAND STATE HIGHWAY ADMINISTRATION	32	39.633694	-78.832528	3979
43	WPCS783	25-50	MIDLAND VOLUNTEER FIRE COMPANY	14	39.589250	-78.953083	4498
44	KUB997	25-50, 450-470	CRESAPTOWN VOLUNTEER FIRE DEPT INC	21	39.595361	-78.831139	4489
45	KGA910	25-50	MARYLAND, STATE OF	40	39.639639	-78.830083	4482
46	WQCA884	450-470	AMERICAN WOODMARK CORPORATION	12.2	39.554806	-78.863639	4582

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
47	WNYV803	450-470	STATE OF MARYLAND - FROSTBURG UNIVERSITY	18	39.624250	-78.941972	4730
48	WQHE659	150-174	FROSTBURG STATE UNIVERSITY	40.7	39.641667	-78.925000	4677
49	WQPV747	450-470	ALLEGANY, COUNTY OF	12	39.598944	-78.823194	4880
50	KNHT493	150-174	MARYLAND, STATE OF - DNR	12	39.557306	-78.947528	4984
51	KNHT494	150-174	MARYLAND, STATE OF - DNR	12	39.557306	-78.947528	4984
52	KNNV447	150-174	MARYLAND STATE DEPARTMENT OF PUBLIC SAFETY & CORRECTIONAL SERVICES	15	39.608694	-78.817806	4964
53	KGJ642	25-50	LAVALE VOLUNTEER FIRE DEPARTMENT INC	21	39.643417	-78.824194	5134
54	WQGJ235	25-50	STATE OF MARYLAND, DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONAL SERVICES	35	39.603278	-78.817306	5166
55	KJD307	150-174	FROSTBURG, CITY OF	20	39.649806	-78.923083	5234
56	KJL891	25-50	MARYLAND, STATE OF	12	39.649806	-78.923083	5234
57	KGD459	25-50	FROSTBURG FIRE DEPARTMENT NO 1 INC	24	39.650083	-78.923361	5273
58	KNFJ222	150-174, 450-470	LAVALE VOLUNTEER RESCUE SQUAD INC	15	39.644806	-78.822528	5338
59	KCO633	150-174	CSX TRANSPORTATION INC	15	39.532722	-78.879417	6016
60	KCO633	150-174	CSX TRANSPORTATION INC	21.3	39.532722	-78.879417	6016
61	WQFI398	450-470	BOWLING GREEN VOLUNTEER FIRE DEPT	14	39.625083	-78.805583	5950
62	WQNC803	450-470	ALLEGANY, COUNTY OF	17	39.653444	-78.931167	5988
63	WPIH295	800/900	CSX TRANSPORTATION INC	2	39.629806	-78.802528	6296
64	KNEC959	150-174	TROUTMAN, ROY E	15	39.658417	-78.929472	6327
65	WPTL759	150-174	ALLEGANY COUNTY OF	15	39.659722	-78.931667	6556
66	WPQD657	450-470	COLUMBIA GAS OF MARYLAND	27.4	39.644528	-78.805278	6609
67	KGJ642	450-470	LAVALE VOLUNTEER FIRE DEPARTMENT INC	25	39.645194	-78.805083	6657
68	KNFJ222	450-470	LAVALE VOLUNTEER RESCUE SQUAD INC	25	39.645194	-78.805083	6657

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
69	KGA886	450-470	ALLEGANY COUNTY OF	40	39.645917	-78.805306	6676
70	WPPV765	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	40	39.645917	-78.805306	6676
71	WQCI629	450-470	ALLEGANY, COUNTY OF	15	39.645917	-78.805306	6676
72	KDG881	450-470	ALLEGANY, COUNTY OF	18.3	39.593833	-78.800889	6859
73	WQHV525	450-470	ALLEGANY COUNTY BOARD OF EDUCATION	18.3	39.593833	-78.800889	6859
74	WQOT448	150-174, 450-470	MINERAL COUNTY EMERGENCY SERVICES	24	39.593833	-78.800889	6859
75	WQQD629	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	18.3	39.593833	-78.800889	6859
76	WNQI770	150-174	MINERAL COUNTY EMERGENCY SERVICES	24	39.593139	-78.801139	6870
77	WQCI629	450-470	ALLEGANY, COUNTY OF	15	39.593139	-78.801139	6870
78	WQHV525	450-470	ALLEGANY COUNTY BOARD OF EDUCATION	18.3	39.567778	-78.979722	6996
79	WQQD629	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	10.7	39.567778	-78.979722	6996
80	WPDA208	25-50	MARYLAND, STATE OF - FROSTBURG STATE UNIVERSITY	18	39.657583	-78.941972	6955
81	KVN610	25-50	MARYLAND, STATE OF	18	39.657583	-78.942528	6989
82	KTK612	25-50	LONACONING VOL FIRE CO	24	39.565917	-78.980306	7101
83	KGJ642	450-470	LAVALE VOLUNTEER FIRE DEPARTMENT INC	15	39.660361	-78.805583	7532
84	KGJ642	25-50	LAVALE VOLUNTEER FIRE DEPARTMENT INC	23	39.660361	-78.805583	7532
85	KJD307	150-174	FROSTBURG, CITY OF	20	39.671750	-78.939750	8042

2. Area-Wide Land Mobile and Emergency Licenses

The regional area-wide licenses were compiled from FCC data sources and identified for each county intersected by the project area. The project area is located in Allegany and Garrett Counties part of Public Safety Region #20, which contains all the counties in Maryland, as well as Mineral County, part of Public Safety Region #44, which contains all of the counties in West Virginia. The regional public safety operation is overseen by the entities listed below:

Charles V. Bryson
Chairperson, Public Safety Region #20
5740 Executive Dr., Suite 110 Catonsville, MD 21228
phone: 410-807-8102
email: charles.bryson@maryland.gov

David W. Saffel
Chairperson, Public Safety Region #44
West Virginia State Police 1300 Harrison Ave., Elkins, WV 26241
Phone: 304-637-0200
Fax: 304-637-0203
Email: dwsaffel@suddenlink.net

The chairpersons for these regions each serve as the representative for all public safety entities in the area and are 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, twenty-nine licenses were issued for the State of Maryland, six for Allegany County, two for Garrett County, twenty-eight for the State of West Virginia, and one for Mineral County (see

Table 10). These area-wide licenses are designated for mobile use only.

To better understand the specific concerns and needs of the state and local emergency services community, Dan's Mountain Wind Force officials along with a delegation including RF consultants and engineers from Broadcast Wind, Comsearch, and CME Engineering traveled to Catonsville, MD in 2015[23] to meet with emergency services representatives. State and County emergency services organizations were represented at the meeting.

Pursuant to a non-disclosure agreement executed between the Maryland Department of Information Technology ("DoIT") and Dan's Mountain Wind Force, DoIT provided Dan's Mountain officials with the 700 MHz channel plan for Maryland First in Allegany County.

The frequencies provided were found to be in the same ranges spanned by the Area-Wide frequencies studied by Comsearch. For the Impact Assessment performed by Comsearch for these frequency bands, refer to Item "C" under this section.

[23] In preparation for publishing EIA II.

Table 10. Summary of Area-Wide Regional Land Mobile and Emergency Licenses.

ID	Licensee	Area of Operation	Frequency Band (MHz)
1	Allegany County	Countywide: ALLEGANY, MD	4940-4990
2	Allegany County 911 Joint Communications Division	Countywide: ALLEGANY, MD	150-174
3	ALLEGANY, COUNTY OF	Countywide: ALLEGANY, MD	25-50, 150-174
4	ALLEGANY, COUNTY OF	Statewide: MD	450-470
5	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	Countywide: ALLEGANY, MD	450-470
6	AMERICAN NATIONAL RED CROSS	Statewide: WV	25-50, 450-470
7	American National Red Cross	Statewide: MD	25-50
8	American National Red Cross	Statewide: WV	25-50
9	BALTIMORE, COUNTY OF	Statewide: MD	2450-2500
10	CITY OF SALISBURY POLICE DEPT SALISBURY MD 21801	Statewide: MD	2450-2500
11	DELMARVA SEARCH AND RESCUE GROUP INC.	Statewide: MD	150-174
12	DNR, State of Maryland	Statewide: MD	150-174
13	DNR, State of Maryland	Statewide: WV	150-174
14	ELLERSLIE VOL FIRE DEPT	Countywide: ALLEGANY, MD	25-50, 450-470
15	Garrett County Public Safety	Countywide: GARRETT, MD	150-174, 450-470
16	GARRETT, COUNTY OF	Countywide: GARRETT, MD	150-174
17	Howard, County of MD	Statewide: MD	2450-2500
18	Jackson County Commission	Statewide: WV	0-10
19	Lewis County	Statewide: WV	0-10
20	Marion County Central Communications 911	Statewide: WV	25-50
21	MARYLAND AND MID-ATLANTIC WILDERNESS RESCUE SQUAD, INC.	Statewide: MD	25-50, 150-174
22	MARYLAND AND MID-ATLANTIC WILDERNESS RESCUE SQUAD, INC.	Statewide: WV	25-50, 150-174
23	Maryland Department of Public Safety and Correctional Services	Statewide: MD	25-50, 150-174
24	MARYLAND STATE HIGHWAY ADMINISTRATION	Statewide: MD	450-470
25	Maryland State Highway Administration	Statewide: MD	0-10, 25-50, 150-174, 4940-4990
26	MARYLAND STATE POLICE	Statewide: MD	25-50, 450-470, 2450-2500

ID	Licensee	Area of Operation	Frequency Band (MHz)
27	Maryland State Police	Statewide: MD	2450-2500
28	Maryland Urban Search and Rescue	Statewide: MD	4940-4990
29	MARYLAND, STATE OF	Statewide: MD	25-50, 150-174, 450-470, 2450-2500
30	Maryland, State of	Statewide: MD	4940-4990
31	Maryland, State of - DNR	Statewide: MD	25-50, 150-174
32	Mineral County Emergency Services	Countywide: ALLEGANY, MD	150-174
33	Mineral County Emergency Services	Countywide: MINERAL, WV	150-174, 450-470
34	MORGANTOWN, CITY OF	Statewide: WV	2450-2500
35	NATIONAL SKI PATROL SYSTEM INC	Statewide: MD	150-174
36	NATIONAL SKI PATROL SYSTEM INC	Statewide: WV	150-174
37	Pleasants County Emergency Management	Statewide: WV	25-50
38	State of Maryland - Department of Information Technology	Statewide: MD	4940-4990
39	State of Maryland - DGS	Statewide: MD	2450-2500
40	State of Maryland - DGS - Westminster District Ct	Statewide: MD	150-174
41	State of Maryland - DoIT	Statewide: MD	25-50, 150-174, 450-470
42	State of Maryland - MDOT - MTA	Statewide: MD	2450-2500
43	State of Maryland - MEMA	Statewide: MD	150-174
44	State Of Maryland, DNR	Statewide: MD	150-174
45	State of Maryland, DNR	Statewide: MD	25-50, 150-174, 450-470, 4940-4990
46	State of Maryland, MIEMSS	Statewide: MD	25-50, 150-174, 450-470, 4940-4990
47	STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION	Statewide: WV	150-174, 450-470
48	STATE OF WEST VIRGINIA DIVISION OF HIGHWAYS	Statewide: WV	25-50, 150-174
49	STATE OF WEST VIRGINIA, DIVISION OF HIGHWYS	Statewide: WV	450-470
50	Tucker Co Commission/911	Statewide: WV	0-10
51	UPSHUR, COUNTY OF	Statewide: WV	450-470
52	Urgent Ambulance	Statewide: MD	150-174

ID	Licensee	Area of Operation	Frequency Band (MHz)
53	WASHINGTON, COUNTY OF	Statewide: MD	150-174, 450-470
54	Webster County Emergency Services	Statewide: WV	0-10
55	WEST VIRGINIA DIVISION OF HIGHWAYS	Statewide: WV	25-50
56	WEST VIRGINIA PARKWAYS, ECONOMIC DEVELOPMENT AND TOURISM AUTHORITY	Statewide: WV	4940-4990
57	WEST VIRGINIA STATE POLICE	Statewide: WV	421-430
58	West Virginia State Police	Statewide: WV	25-50, 150-174, 450-470
59	WEST VIRGINIA, STATE OF	Statewide: WV	25-50, 450-470
60	West Virginia, State of	Statewide: WV	150-174
61	WEST VIRGINIA, STATE OF - WV DIV OF CORRECTIONS	Statewide: WV	25-50
62	WEST VIRGINIA, STATE OF DIVISION OF CORRECTIONS	Statewide: WV	150-174
63	WEST VIRGINIA, STATE OF OFFICE OF EMERGENCY SERVICES	Statewide: WV	450-470
64	WEST VIRGINIA, STATE OF, OFFICE OF EMERG SVCS	Statewide: WV	450-470
65	WEST VIRGINIA, STATE OF/WEST VIRGINIA DEPARTMENT OF AGRICULTURE	Statewide: WV	150-174
66	WV DIVISION OF EMERGENCY MANAGEMENT	Statewide: WV	150-174, 450-470

3. 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 Allegany County in Table 11.

Table 11. Mobile Phone Carriers in the Area of Interest with E911 Service

Mobile Phone Carrier	**Service**[24]
AT&T	700 MHz, AWS, Cellular, PCS, WCS
DISH Network	700 MHz, AWS
TerreStar	AWS
T-Mobile	700 MHz, AWS, PCS
US Cellular	700 MHz, AWS, Cellular, PCS
Verizon	700 MHz, AWS, PCS

[24] 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

C. Impact Assessment

We do not anticipate any significant harmful effect on these services due to the Dan's Mountain Wind Farm project. Although each of these services operates in different frequency ranges and provides different types of service including voice, video, and data applications, there is a commonality among these different networks with regard to the 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 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. 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 77.3 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 at least 77.3 meters from the land mobile stations, they will meet the setback distance criteria for FCC interference emissions in the land mobile bands.[25]

The closest proposed turbine to a licensed Land Mobile fixed site is 408 meters away (ref. Table 9). Considering the turbine rotor diameter of 158 meters (rotor radius of 79 meters) and the recommended separation distance of 77.3 meters, the blade tip of the nearest turbine in its closest distance is more than 4 times the recommended setback distance. Therefore, no adverse effects are expected from this wind project.

[25] Appendix A, Comsearch Geoplanner

VIII. ELECTROMAGNETIC INTERFERENCE (EMI)

Because land mobile and emergency communications systems may be used for emergencies at or near the wind farm, the possibility of interference to fixed or mobile communication equipment produced by electromagnetic fields (EMF) from the farm itself is considered.

A. Wind Farm Interconnection System

The diagram of the interconnect system shown schematically in Figure 29 identifies the system elements that can produce electromagnetic fields. At the base of each wind turbine, a transformer steps up the 600-volt generator output to 34.5 KV. Buried cables carry current at 34.5 KV from the 9 turbines to the substation and switchyard. The switch yard and substation are located adjacent to Potomac Edison's Carlos Junction-to-Ridgeley overhead 138 KV transmission line.

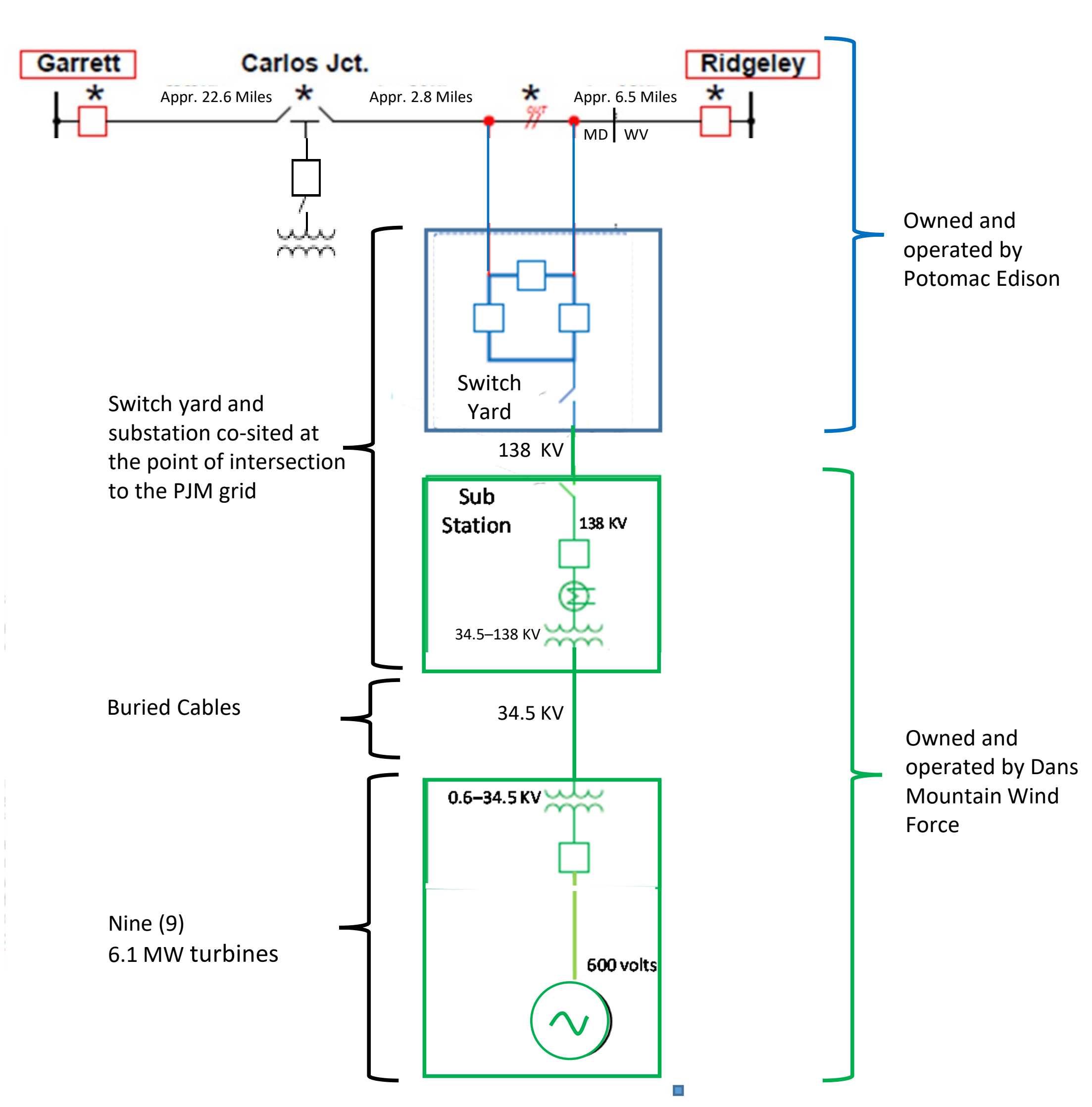


Figure 29. Interconnection Schematic

B. Long Range EMF

Long-range EMF consists of electromagnetic waves that propagate from their source through space. They can be produced intentionally (e.g., by radio communicators in the wind turbines) or unintentionally (e.g., by arcing in the generator or by corona at high voltage components).

Radio Transmissions. The wind farm will not use radio communication to exchange monitoring and control system data, often referred to as Supervisory Control And Data Acquisition (SCADA), between the turbines and the central data management point. These functions will be accomplished through the use of underground optical fiber cable co-located with the collection system, so no radio waves will be emitted that could be picked up by and cause interference to mobile communication equipment or base stations on nearby communication towers.

Arcing. The turbines proposed for the Dan's Mountain wind farm will be induction generators, which utilize brushes to carry current into and out of rotating coils. Generators that use brushes can experience arcing at the brushes if they are not well maintained. Arcing produces broad-band spurious electromagnetic emissions that can interfere with the operation of nearby radios and other types of communications devices if not properly controlled. There will be no interference to service due to arcing.

Corona. The high voltage components in the wind farm will be sealed from rain and airborne contaminants to prevent corona discharges. High voltage components, such as those used for power transmission, can experience corona discharges if they are not kept clear of rain and atmospheric contaminants (dust and debris). These discharges create electrical noise in the sub-megahertz frequency range, which can cause static in AM radios (0.5-to-1.3 MHz) and some other types of low-frequency receivers. Corona discharge noise occurs below the frequencies of the bands used for land mobile and emergency communication, the lowest of which is 25 MHz (Table 10). In particular, it is significantly below the frequency of the new 700 MHz public safety band.

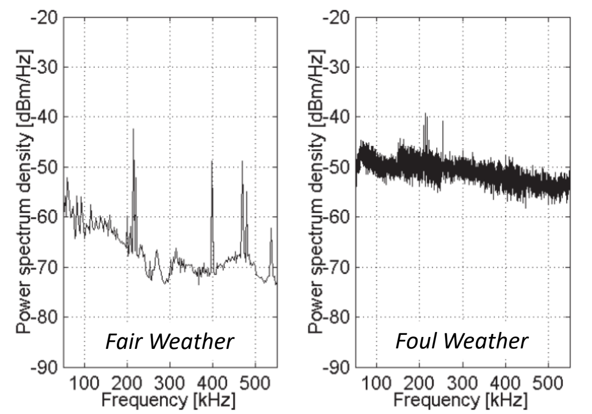


Figure 30. Corona discharge diagram

Corona discharge power spectrum from a 400 kV power line in good and bad weather[26].

The 600 Volt-to-34.5KV step-up transformer at each turbine will be housed in a water-proof enclosure; the underground cables will be encased in insulation and buried under approximately 4 feet of soil; and the 34.5 KV to 138 KV transformer in the substation will be housed in a water-proof metal enclosure. All of these components will be inspected periodically as part of the wind farm's preventive maintenance program and serviced as needed.

[26] Corona noise on the 400 kV overhead power line - measurements and computer modeling
A. Mujcic, N. Sulianovic, M. Zajc, J.F. Tasic, University of Ljubljana, Faculty of Electrical Engineering, Digital Signal Processing Laboratory, Tržaška 25, 1000 Ljubljana, Republic of Slovenia

The substation and adjacent switchyard are conventional utility infrastructures. The point where they adjoin is where the power handoff from the wind farm to the grid takes place. By necessity, at this point, there will be overhead high-voltage lines, bushings, and other elements that are unprotected from the weather. The switch yard will be owned and operated by Potomac Edison and, as such, its unprotected elements will be maintained by the utility as part of its transmission system. This maintenance will include standard utility procedures (inspection, cleaning, etc.) employed at other switchyards throughout the Potomac Edison system to prevent corona discharges from elements exposed to the weather.

C. Short Range EMF

Short-range EMF consists of non-propagating fields that attenuate or die out within a short distance from their source. Electrical currents in wind turbines and the collection system will induce magnetic fields around the current conductors. The 60 HZ power-line frequency of these currents is too low to produce propagation of electromagnetic waves, so these fields exist only very close to the conductors. For this reason, magnetic fields in wind farms are found only within a very short distance (typically a few meters) from the equipment that produces them. To our knowledge, no cases have been reported of interference with electronic equipment due to magnetic fields in wind farms.

Buried Cables. Electrical currents in the buried cables that carry power from the turbines to the substation will produce negligible magnetic fields at the surface of the ground. Like most buried sub-transmission-voltage electrical cables, they will be placed close to each other in a common trench so that magnetic fields tend to cancel each other. Any remaining fields that are not canceled will be attenuated by distance and earthen cover.

Experimental measurements verify that the EMF above buried high-voltage cables is very low. For example, in downtown Seattle, Washington, a 240KV line pair buried under a sidewalk that fed a substation produced a magnetic field strength above the sidewalk of 1 mG[27]. For comparison, the field beneath a residential ceiling fan is 50 mG.

Wind Turbines. Electric currents in the windings of the turbine's generator will produce negligible magnetic fields on the ground (117 meters below the nacelle for the proposed turbines). Fields produced by currents in the 600 V-to-34.5 KV step-up transformer at the base of the tower will die down to a negligible level within a few meters from the tower base.

An example of a measurement of the magnetic field at ground level is shown in Figure 31. The measured magnetic field vs distance from the base of a 1.8 MW turbine is plotted under 3 operating conditions:

[27] Measured by Steve Lockwood, Hatfield and Dawson Consulting Engineers, March 2012 under contract to Seattle City Light Power Co., Seattle WA.

1. High wind conditions, generating power,
2. low wind conditions, drawing power from the collection system, but not generating power,
3. shut off, neither drawing nor generating power.

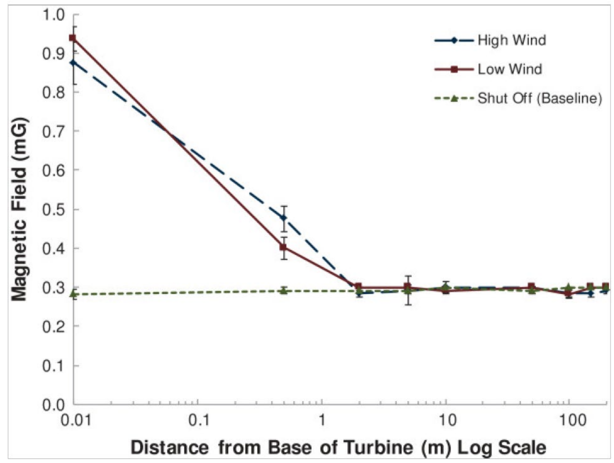


Figure 31. EMF on the ground below a 1.8 MW turbine at the Kingsbridge 1 Wind Farm, Goderich, ON Canada.[28]

At distances close to the base of the tower, where the step-up transformer is located, the magnetic field is the highest. At distances greater than 5 meters from the turbine base, the magnetic field is indistinguishable from the background magnetic field (that is, when the turbine is not operating).

Substation. The substation will produce a local magnetic field, which will attenuate to a negligible level just outside the surrounding fence. In any case, it will be located about a kilometer from the nearest communication tower (Figure 32) – a distance far beyond the reach of the magnetic fields. The substation will be located adjacent to a switch yard that will connect the wind farm to Potomac Edison's existing 138 KV Carlos Junction to Ridgeley overhead transmission line.

[28] Measuring electromagnetic fields (EMF) around wind turbines in Canada: http://www.ehjournal.net/content/13/1/9

Figure 32. Substation location adjacent to the existing 138 KV transmission line

Experimental measurements of magnetic fields at similar substations verify that the fields are small and die out quickly. For example, at a substation connected to a 240 KV transmission line in Seattle[29]:

Magnetic field inside the security fence at the transformer	40 mG
Magnetic field just outside the security fence	12 mG
Magnetic field 10 feet from the security fence	6 mG

D. Impact Assessment (EMF)

There will be no impact of EMF on mobile communication and emergency equipment in or near the wind farm. There will be no radios in the turbines for data exchange that could produce propagating electromagnetic waves. Standard methods will be carried out as part of the turbines' normal maintenance to prevent corona discharges, which in any case are below the public safety frequency bands. Magnetic fields produced by current-carrying conductors are small, not known to affect electronic equipment and attenuate to negligible levels within a few feet from the equipment that produces them.

To avoid any possible impact to the communications services due to unintended emissions from the wind farm, the turbines will be sited farther from any cellular or land mobile emergency base stations than the minimum distance based on FCC rules. FCC rule §15.109 of CFR 47 specifies the FCC maximum permitted field strength of unintended emissions from electrical devices in the frequency bands of these services. Given the maximum field strengths allowed by the FCC for unintended emissions and the typical values for antenna gains and effective receiver sensitivities for cellular and land mobile radios in these bands, a minimum setback distance of 77.3 meters can be computed. All of the proposed wind turbines exceed this minimum setback distance (ref. Table 9 and Table 13).

Importantly, the presence of distribution, sub-transmission, and transmission utility cables quite commonly exists both overhead and underground. For instance, an underground 138 KV transmission line currently operates crossing through the city of Frostburg. Both underground and overhead distribution and sub-transmission facilities are ubiquitous in and around communication systems worldwide. In fact, there are existing overhead distribution facilities in the area of the communication towers on Dan's Mountain. We are unaware of any issues related to these facilities. The collection system for the Dan's Mountain wind farm will be located substantially further from the communication towers and will be buried underground, therefore further attenuating EMF.

[29] Measured by Steve Lockwood, Hatfield and Dawson Consulting Engineers, March 2012 under contract to Seattle City Light Power Co., Seattle WA

IX. MOBILE PHONE & PERSONAL COMMUNICATION

Mobile phone carriers operate in multiple frequency bands and are often referred to as Advanced Wireless Service (AWS), Personal Communication Service (PCS), and Cellular. They hold licenses on an area-wide basis which are typically comprised of several counties.

A. Methodology

Our subcontractor, Comsearch developed and maintains comprehensive technical databases containing information on licensed mobile phone carriers across the US. Data is derived from a variety of sources including the Federal Communications Commission (FCC). These databases will be the source of the data used for the following analysis. 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.

The Dans Mountain Wind Farm Project is located in Allegany County, MD, Garret County, MD, and Mineral County, WV. 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 follows with a summary in Table 12.

B. Results

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

Table 12. Mobile Phone Carriers in Allegany County, MD, Garret County, MD, and Mineral County, WV.

Service[30]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
700 MHz	T-MOBILE	Lower A	ALLEGANY	MD	BEA013	WQJQ698
700 MHz	T-MOBILE	Lower A	GARRETT	MD	BEA013	WQJQ698
700 MHz	T-MOBILE	Lower A	MINERAL	WV	BEA013	WQJQ698
700 MHz	US CELLULAR	Lower B	ALLEGANY	MD	CMA269	WQLE711
700 MHz	US CELLULAR	Lower B	MINERAL	WV	CMA269	WQLE711
700 MHz	US CELLULAR	Lower B	GARRETT	MD	CMA467	WQLE751
700 MHz	AT&T	Lower C	ALLEGANY	MD	CMA269	WPYZ882
700 MHz	AT&T	Lower C	MINERAL	WV	CMA269	WPYZ882
700 MHz	AT&T	Lower C	GARRETT	MD	CMA467	WPYZ908
700 MHz	AT&T	Lower D	ALLEGANY	MD	EAG702	WPZA236
700 MHz	AT&T	Lower D	GARRETT	MD	EAG702	WPZA236
700 MHz	AT&T	Lower D	MINERAL	WV	EAG702	WPZA236
700 MHz	DISH NETWORK	Lower E	ALLEGANY	MD	BEA013	WQJY953
700 MHz	DISH NETWORK	Lower E	GARRETT	MD	BEA013	WQJY953
700 MHz	DISH NETWORK	Lower E	MINERAL	WV	BEA013	WQJY953

[30] 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

Service[30]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
700 MHz	Verizon	Upper C	Allegany	MD	REA002	WQJQ690
700 MHz	Verizon	Upper C	Garrett	MD	REA002	WQJQ690
700 MHz	Verizon	Upper C	Mineral	WV	REA002	WQJQ690
AWS	AT&T	A	Allegany	MD	CMA269	WQGA814
AWS	AT&T	A	Mineral	WV	CMA269	WQGA814
AWS	AT&T	A	Garrett	MD	CMA467	WQGA825
AWS	Verizon	B	Allegany	MD	BEA013	WQGA909
AWS	Verizon	B	Garrett	MD	BEA013	WQGA909
AWS	Verizon	B	Mineral	WV	BEA013	WQGA909
AWS	Verizon	C	Allegany	MD	BEA013	WQPG204
AWS	Verizon	C	Garrett	MD	BEA013	WQPG204
AWS	Verizon	C	Mineral	WV	BEA013	WQPG204
AWS	Verizon	D	Allegany	MD	REA002	WQQZ831
AWS	Verizon	D	Garrett	MD	REA002	WQQZ831
AWS	Verizon	D	Mineral	WV	REA002	WQQZ831
AWS	T-Mobile	E	Allegany	MD	REA002	WQGB375
AWS	T-Mobile	E	Garrett	MD	REA002	WQGB375
AWS	T-Mobile	E	Mineral	WV	REA002	WQGB375
AWS	T-Mobile	F	Allegany	MD	REA002	WQQZ847
AWS	T-Mobile	F	Garrett	MD	REA002	WQQZ847
AWS	T-Mobile	F	Mineral	WV	REA002	WQQZ847
Cellular	AT&T	A	Allegany	MD	CMA269	KNKA570
Cellular	AT&T	A	Mineral	WV	CMA269	KNKA570
Cellular	AT&T	A	Garrett	MD	CMA467	KNKN938
Cellular	US Cellular	B	Garrett	MD	CMA467	KNKN654
Cellular	US Cellular	B	Allegany	MD	CMA269	KNKA786
Cellular	US Cellular	B	Mineral	WV	CMA269	KNKA786
PCS	T-Mobile	A	Allegany	MD	MTA010	KNLF200
PCS	T-Mobile	A	Garrett	MD	MTA010	KNLF200
PCS	T-Mobile	A	Mineral	WV	MTA010	KNLF200
PCS	US Cellular	A	Allegany	MD	MTA010	WQIP559

Service[30]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
PCS	US Cellular	A	Garrett	MD	MTA010	WQIP559
PCS	US Cellular	A	Mineral	WV	MTA010	WQIP559
PCS	AT&T	B	Allegany	MD	MTA010	KNLF220
PCS	AT&T	B	Garrett	MD	MTA010	KNLF220
PCS	AT&T	B	Mineral	WV	MTA010	KNLF220
PCS	AT&T	B	Allegany	MD	MTA010	WPOK289
PCS	AT&T	B	Garrett	MD	MTA010	WPOK289
PCS	AT&T	B	Mineral	WV	MTA010	WPOK289
PCS	Verizon	C	Allegany	MD	BTA100	WPOJ710
PCS	Verizon	C	Garrett	MD	BTA100	WPOJ710
PCS	Verizon	C	Mineral	WV	BTA100	WPOJ710
PCS	Verizon	C	Allegany	MD	BTA100	WQKS703
PCS	Verizon	C	Garrett	MD	BTA100	WQKS703
PCS	Verizon	C	Mineral	WV	BTA100	WQKS703
PCS	T-Mobile	C	Allegany	MD	BTA100	WQYH202
PCS	T-Mobile	C	Garrett	MD	BTA100	WQYH202
PCS	T-Mobile	C	Mineral	WV	BTA100	WQYH202
PCS	T-Mobile	D	Allegany	MD	BTA100	KNLG674
PCS	T-Mobile	D	Garrett	MD	BTA100	KNLG674
PCS	T-Mobile	D	Mineral	WV	BTA100	KNLG674
PCS	T-Mobile	E	Allegany	MD	BTA100	KNLH323
PCS	T-Mobile	E	Garrett	MD	BTA100	KNLH323
PCS	T-Mobile	E	Mineral	WV	BTA100	KNLH323
PCS	T-Mobile	F	Allegany	MD	BTA100	KNLH389
PCS	T-Mobile	F	Garrett	MD	BTA100	KNLH389
PCS	T-Mobile	F	Mineral	WV	BTA100	WQCL694
PCS	T-Mobile	G	Allegany	MD	BEA013	WQKS987
PCS	T-Mobile	G	Garrett	MD	BEA013	WQKS987
PCS	T-Mobile	G	Mineral	WV	BEA013	WQKS987
WCS	AT&T	A	Allegany	MD	MEA005	KNLB315
WCS	AT&T	A	Garrett	MD	MEA005	KNLB315

Service[30]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
WCS	AT&T	A	Mineral	WV	MEA005	KNLB315
WCS	AT&T	B	Allegany	MD	MEA005	KNLB276
WCS	AT&T	B	Garrett	MD	MEA005	KNLB276
WCS	AT&T	B	Mineral	WV	MEA005	KNLB276
WCS	AT&T	C	Allegany	MD	REA002	KNLB238
WCS	AT&T	C	Garrett	MD	REA002	KNLB238
WCS	AT&T	C	Mineral	WV	REA002	KNLB238
WCS	AT&T	D	Allegany	MD	REA002	KNLB239
WCS	AT&T	D	Garrett	MD	REA002	KNLB239
WCS	AT&T	D	Mineral	WV	REA002	KNLB239

For competitive and confidentiality reasons, most mobile phone carriers' individual sites are not registered 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 five cellular sites within five miles of the proposed turbines. Figure 35 on the next page depicts their location in relation to the area of interest and Table 13 contains the technical parameters of the FCC license.

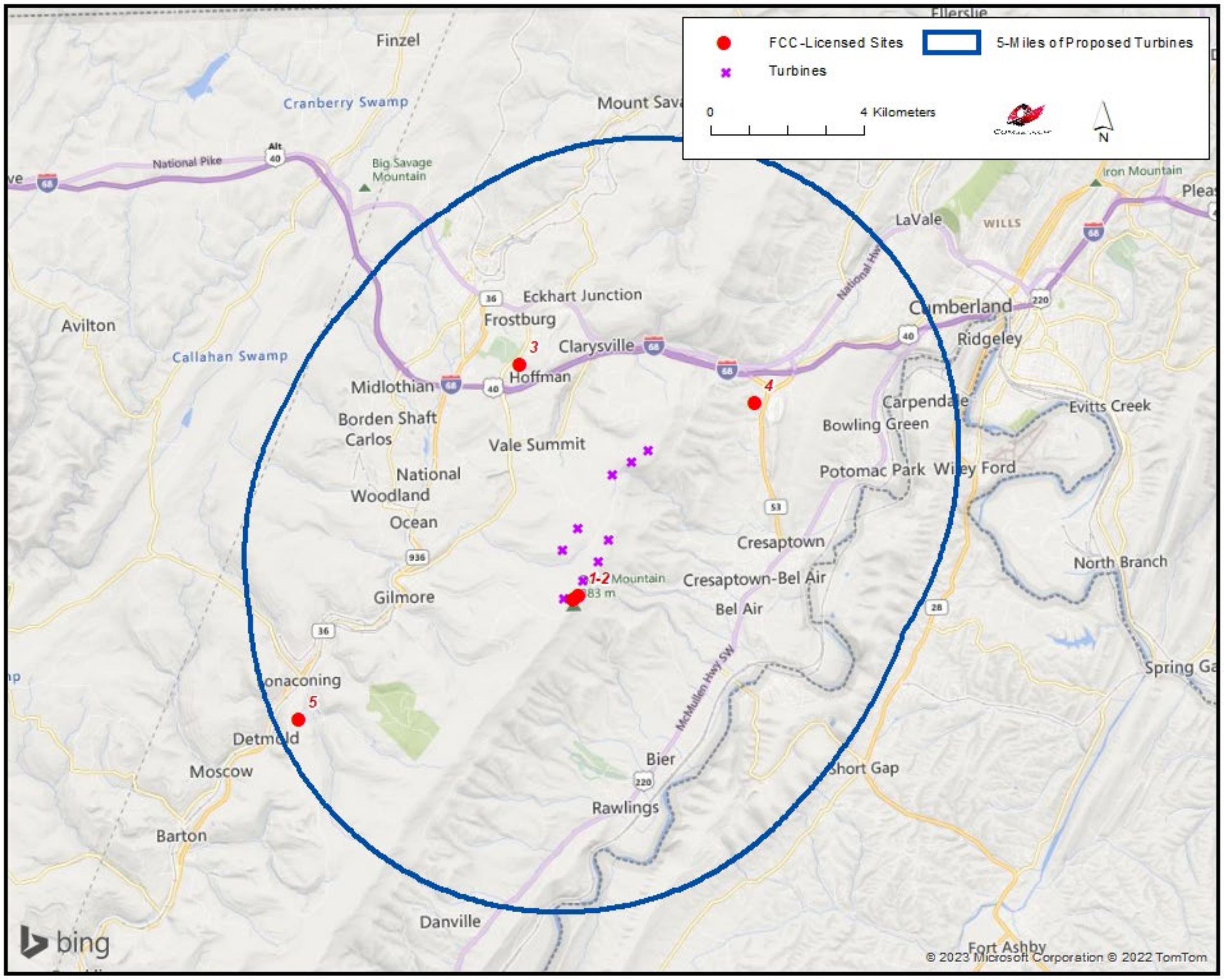


Figure 33. FCC-Licensed Mobile Phone Sites within Five Miles of the Proposed Turbines

Table 13. FCC-Licensed Mobile Phone Sites

Plot ID	Callsign	Licensee	Structure Height to Tip (m)	ASR Number	Latitude (NAD83)	Longitude (NAD83)	Distance to the Nearest Turbine (meters)
1	KNKA786	US Cellular	76.8	1036978	39.584444	-78.895833	420
2	KNKA570	AT&T	Unknown		39.583333	-78.897389	336
3	KNKA786	US Cellular	55.2		39.638694	-78.911972	3675
4	KNKA786	US Cellular	Unknown	1225803	39.628472	-78.841306	3055
5	KNKA570	AT&T	Unknown	1258082	39.557056	-78.981111	7506

C. Impact Assessment

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 Dan's Mountain Wind Farm 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 in rural areas containing a wind energy turbine facility.

For the cellular towers located within the project area, no mechanical turbine minimum setback distance is required other than physical clearance of the blades. To meet FCC requirements for spurious emissions, a turbine setback distance from a base station of at least 77.3 meters is required[31] The closest proposed turbine to a licensed cellular tower site is 336 meters away. Considering the turbine diameter of 158 meters and the minimum separation distance of 77.3 meters, the nearest turbine will be more than two times the setback distance needed to avoid service interruption.

In the unlikely event that a mobile phone carrier's coverage is compromised by the presence of the wind energy facility, there are many options available to improve their signal coverage to the area, for example, by changing the height of their antenna, optimizing a nearby base transmitter, adding a new sector or cell site, or utilizing a utility or meteorological tower.

[31] Appendix A, Comsearch Geoplanner

X. TELEVISION BROADCASTING

Broadcast Wind's subcontractor, MSW, conducted a computer simulation desktop study to assess the potential for signal impairment due to the wind farm in the area surrounding its location. Television stations both on and off Dan's Mountain were considered.

A. Methodology

Eight stations were identified whose FCC-protected service contour (signal strength ≥ 60dBµV) encompassed the wind farm location. Their signal strengths were simulated in the regions surrounding Dan's Mountain for assumed terrain conditions with and without the wind farm to identify the potential for impairment to the signals due to the wind farm. Potential for signal impairment was defined by signal strength dropping from above 60dBµV before turbine construction to below the threshold of reception after turbine construction.

Table 14. Licensed television stations with service contours encompassing the wind farm

Sign	Channel	City	State	Distance to Nearest Turbine (km)
WWCP-TV	8	Johnstown	PA	66.99
W21DZ-D	21	Romney	WV	34.35
WDVM	23	Hagerstown	MD	78.14
WGPT	26	Oakland	MD	39.18
WWPB	29	Hagerstown	MD	77.57
WNPB-TV	34	Morgantown	WV	74.64
WJAC-TV	35	Johnstown	PA	84.09
W41DK-D	16	Keyser	WV	27.13

Computer modeling and simulation were conducted by Broadcast Wind's subcontractor, Meintel, Sgrignoli, and Wallace, LLC (MSW), utilizing software used by the FCC (FCC OET-69) to assess coverage and interference of proposed television broadcast station facilities. The software models electromagnetic wave propagation taking into account the effects of terrain variation on the signal. The individual wind turbines were modeled as additional path obstructions in the terrain. Each turbine site was given a footprint approximately equal to its blade diameter and the proposed height. The model is conservative because each turbine had to be modeled as a solid, obstructing rectangle, similar to a tall building. Wind turbine rotors are not solid – they consist of 3 blades with significant space between the blades. Please refer to Figure 5 for a depiction of a turbine rotor. These obstructions were then added to the terrain site elevation for the area encompassed by the turbine footprint.[32]

32 The approximation of a turbine in the model by a solid rectangle will lead to a conservative result given that the rotor is not a solid object and does not extend to the ground.

The OET-69 analysis software divides the area within a station's protected contour into a matrix of square grid cells (0.5 km on a side) and then uses the Longley-Rice propagation model to predict the field strength at each individual cell. The output of the studies was analyzed to determine which cells (if any) showed a reduction in the predicted field strength from above 60 dBµV before the wind turbines are constructed to below 60 dBµV after they are constructed. These are the areas in which the wind farm could create a potential for unreliable service.

It is important in interpreting the results of the study to remember that it predicts the *potential* for *signal* impairment. The locations of predicted potential for signal impairment are sites where the television broadcast stations have reliable existing service (signal strength above 60dBµV) but where the wind farm would lower the predicted field strength to a level where service *may* no longer be reliable. These predictions are based on computer modeling. Real-world factors may cause different results. The study does not predict whether or how the impairment of the signal may impair the *reception* of the signal (the ability of a specific TV receiver to produce pictures and sound). To determine reception impairment, experimental measurements of actual signals in the field would be needed and of reception by actual television receivers.

B. Results

The above-listed eight stations were analyzed according to the methodology previously discussed and it was determined that all showed some potential impairment, but in all cases the impact was minor. The predicted impairment to five (W21DZ-D, W42DK-D, WJAC, WNPB, and WWPC) of the eight stations was in areas with no population. The station with the most significant predicted impairment was WGPT with 31 potentially impacted cells, but those cells contained a total population of only 172. Details for each of the 8 TV Stations follow. The yellow squares in each show the areas with the highest potential for signal impairment. No determination has been made as to whether or by how much any impairment to the signal would prevent the reception of the signal by a specific television receiver (the ability of the receiver to produce pictures and sound).

1. WWCP-TV Channel 8 Johnstown, PA

WWCP-DT is a VHF TV station located approximately 43 miles NNW of Dan's Mountain operating on RF channel 8 and serving the city of Johnstown PA with Fox Network programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County are typically very low and confined to mountain tops, including Dan's Mountain, where service is predicted to be impaired. There are no households and no Cable Head Ends at risk of losing reception.

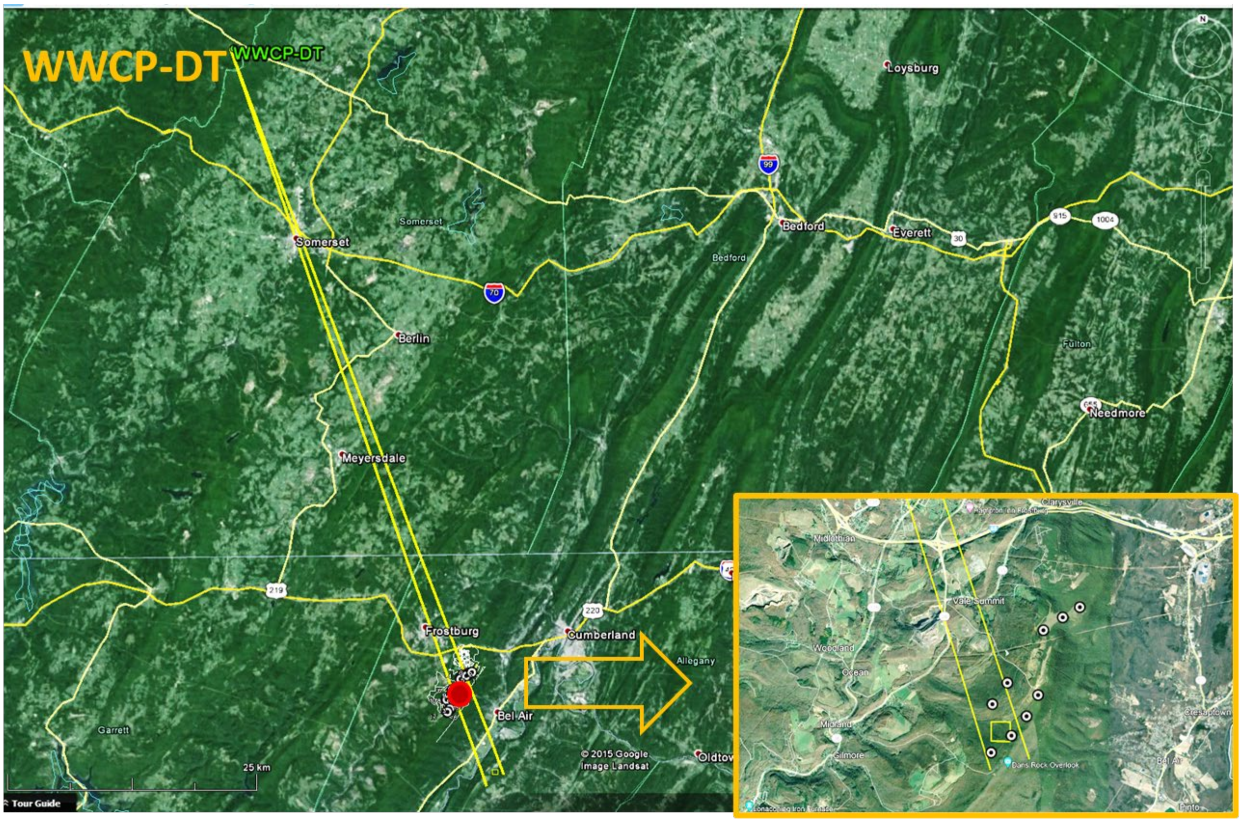


Figure 34. WWCP-TV Channel 8 Johnstown, PA.

The red dot depicts the wind farm location. The yellow squares show the areas with the potential for signal impairment.

2. W41DK-D Channel 16 Keyser, WV

W41DK-D is a digital low-power UHF TV station located approximately 45 miles SW of Dan's Mountain operating on RF channel 16 and serving the city of Keyser, WV with Educational programming. Service in Allegany County is stronger in the higher elevations and marginal elsewhere. Some service impairment is predicted atop Dan's Mountain. Zero population will be impacted.

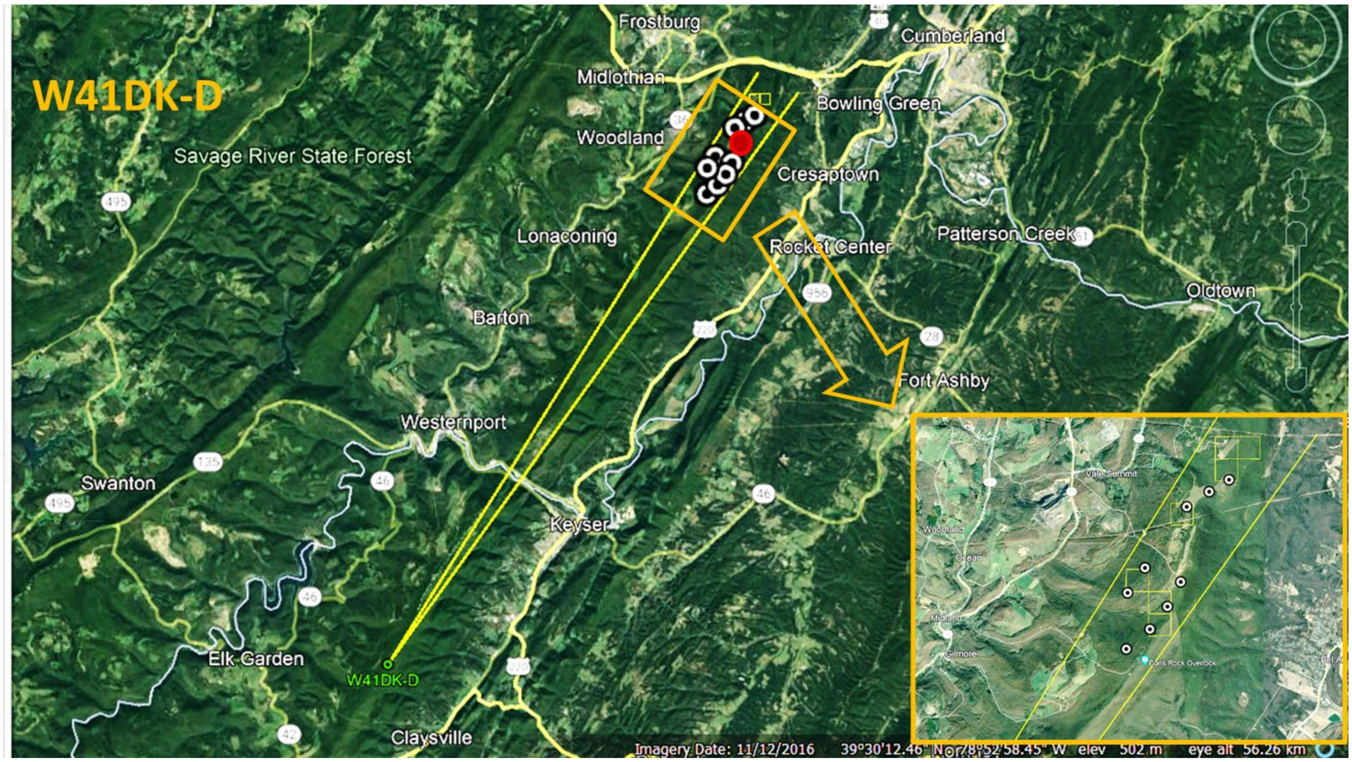


Figure 35. W41DK-D -TV Channel 16 Keyser, WV.

The red dot depicts the wind farm location. The yellow squares show the areas with the potential for signal impairment

3. W21DZ-D Channel 21 Romney, WV

W23DR-D is a low-power UHF TV station located approximately 21 miles SSE of Dan's Mountain operating on RF channel 23 and serving the city of Romney, WV with PBS programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County range from good to marginal. Some signal impairment is predicted in areas to the north of Frostburg. There are no households and no Cable Head Ends at risk of losing reception.

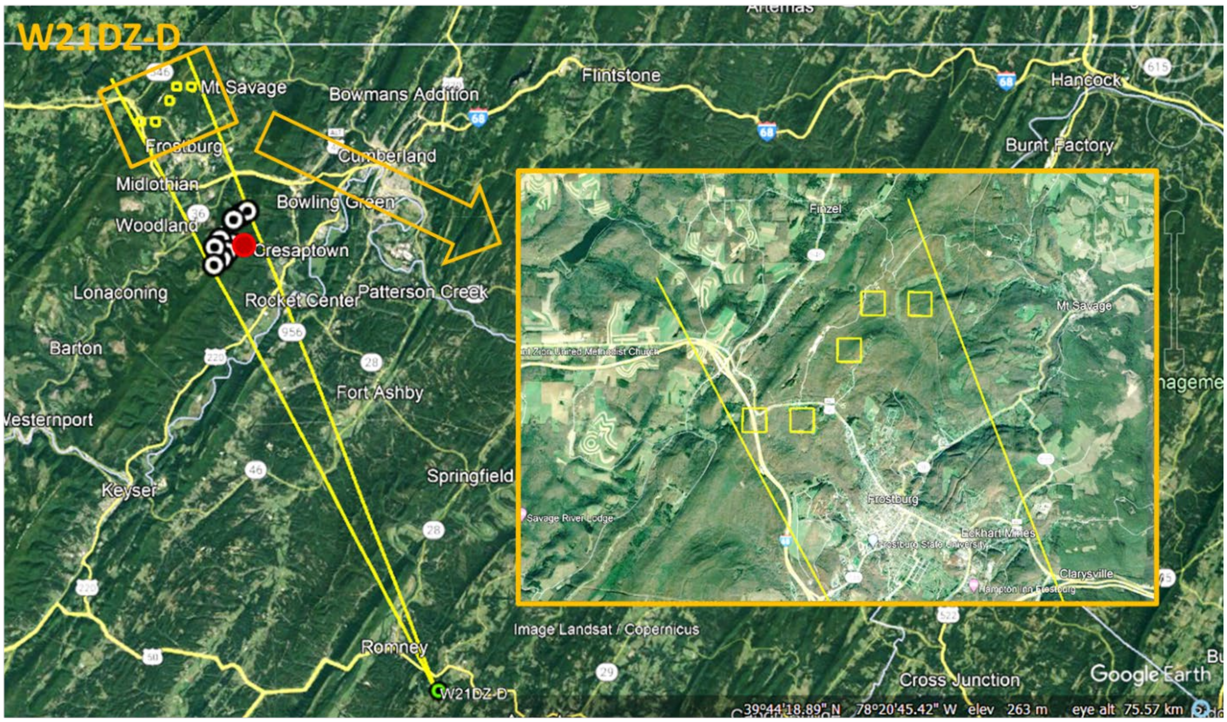


Figure 36. W21DZ-D Channel 21 Romney, WV.

The red dot depicts the wind farm location. The yellow squares show the areas with the potential for signal impairment

4. WDVM Channel 23 Hagerstown, MD

WDVM-DT (Previously WHAG-26) is a UHF TV station located approximately 50 miles East of Dan's Mountain operating on RF channel 23 and serving the city of Hagerstown, MD with independent programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County range from good to poor. Some signal impairment is predicted in areas west of Frostburg. There are few households and no Cable Headends at risk of losing reception.

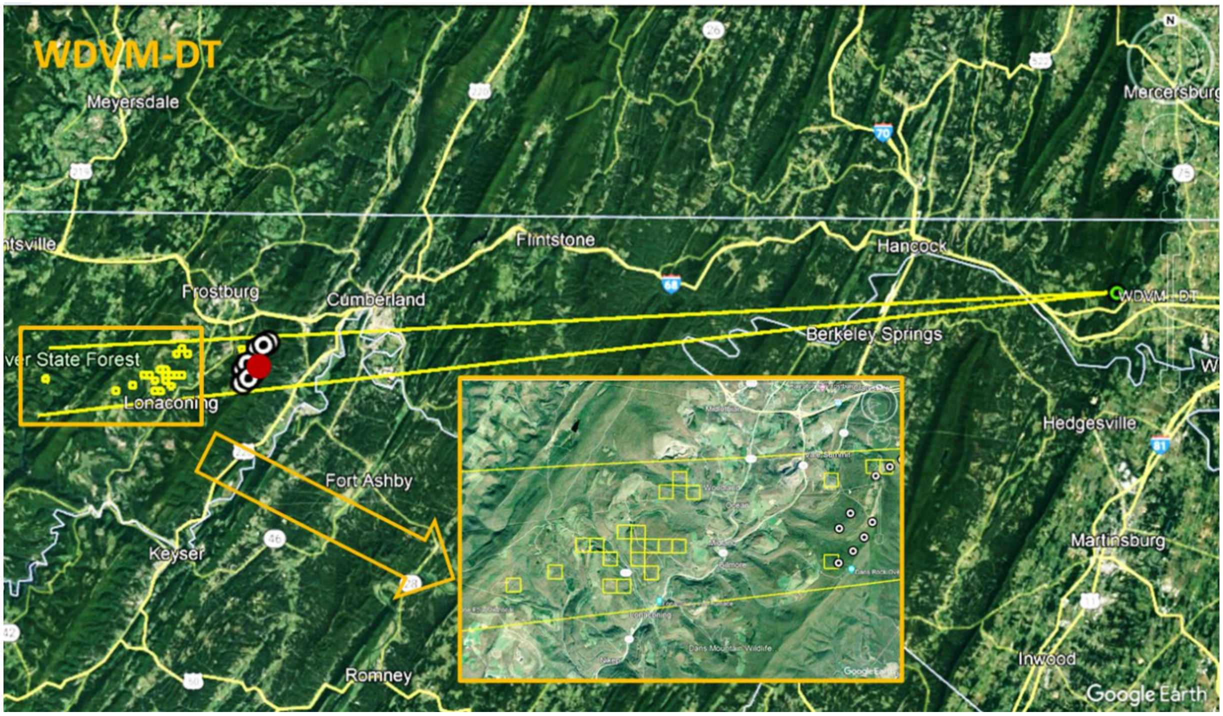


Figure 37. WDVM Channel 23 Hagerstown, MD.

The red dot depicts the wind farm location. The yellow squares show the areas with the potential for signal impairment, which are located in sparsely populated areas.

5. WGPT Channel 26 Oakland, MD

WGPT-DT is a UHF TV station located approximately 25 miles SW of Dan's Mountain operating on RF channel 26 and serving the city of Oakland, MD with PBS programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County range from good to poor. Some signal impairment is predicted in the area of Flintstone, MD. There are few households and no Cable Head Ends at risk of losing reception.

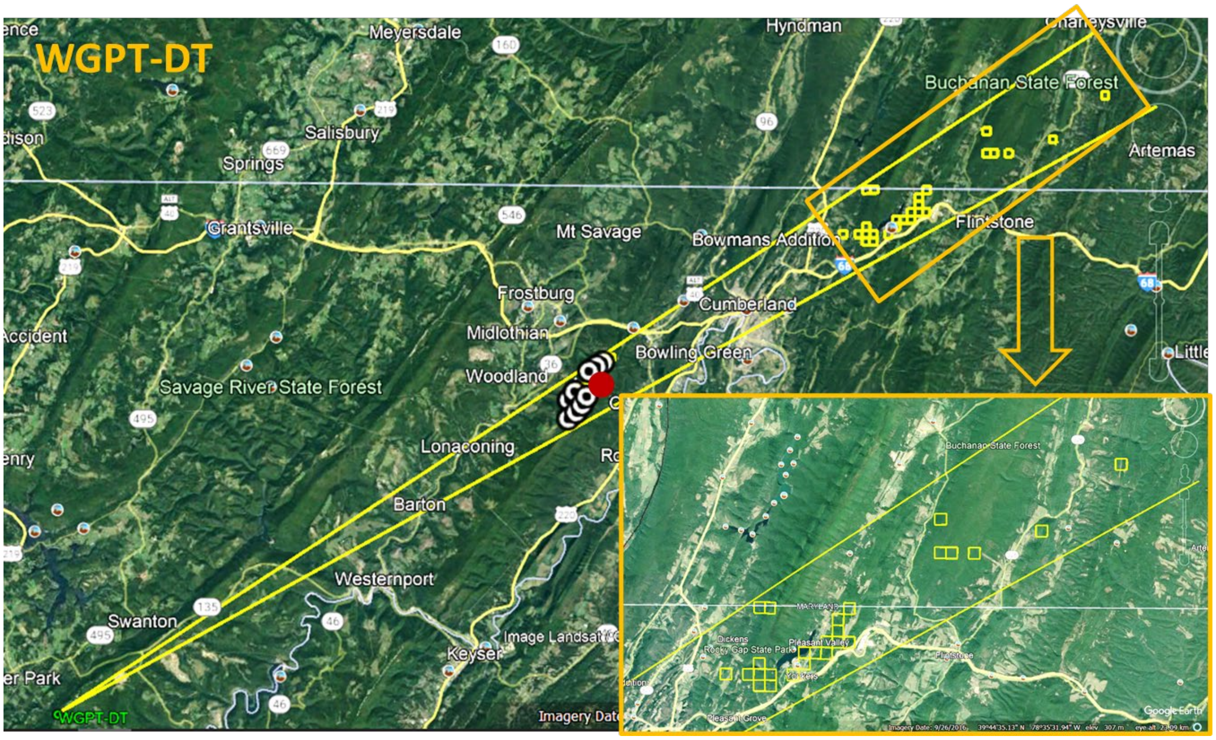


Figure 38. WGPT channel 26 Oakland, MD.

The red dot depicts the wind farm location. The yellow squares (located beneath the turbines) represent the areas with the potential for signal impairment

6. WWPB Channel 29 Hagerstown, MD

WWPB-DT is a UHF TV station located approximately 50 miles East of Dan's Mountain operating on RF channel 29 and serving the city of Hagerstown, MD with PBS programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County range from good to poor. Some signal impairment is predicted in a small area west of Midland, MD. There are few households and no Cable Head Ends at risk of losing reception.

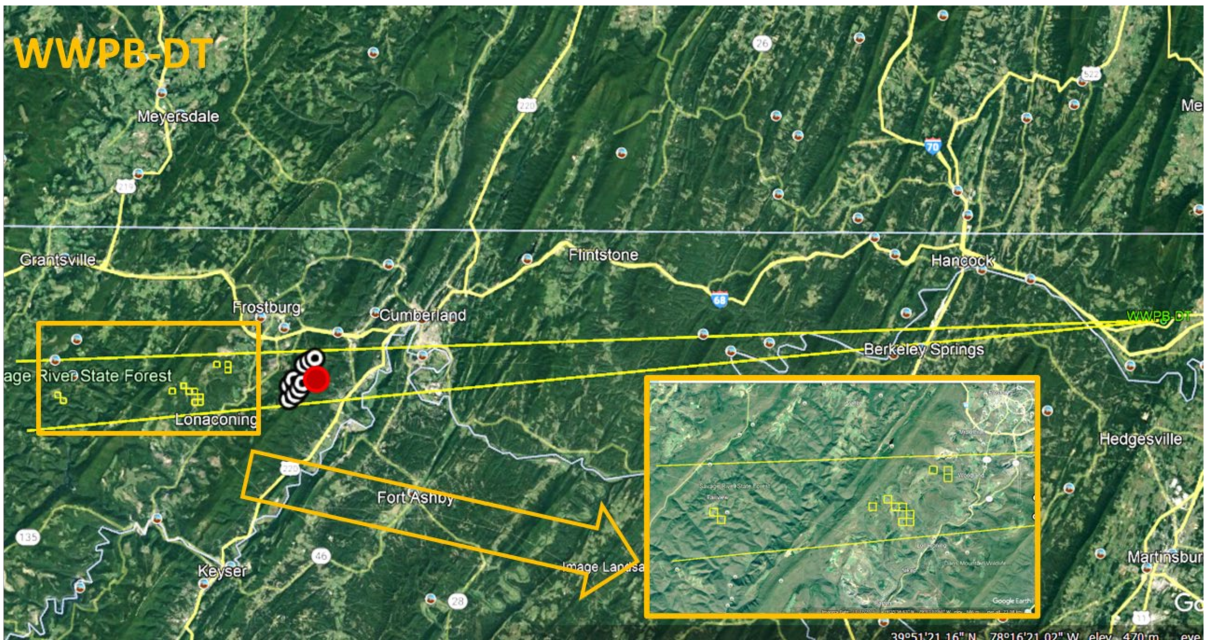


Figure 39. WWPB Channel 29 Hagerstown, MD.

The red dot depicts the wind farm location. The yellow squares (located beneath the turbines) represent the areas with the potential for signal impairment

7. WNPB-TV Channel 34 Morgantown, WV

WNPB-DT is a UHF TV station located approximately 47 miles West of Dan's Mountain operating on RF channel 34 and serving the city of Morgantown, WV with PBS programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County are typically very low and confined to mountain tops, including Dan's Mountain, where service is predicted to be impaired. There are no households and no Cable Head Ends at risk of losing reception.

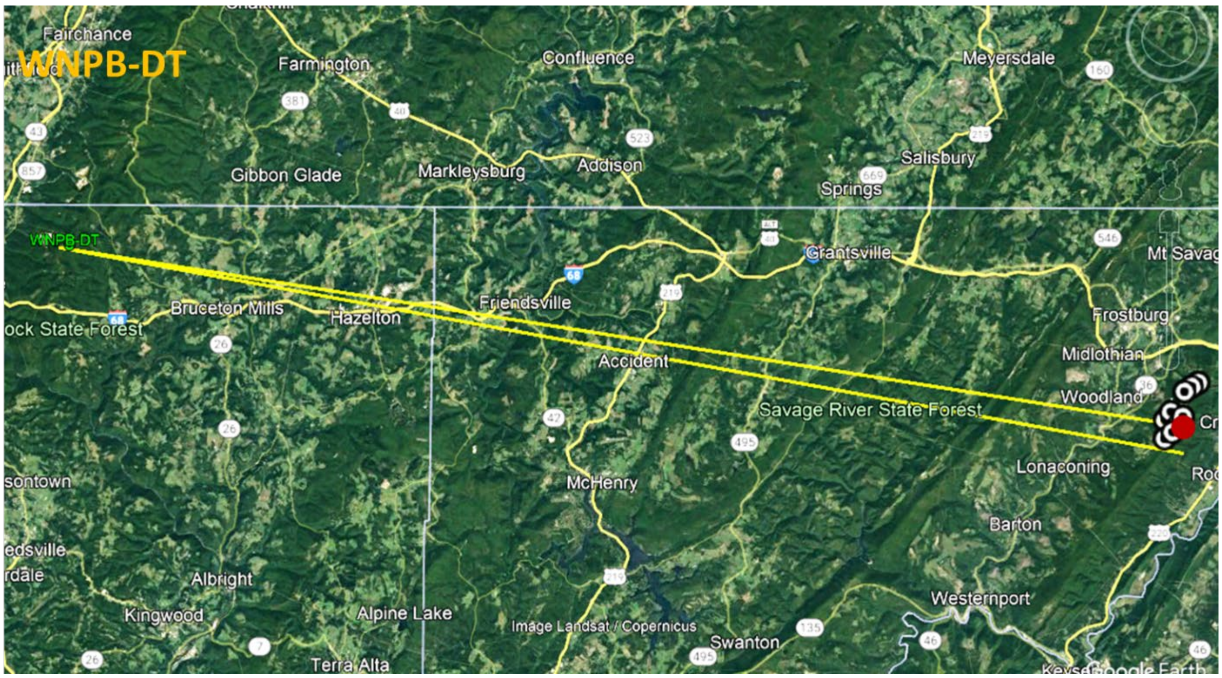


Figure 40. WNPB-TV Channel 34 Morgantown, WV.

The red dot depicts the wind farm location. The yellow squares show the areas with the potential for signal impairment

8. WJAC-TV Channel 35 Johnstown, PA

WJAC-DT is a UHF TV station located approximately 55 miles North of Dan's Mountain operating on RF channel 35 and serving the city of Johnstown, PA with NBC programming. According to Longley Rice RF terrain mapping, signal levels in Allegany County are typically very low and confined to mountain tops, including Dan's Mountain, where service is predicted to be impaired. There are no households and no Cable Head Ends at risk of losing reception.

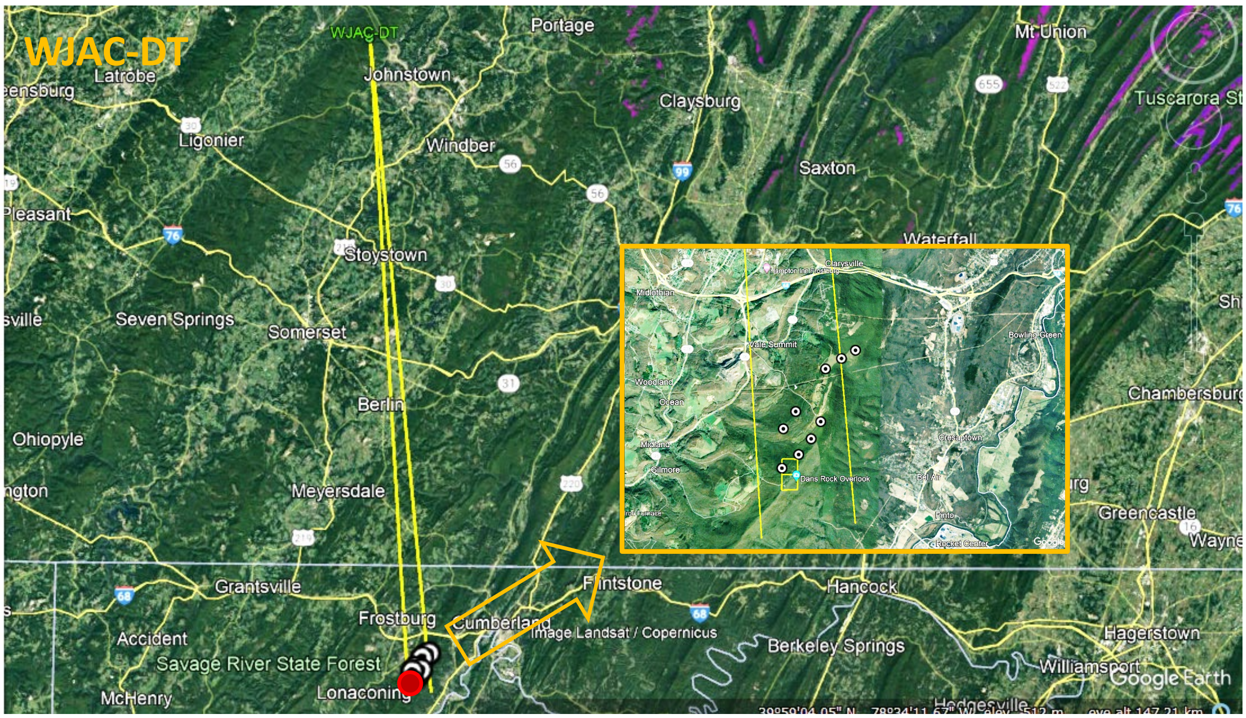


Figure 41. WJAC-TV Channel 35 Johnstown, PA.

The red dot depicts the wind farm location. The yellow squares show the areas with the potential for signal impairment

C. Population Affected

The number of homes that would be affected by loss or serious degradation of service due to Dan's Mountain Wind farm is extremely low. Most households receive television by cable, satellite, or internet. The estimated average number of homes that receive television over-the-air (10%) is factored into the following analysis.

	Call Sign	Type	Status	City	State	Channel	Population	% Over-the-Air	Net Pop Impacted	Est. Impact
1	WWCP-TV	Full Service	Licensed	Johnstown	PA	8	0	10%	0	None
2	W41DK-D	LPD	STA	Keyser	WV	16	0	10%	0	None
3	W21DZ-D	LPT	Licensed	Romney	WV	21	0	10%	0	None
4	WDVM	Full Service	Licensed	Hagerstown	MD	23	38	10%	4	Low
5	WGPT	Full Service	Licensed	Oakland	MD	26	172	10%	17	Low
6	WWPB	Full Service	Licensed	Hagerstown	MD	29	5	10%	1	Low
7	WNPB-TV	Full Service	Licensed	Morgantown	WV	34	0	10%	0	None
8	WJAC-TV	Full Service	Licensed	Johnstown	PA	35	0	10%	0	None

Table 15. Projected population with potential television reception impairment

LPT: Low-Power Television, LPD: Low-Power Digital, STA: Special Temporary Authority.

For practical purposes, the number of households likely to experience impaired television reception is negligible. For 2017–2021, the U S Census Bureau reports 2.47 persons per household in West Virginia[33] and 2.62 in Maryland[34], so the expected number of households needing remediation would be between 8 and 9. For any who do, a number of standard mitigation options are available to restore their service.

D. Impact Assessment

Little to no impairment to television reception is forecast as a consequence of constructing the wind farm on Dan's Mountain.

Eight active television stations have FCC coverage areas that include the wind farm on Dan's Mountain. If any of the predicted homes with potential for signal impairment should actually experience impaired reception, straightforward mitigation steps are available to restore full reception, ranging from adjusting or upgrading their receive antennas, to relocating and/or elevating their antennas, to switching to alternate means of providing television such as satellite TV.

33 https://www.census.gov/quickfacts/fact/table/WV/HSD310221#HSD310221
34 https://www.census.gov/quickfacts/fact/table/MD/HSD310221#HSD310221

XI. CABLE TV OFF-AIR PICKUP

A. Analysis

There is no expected impairment to off-air pickup by cable television companies due to the wind farm because no cable head ends in the area of the Dan's Mountain Wind Farm receive their television programming over-the-air. Comcast signals are distributed to their Mt. Savage distribution point via fiber and sent into local neighborhoods via laser transmitters. Breezeline[35] (formerly Atlantic Broadband) reports that all of their local cable headends receive their TV signals via fiber.

B. Impact Assessment

No impact to off-air pickup by cable head ends will result from the construction of the wind farm.

[35] Cogeco US, operating as Breezeline, a subsidiary of Cogeco Communications Inc. (TSX: CCA)

XII. AM RADIO BROADCASTING

A. Methodology

Comsearch found 10 database records for AM stations within approximately 30 kilometers of the project, as shown in Table 16 and Figure 42. These records represent 5 stations: WCBC, WFRB, WTBO, WCMD, and WKLP, which are located throughout Allegany County and the adjacent counties of Garrett and Mineral (WV). Each station has 2 FCC databases, one authorizing a daytime power level and one authorizing a nighttime power level. The daytime power level is usually higher but for two of these five stations, they are the same.

Table 16. Five (5) AM Radio Stations within 30 kilometers of Dan's Mountain.

ID	Call Sign	Status [36]	Frequency (kHz)	Transmit ERP[37] (kW)	Operation Time	Latitude (NAD 83)	Longitude (NAD 83)	Recommended Separation Distance (km)	Distance to the Nearest Proposed Turbine (km)
1	WCBC	LIC	1270	5.0	Daytime	39.674531	-78.779742	2.36	10.25
2	WCBC	LIC	1270	1.0	Nighttime	39.674531	-78.779742	2.36	10.25
3	WFRB	LIC	560	5.0	Daytime	39.683531	-78.965025	0.54	10.42
4	WFRB	LIC	560	0.055	Nighttime	39.683531	-78.965025	0.54	10.42
5	WTBO	LIC	1450	1.0	Daytime	39.646144	-78.751961	0.21	10.95
6	WTBO	LIC	1450	1.0	Nighttime	39.646144	-78.751961	0.21	10.95
7	WCMD	LIC	1230	1.0	Daytime	39.643978	-78.741961	0.24	11.72
8	WCMD	LIC	1230	1.0	Nighttime	39.643978	-78.741961	0.24	11.72
9	WKLP	LIC	1390	1.0	Daytime	39.436761	-78.955581	0.22	17.03
10	WKLP	LIC	1390	0.074	Nighttime	39.436761	-78.955581	0.22	17.03

[36] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

[37] ERP = Transmit Effective Radiated Power.

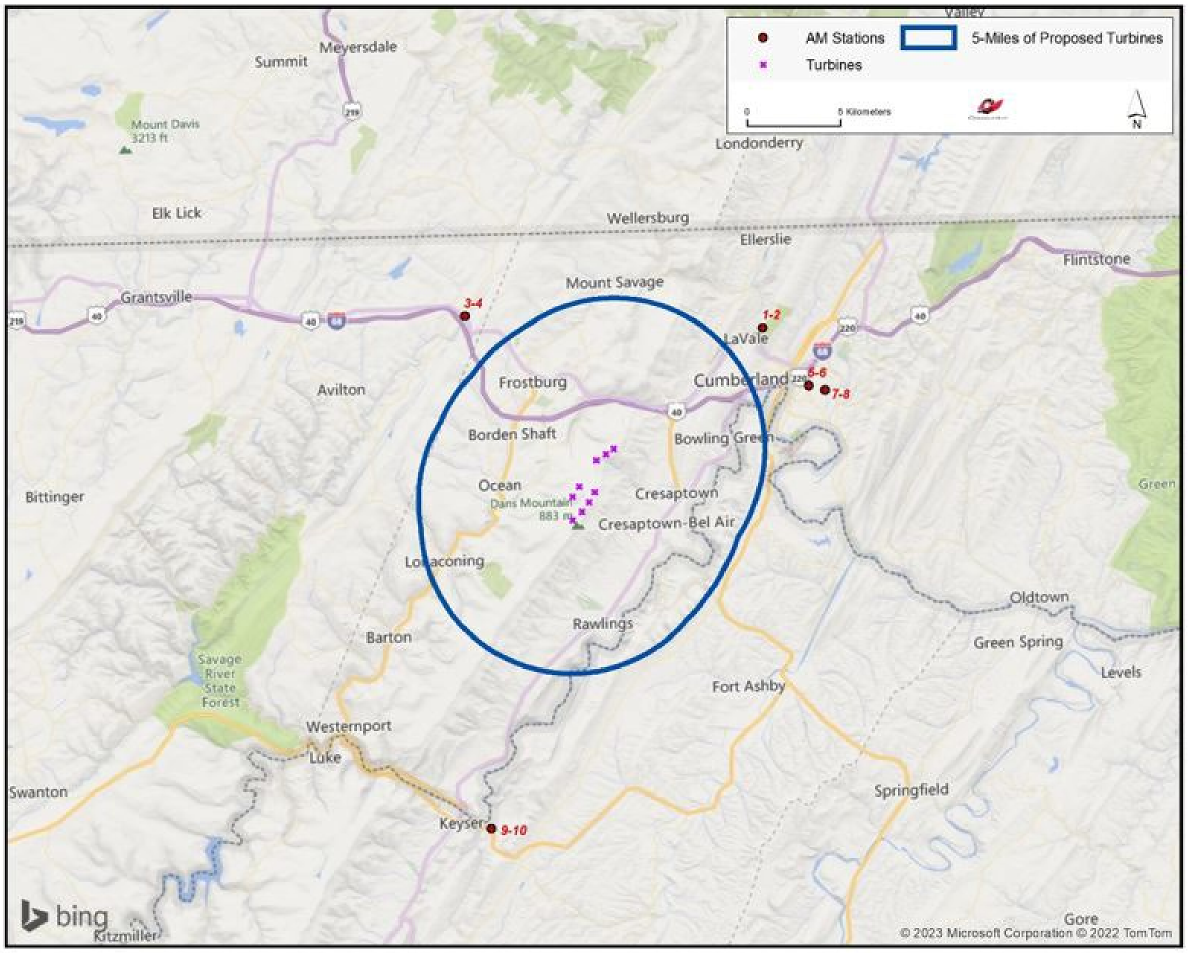


Figure 42. AM Radio Stations within 30 Km of Dan's Mountain.

B. Impact Assessment

The exclusion distance[38] 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 (WCBC) is located 10.25 km from the nearest proposed turbine location. 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.

[38] Turbines nearer to AM radio transmitters than the exclusion distance can alter the AM signal coverage pattern from its FCC-prescribed pattern, which can lead to FCC fines levied upon the station, due to lost audience, and to post-construction lawsuits.

XIII. FM RADIO BROADCASTING

A. Methodology

Comsearch determined that there were twenty-five database records for FM stations within a 30-kilometer radius of the Dan's Mountain Wind Farm, as shown in Table 2 and Figure 2. Twenty-four of the stations are currently licensed and operating; eight of which are translator stations, two are booster stations and one is a low power station, all of which operate with limited range. All but seven stations were ruled out for potential signal impairment due to the Dan's Mountain wind farm based on distance from the turbines.

Table 17. FM Radio Stations within 30 kilometers of the wind farm.

ID	Call Sign	Service [39]	Status [40]	Frequency (MHz)	Transmit ERP[41] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Nearest Turbine (km)
1	W289BR	FX	LIC	105.7	0.1	39.581194	-78.899444	0.367
2	W294CF	FX	LIC	106.7	0.25	39.581194	-78.899444	0.367
3	WRQE	FM	LIC	106.1	5.4	39.581139	-78.899444	0.373
4	W278BL	FX	LIC	103.5	0.01	39.580917	-78.899750	0.387
5	WLVV	FM	LIC	88.3	0.49	39.580083	-78.900833	0.461
6	WFWM	FM	LIC	91.9	1.3	39.581750	-78.897778	0.398
7	WLIC	FM	LIC	97.1	0.14	39.601750	-78.886944	0.456
8	WDZN-FM1	FB	LIC	99.5		39.645333	-78.804444	6.712
9	WCBC-FM	FM	LIC	107.1	0.48	39.525083	-78.861667	7.391
10	WQZK-FM1	FB	LIC	94.1		39.634528	-78.778083	8.458
11	W260BP	FX	LIC	99.9	0.075	39.634528	-78.778083	8.458
12	W300BU	FX	LIC	107.9	0.005	39.522944	-78.973333	9.210
13	WDZN	FM	LIC	99.5	1.05	39.674944	-78.961750	9.521
14	W276DQ	FX	LIC	103.1	0.155	39.674611	-78.778944	10.308
15	WFRB-FM	FM	LIC	105.3	13.5	39.683528	-78.965028	10.415
16	W250CM	FX	LIC	97.9	0.25	39.646194	-78.751972	10.953
17	-	FM	CP	89.9	0.8	39.600389	-78.743222	11.429
18	W271AT	FX	LIC	102.1	0.027	39.643917	-78.741917	11.719
19	WDYK	FM	LIC	100.5	6.0	39.713861	-78.715444	17.283
20	WKYW-LP	FL	LIC	102.9	0.1	39.437583	-78.980000	17.638
21	WQZK-FM	FM	LIC	94.1	13.0	39.418694	-78.953917	18.931
22	WAIJ	FM	LIC	90.3	10.0	39.703972	-79.091694	20.331

[39] FM = FM broadcast station; FL = FM low power station, FX = FM translator station; FS = FM auxiliary (backup) station; FB = FM booster station.
[40] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.
[41] ERP = Transmit Effective Radiated Power.

ID	Call Sign	Service [39]	Status [40]	Frequency (MHz)	Transmit ERP[41] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Nearest Turbine (km)
23	WVMD	FM	LIC	100.1	0.9	39.422306	-78.790000	20.361
24	WHYU-FM	FM	LIC	89.1	1.3	39.783333	-79.101944	26.526
25	WWPN	FM	LIC	101.1	0.32	39.382861	-79.078361	27.061

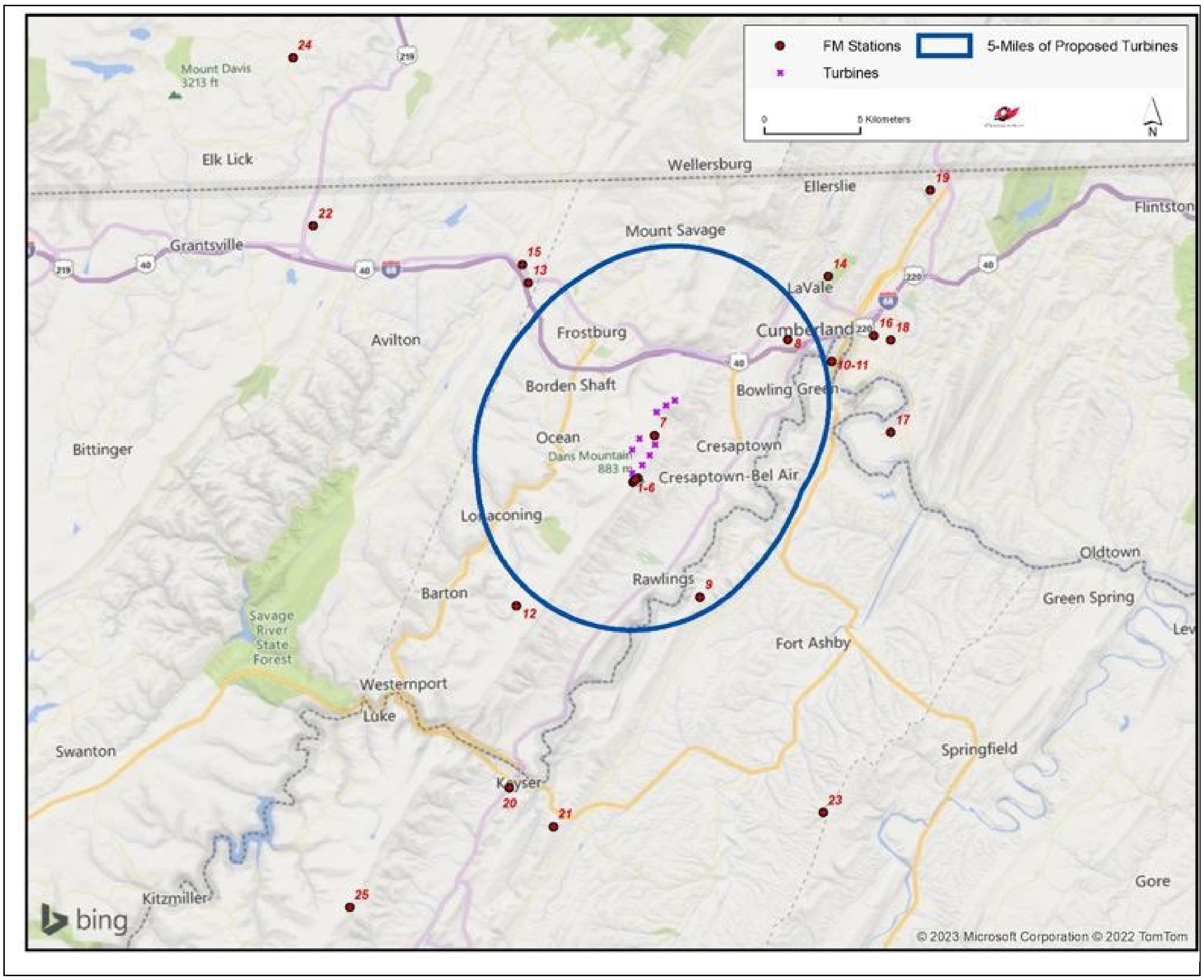


Figure 43. FM Radio Stations within 30 km of the wind farm.

B. Results

Emission Pattern Distortion

The coverage of FM stations can be distorted by the placement of large objects within the near-field region of its radiating antenna. There are seven FM stations within 2 km of a turbine location, stations W289BR and W294CF are the nearest FM stations at 0.367 km away, with the other five stations located between 0.373 km and 0.461 km from a turbine location. Based on the licensed antenna information; W289BR, W294CF, and WRQE all require a minimum separation distance of 0.023 km, W278BL requires a minimum separation distance of 0.093 km, WLVV requires a minimum separation distance of 0.027 km, WFWM requires a minimum separation distance of 0.026 km and WLIC requires a minimum separation distance of 0.006 km from the stations and any turbine tower and blade. Based on the distance calculations, all of these stations meet the required separation distance and therefore there is adequate separation to avoid radiation pattern distortion. All other FM stations are located 6.712 km or further from the proposed turbine locations and would not be impacted by the wind project.

Signal Attenuation Desktop Study

Stations WLVV, W278BL, WRQE, W289BR, W294CF, and WFWM are all on Dan's Mountain within close proximity of turbines 8 and 9 in the southwestern corner of the project. WLIC is close to the center of the project area, in close proximity to turbines 4 and 6. These seven FM stations' transmit antennas are situated on higher ground than the planned turbines, but given the relative heights of the much larger wind turbines to the FM transmit antennas, the potential for signal attenuation needed to be analyzed in detail.

Call Sign	Closest Turbine #	Distance to WT (m)	ERP (kW)	City Served	Freq.	Closest WT ASL (m)	Antenna ASL (m)	Var (m)
1) W289BR	9	367	0.10	Cumberland	105.7	1,032	903	129
2) W294CF	9	367	0.25	Frostburg	106.7	1,032	910	122
3) WRQE	9	373	5.40	Cumberland	106.1	1,032	917	115
4) W278BL	9	387	0.01	Cumberland	103.5	1,032	904	128
5) WLVV	9	461	0.49	Midland	88.3	1,032	911	121
6) WFWM	9	398	1.30	Frostburg	91.9	1,032	913	119
7) WLIC	6	456	0.14	Frostburg	97.1	1,015	867	148

Table 18. FM Stations studied for potential signal attenuation.

To predict the potential for signal attenuation, and where it may occur, Broadcast Wind commissioned MSW to conduct a computer simulation desktop study to assess the potential for impairment to the signals of the seven FM stations.

As with the television study, the signal strength of each FM station was simulated in the regions surrounding Dan's Mountain for assumed terrain conditions with and without the wind farm to identify the potential for impairment due to the wind farm. Studies of the FM signals were conducted in the same manner as the television analyses were but with changes made to the FCC analysis software to account for the difference in the planning factors between the television and FM broadcast services. Results depict the areas where the field strength is predicted to be reduced below the FCC's 60 dB service threshold.

Simulations for each of the seven FM stations showed some level of predicted attenuation to the signal from the construction of the wind farm. Six of the stations are located just south of the wind farm. For these transmitters, areas to the north, northeast, and northwest see some potential for signal impairment. One station, WLIC, is located closer to the center of the wind farm and may see signal attenuation to the North, West, and southeast of Dan's Mountain. In Figure 44 through Figure 50, the yellow squares are grid cells in which there is predicted potential for signal impairment, defined as areas where the field strength is predicted to drop below the FCC planning factor service level. No determination has been made as to whether the predicted signal impairment would cause actual reception to be impaired. Actual reception impairment would need to be determined by an RF field study of signal strength and testing reception with a hardware FM receiver before and after turbine construction.

1. W289BR - FM

W289BR is a translator station (retransmits signal from another channel) operating on channel 289 (FM frequency of 88.3 MHz) at a power of 0.1 kW ERP serving the city of Cumberland, MD. Modeling predicts that field strength may drop below the FCC planning factor service level in areas outside the station's city of license, depicted by yellow squares. Areas impacted include Frostburg and areas to the north. The simulation results suggest that if an RF field study were done it would be most informative along sections of MD Route 68 and Route Alt 40.

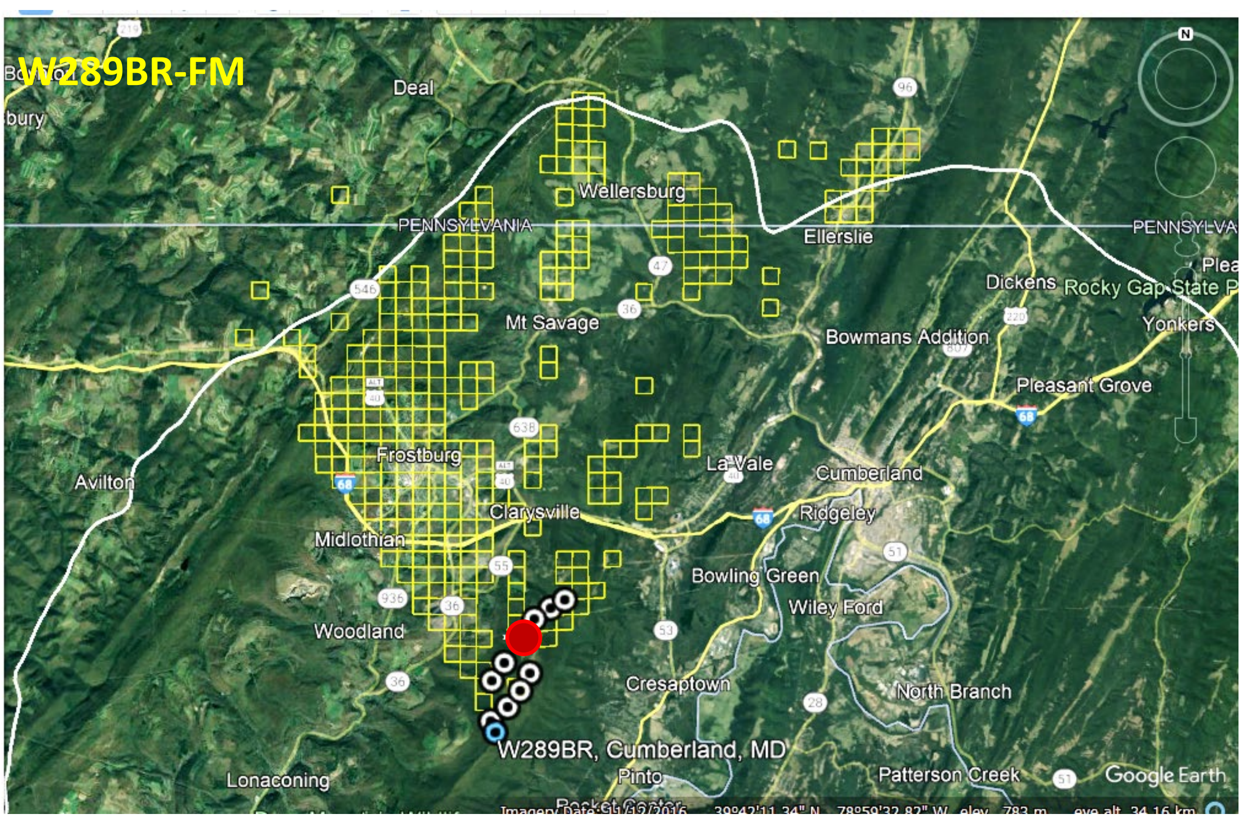


Figure 44. W289BR Cumberland, MD.

Simulation results for the signal of W289BR – Cumberland MD. The red dot depicts the wind farm location.

2. W294CF - FM

W294CF is a translator station (retransmits signal from another channel) operating on FM channel 294 (frequency of 106.7 MHz) at a power of 0.25 kW ERP serving the city of Frostburg, MD. MSW's modeling predicts that field strength may drop below the FCC planning factor service level in areas depicted by yellow squares. Areas impacted include Frostburg and rural areas to the north. The simulation results suggest that if an RF field study were done it would be most informative along sections of MD Route 68.

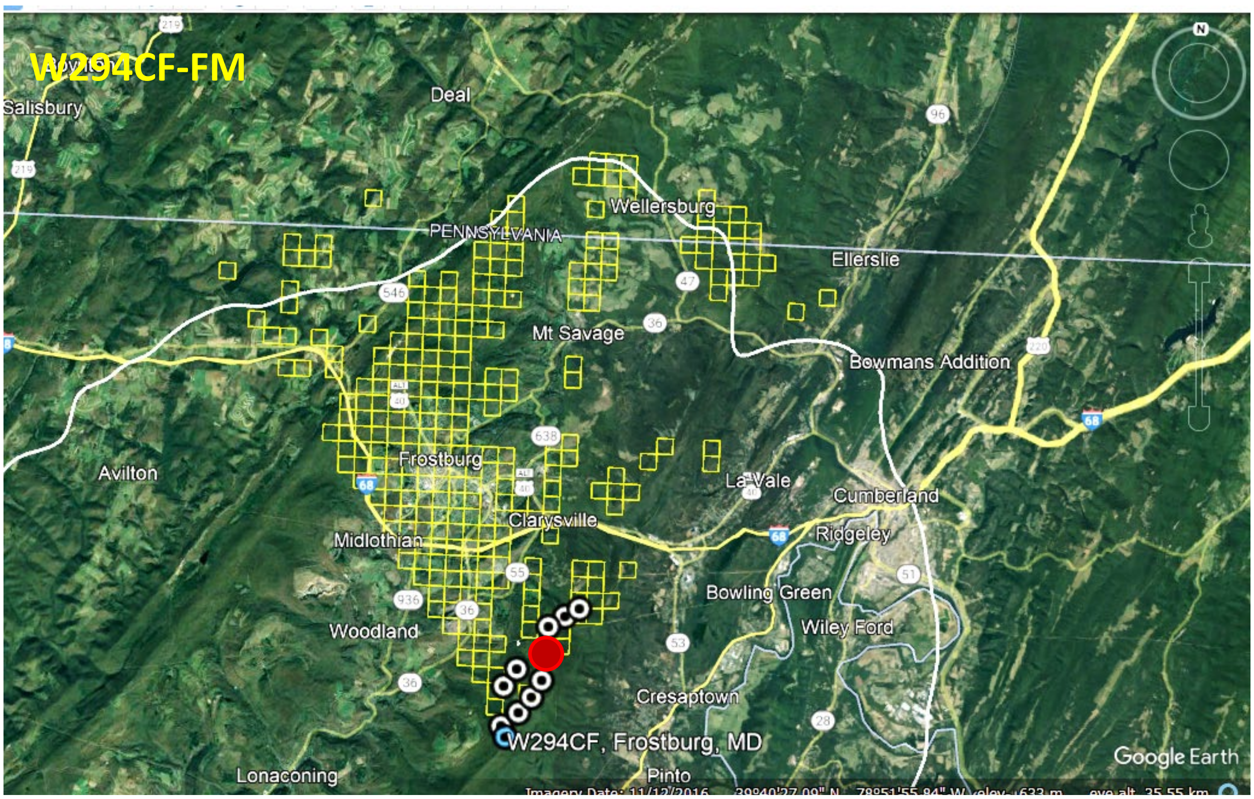


Figure 45. W294CF Channel 294 Frostburg, MD

Simulation results for the signal of W294CF Channel 294Frostburg, MD. The red dot depicts the wind farm location.

3. WRQE - FM

WRQE is a full-service station operating on FM channel 291 (frequency of 106.1 MHz) at a power of 5.4 kW ERP serving the city of Cumberland, MD. MSW's modeling predicts that field strength may drop below the FCC planning factor service level outside of the station's city of license, in areas depicted by yellow squares. Impacted areas include highly rural to the north, in Pennsylvania. The simulation results suggest that if an RF field study were done it would be most informative along sections of Routes 219 and 76.

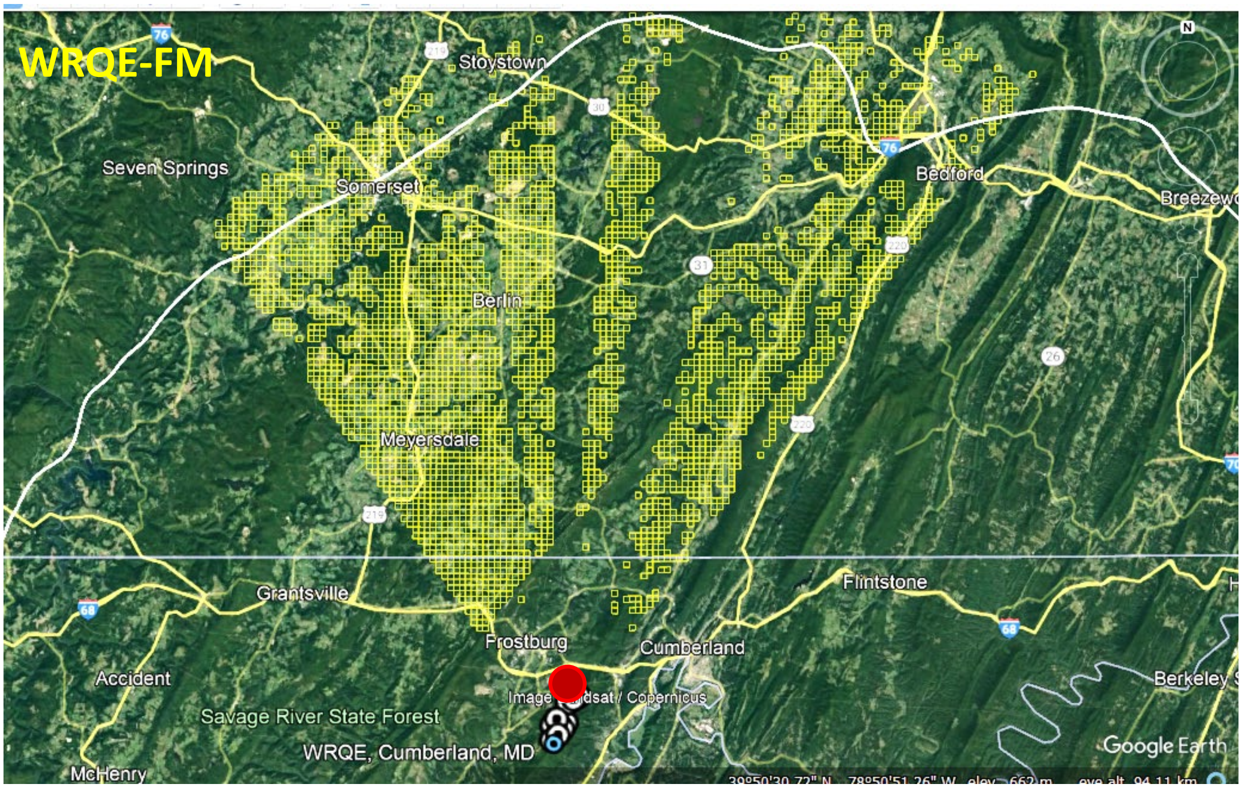


Figure 46. WRQE Channel 291 Cumberland, MD.

Simulation results for the signal of WRQE Channel 291 Cumberland, MD. The red dot depicts the wind farm location.

4. W278BL - FM

W278BL is a low-power FM translator (retransmits signal from another channel) operating on channel 278 (frequency of 103.5 MHz) at a power of 0.01 kW ERP serving the city of Cumberland, MD. MSW's modeling predicts that field strength may drop below the FCC planning factor service level outside the station's city of license, depicted by yellow squares. Areas of potential interference are mostly located in the vicinity of Frostburg and Eckhart Mines MD. The simulation results suggest that if an RF field study were done it would be most informative at areas within Frostburg, Eckhart Mines, and along a section of MD Route 68.

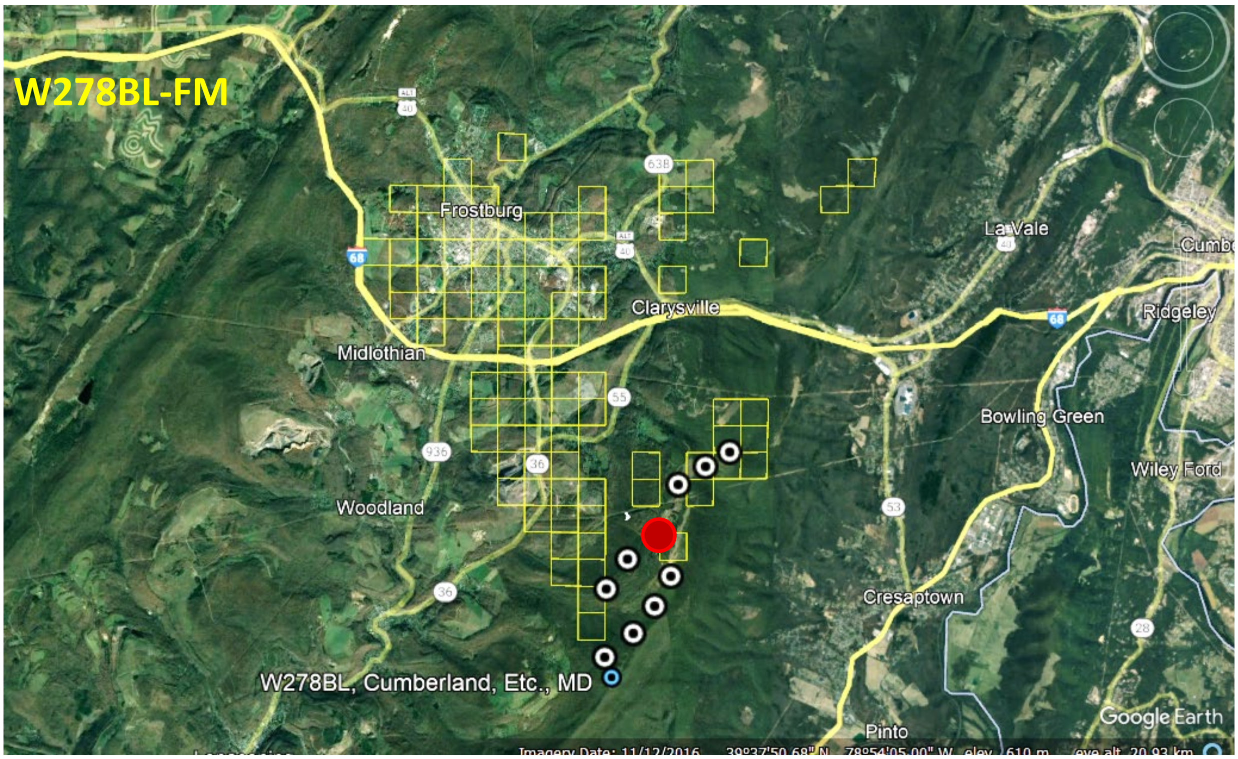


Figure 47. W278BL Channel 278 Cumberland MD.

Simulation results for the signal of W278BL Channel 278 Cumberland MD. The red dot depicts the wind farm location.

5. WLVV - FM

WLVV is a Non-commercial Class B1 station operating on FM channel 202 (frequency of 88.3 MHz) at a power of 0.49 kW ERP serving the city of Midland, MD. MSW's modeling predicts that field strength may drop below the FCC planning factor service level in areas depicted by yellow squares. Areas of potential interference are mostly located in highly rural sections outside of Allegany County. The simulation results suggest that if an RF field study were done it would be most informative along sections of MD Route 35, and PA Route 96.

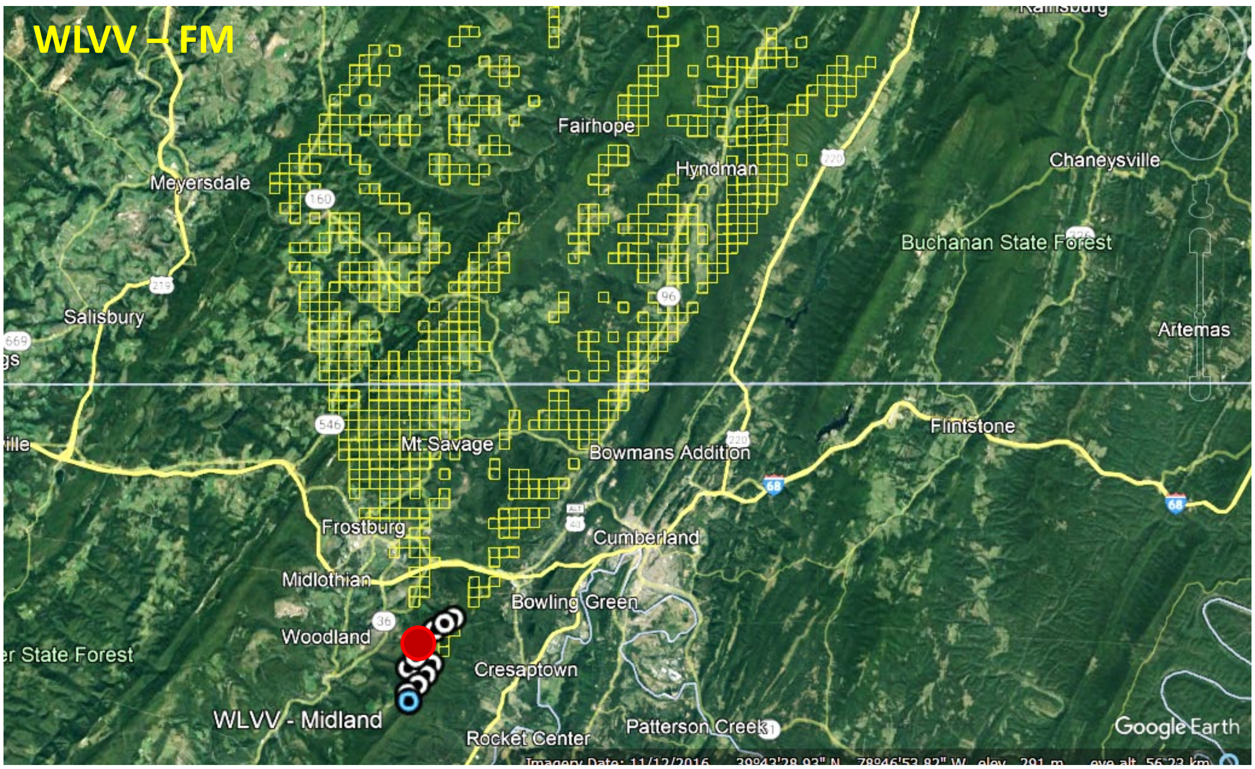


Figure 48. WLVV Channel 202 Frostburg, MD.

Simulation results for the signal of WFWM Channel 220 Midland, MD. The red dot depicts the wind farm location.

6. WFWM - FM

WFWM is a full-service station operating on FM channel 220 (frequency of 91.9 MHz) at a power of 1.3 kW ERP serving the city of Frostburg, MD. MSW's modeling predicts that field strength may drop below the FCC planning factor service level in areas depicted by yellow squares. Areas of potential interference are mostly located in highly rural sections outside of Allegany County. The simulation results suggest that if an RF field study were done it would be most informative along sections of MD Route 68, and PA Routes 160 and 96.

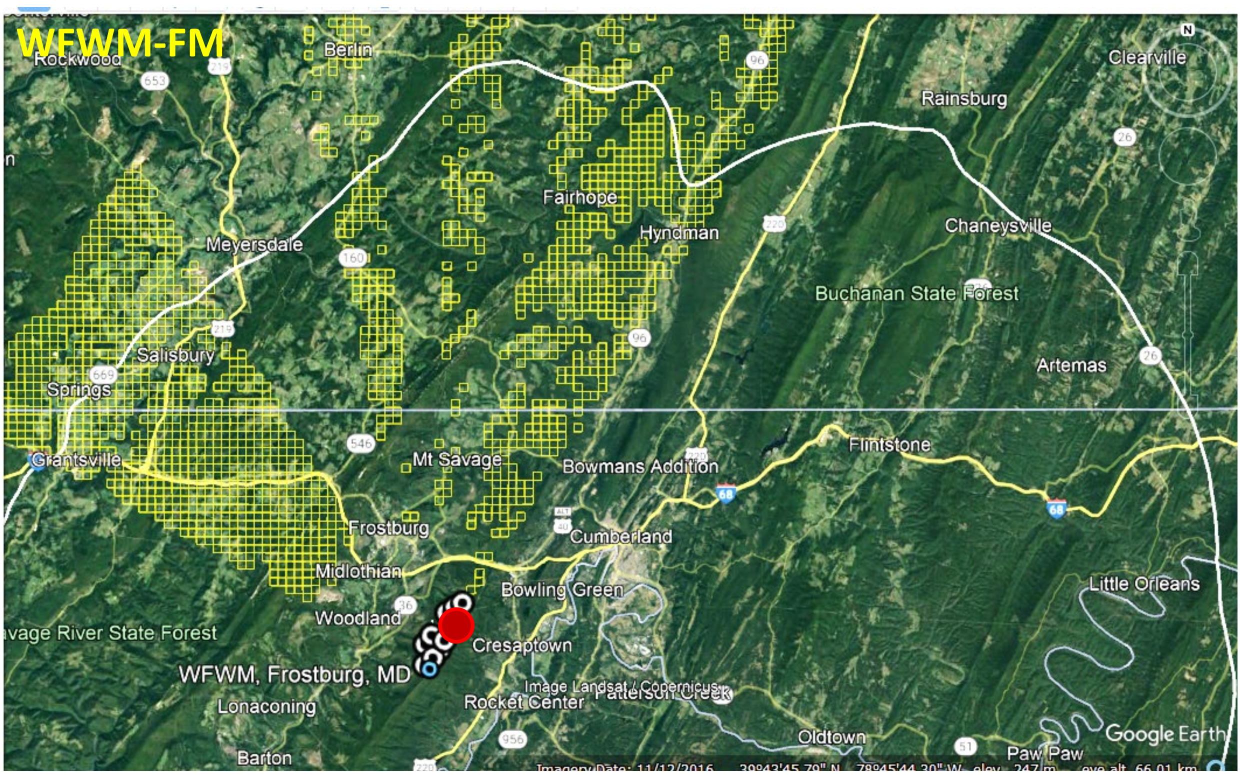


Figure 49. WFWM Channel 220 Frostburg, MD.

Simulation results for the signal of WFWM Channel 220 Frostburg, MD. The red dot depicts the wind farm location.

7. WLIC - FM

WLIC is a full-service station operating on FM channel 246 (frequency of 97.1 MHz) at a power of 0.14 kW ERP serving the city of Frostburg, MD. MSW's modeling predicts that field strength may drop below the FCC planning factor service level in areas depicted by yellow squares. Areas of potential interference are mostly located in highly rural sections outside of Allegany County. The simulation results suggest that if an RF field study were done, it would be most informative along sections of MD Route 220 and PA Route 96.

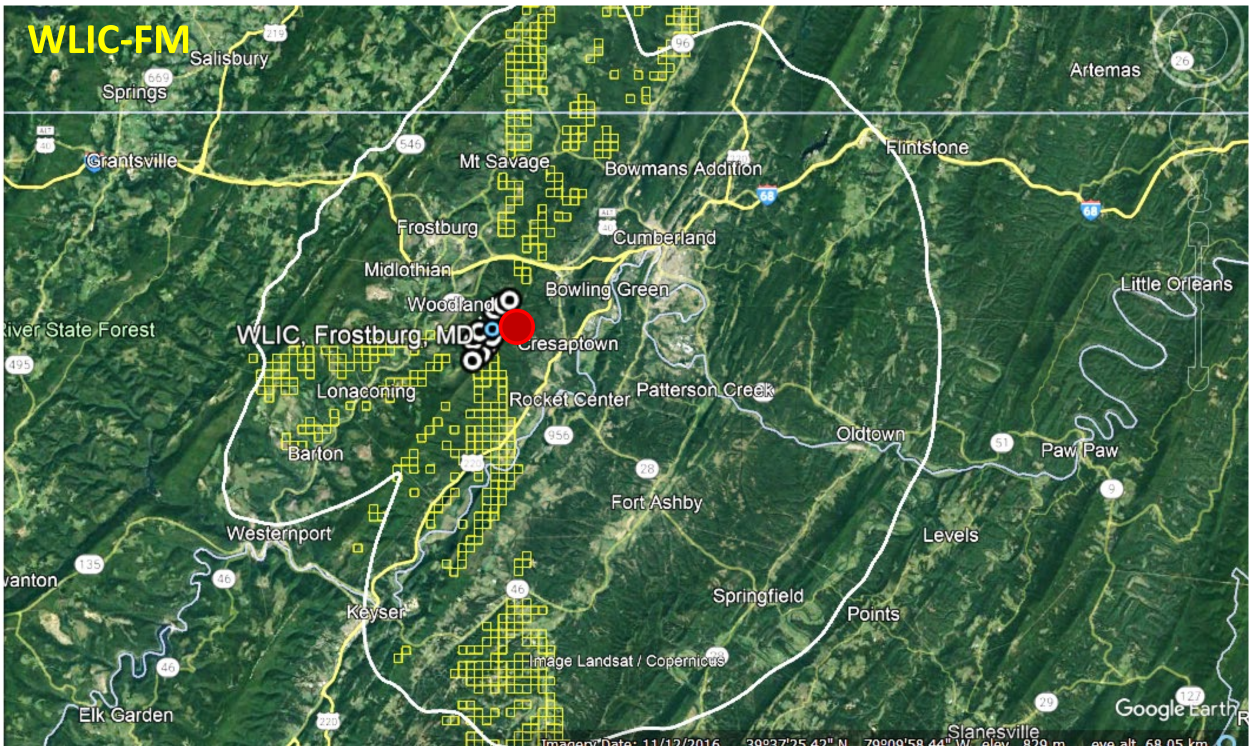


Figure 50. WLIC Channel 246 Frostburg, MD.

Simulation results for the signal of WLIC Channel 246 Frostburg, MD. The red dot depicts the wind farm location.

B. Impact Assessment

It is important in interpreting the results of the study to remember that it predicts the *potential* for signal impairment. The locations of predicted potential for signal impairment are sites where the FM radio broadcast stations have reliable existing service but where the wind farm could lower the predicted field strength to a level where service *may* no longer be reliable. These predictions are based on computer modeling. Real-world factors may cause different results.

	Call Sign	City Served	State	Facility	Freq.	ERP (kW)	Areas of Potential Signal Attenuation
1)	W289BR	Cumberland	MD	FX	105.7	0.10	Frostburg and areas to the north
2)	W294CF	Frostburg	MD	FX	106.7	0.25	Frostburg and areas to the north
3)	WRQE	Cumberland	MD	FM	106.1	5.40	PA and Rural PA roadways
4)	W278BL	Cumberland	MD	FX	103.5	0.01	Frostburg and Eckhart Mines
5)	WLVV	Midland	MD	FM	88.3	0.49	North of Frostburg and rural PA
6)	WFWM	Frostburg	MD	FM	91.9	1.30	North and west of Frostburg, rural PA
7)	WLIC	Frostburg	MD	FM	97.1	0.14	North and south of Frostburg

Table 19. Potential areas of signal attenuation to Dan's Mountain FM facilities.

MSW's desktop study predicts regions for *potential* impairment to the *signal* but does not predict whether or how the impairment to the signal may impair the *reception* of the signal (the ability of the radio receiver to produce sound). As a precaution, Broadcast Wind recommends that a field study be conducted within the areas identified by the MSW FM study prior to and following the wind farm's construction to determine the real-world impact to the FM stations and what, if any, mitigation efforts may be required. Dan's Mountain has established a baseline through earlier pre-construction studies.

If signal level impairments are found following construction, mitigation measures described below may be used to restore service:

- Move the FM or FX transmit antenna to another tower, away from the wind turbines
- Increase the station's or translator's power
- Address individual homeowner complaints by adjusting the listener's receive antenna
- Replace the homeowner's receiving antenna with one of higher performance
- Provide equivalent programming to the homeowner with internet radio (where available).

XIV. GOVERNMENT RADAR SYSTEMS

Three types of radar services: radar systems used by the Department of Defense (DoD), NEXRAD (WSR-88D) systems of the National Weather Service (NWS), and FAA radar systems were examined.

A. Methodology

The DoD Screening Tool was used to examine whether potential coverage issues were anticipated for these Government Radar systems. The center point coordinates for the Dan's Mountain Wind Farm project area were used as an input parameter for the screening tool. The results from the DoD Screening Tool showed that there were no problems anticipated with any of the Radar Systems. This includes Radars for military operations, weather service, and the FAA Radar systems. In support of these findings, three snapshot figures and statements were captured from the DoD Screening Tool and are presented on the following pages.

B. Results

Department of Defense Military Radar

Figure 51 shows the results of the DoD military system screening[42]. The map shows that there are no military facilities in the area and therefore no issues with military systems are anticipated with the planned location of the Dan's Mountain Wind Farm project. The screening analysis of the project location does not result in any degrading impacts to military airspace.

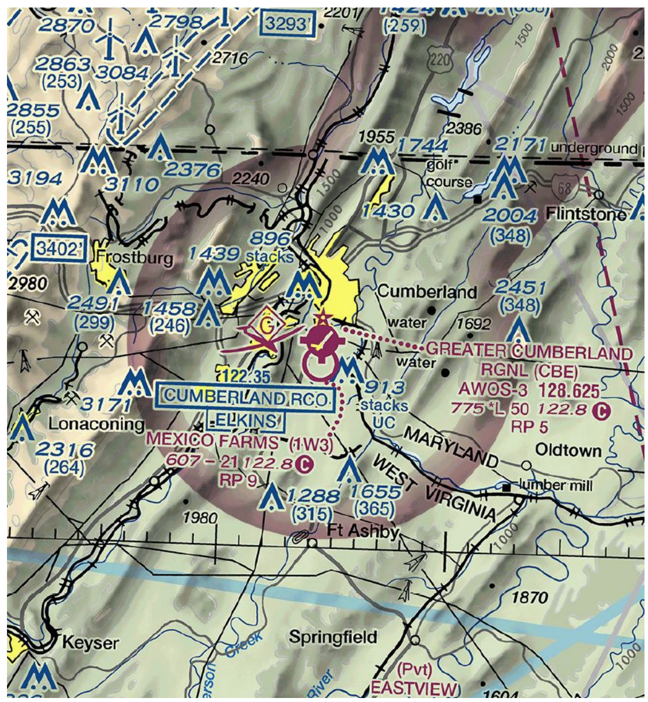


Figure 51. DoD military radar screening results.

No military radars are in the area of the proposed project

National Weather Service Radar

Westslope Consulting conducted a WSR-88D screening analysis using the 4/3rd Effective Earth's Radius Model and USGS 1/3rd arc-second 3DEP bare-earth data. Westslope's analysis shows whether the proposed locations at a blade-tip height of 645 feet AGL will (1) be within line-of-sight of a WSR-88D site and (2) penetrate the lowest three elevation angles scanned by the radar site.

Westslope conducted the WSR-88D screening analysis for the following two NEXRAD sites:

- Pittsburgh WSR-88D

[42] https://aeronav.faa.gov/visual/02-23-2023/PDFs/Washington.pdf

- Sterling WSR-88D

These radar sites scan at the NWS's standard three lowest elevation angles of 0.5 degrees, 0.9 degrees, and 1.3 degrees.

Pittsburgh WSR-88D

Westslope's WSR-88D screening analysis results show that the 10 proposed locations[43] will not be within line-of-sight of the Pittsburgh WSR-88D at a blade-tip height of 645 feet AGL. The results also show that the 10 proposed locations will fall within a no-impact zone for this radar site at a blade-tip height of 645 feet AGL. See **Figure 52**.

As a result, Westslope does not expect any impacts to Pittsburgh WSR-88D operations at or below this blade-tip height.

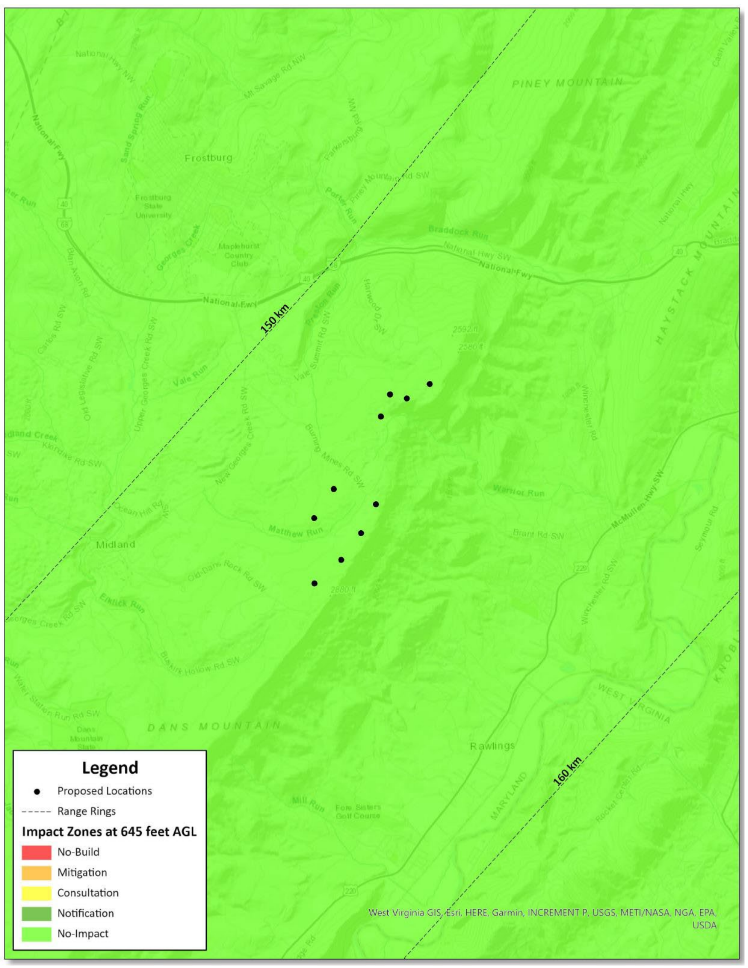


***Figure 52.** Impact Zones for the Pittsburgh WSR-88. Green indicates no impact.*

[43] Nine wind turbines and one permanent meteorological tower.

Sterling WSR-88D

Westslope's WSR-88D screening analysis results show that the 10 proposed locations will not be within line-of-sight of the Sterling WSR-88D at a blade-tip height of 645 feet AGL. The results also show that the 10 proposed locations will fall within a no-impact zone for this radar site at a blade-tip height of 645 feet AGL. See **Figure 53**.

As a result, Westslope does not expect any impacts to Sterling WSR-88D operations at or below this blade-tip height.

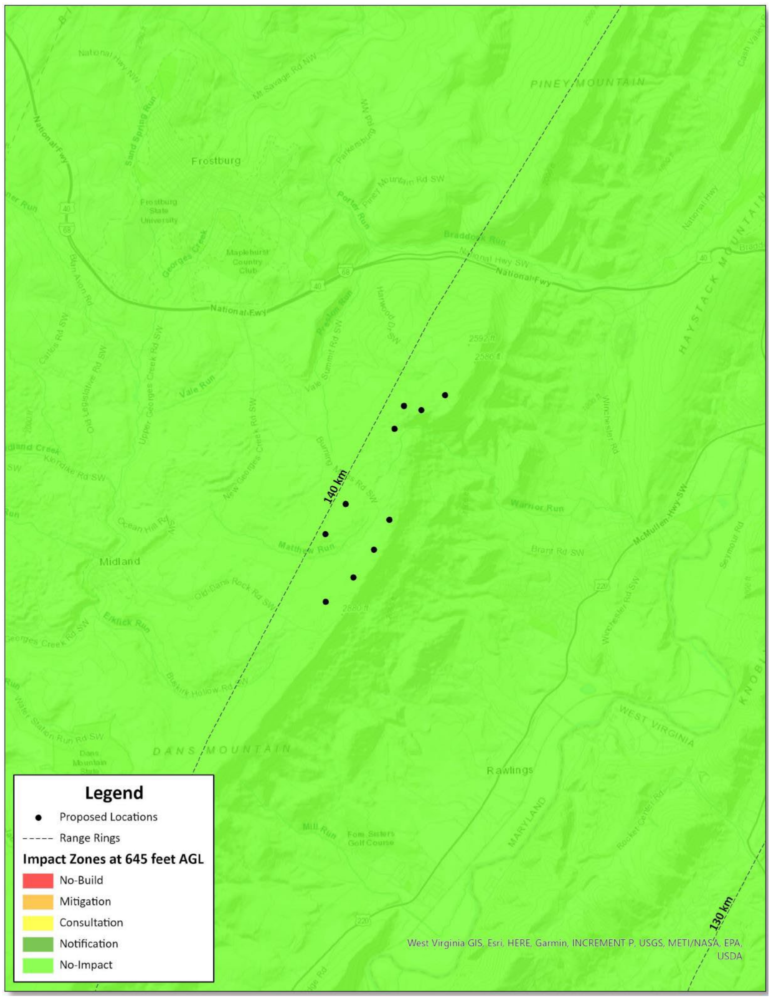


Figure 53. *Impact Zones for Sterling WSR-88D. Green indicates no impact.*

FAA Radar – ARSR and ASR LOS Analysis

Westslope conducted an ARSR and ASR LOS analysis using the 4/3rd Effective Earth's Radius Model and United States Geological Survey (USGS) 1/3rd arc-second 3-Dimensional Elevation Program (3DEP) bare-earth data. The 4/3rd Effective Earth's Radius Model accounts for the refraction of radio waves as these waves propagate through the lowest layer of the atmosphere under standard atmospheric conditions.

Westslope's analysis shows whether the proposed locations at a blade-tip height of 645 feet AGL will be within line-of-sight of and will interfere with ARSR or ASR sites.

Westslope conducted the LOS analysis for the following seven ARSR and ASR sites:

- Clarksburg ASR-8
- Dulles ASR-9
- Johnstown ANGS DASR
- Martinsburg ASR-9
- Pittsburgh ASR-9
- Pittsburgh CARSR
- The Plains CARSR

Westslope does not expect any radar effects at or below this blade-tip height for any of the above sites.

VOR Screening Analysis

Westslope conducted a VOR screening analysis using the 4/3rd Effective Earth's Radius Model and USGS 1/3rd arc-second 3DEP bare-earth data. This analysis shows whether the proposed locations will (1) fall within eight nautical miles (NM) of a VOR site and (2) be within line-of-sight at a blade-tip height of 645 feet AGL. Westslope's analysis provides a cursory indication of whether the proposed locations may affect VOR performance and is similar to the FAA's screening approach for VOR sites. The same criteria will also protect for DME sites.

Westslope conducted the VOR screening analysis for the Grantsville DME. Results show that nine of the 10 proposed locations[44] will fall within eight NM of the Grantsville DME but will not be within line-of-sight of this DME site at a blade-tip height of 645 feet AGL. See Figure 54.

[44] Nine wind turbines and one permanent meteorological tower.

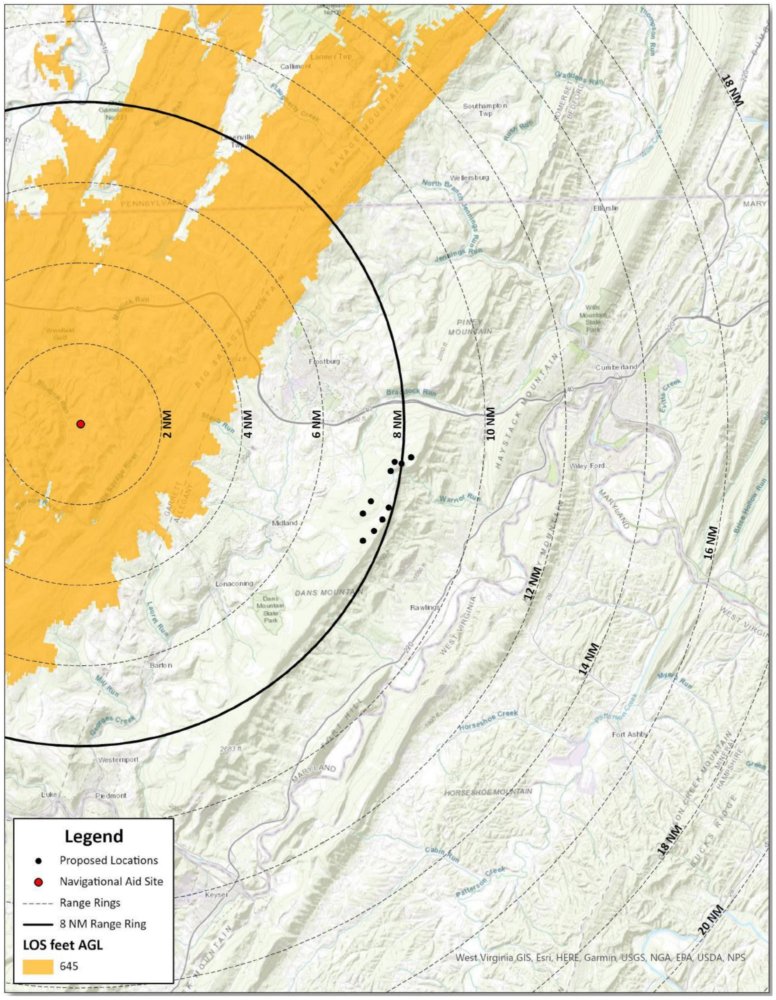


Figure 54. VOR Screening Analysis Results for the Grantsville DME.

C. Impact Assessment

The wind farm on Dan's Mountain poses no danger of degradation to or interference with Department of Defense (DoD) military systems, National Weather Service (NWS) radar systems, or FAA long-range radar systems.

XV. COMMERCIAL DOPPLER RADAR

This section assesses the impact of the Dan's Mountain Wind Farm project on the operation of Doppler Weather Radar systems owned and operated by television stations and commercial interests within 250 kilometers of the proposed wind energy project.

A. Methodology

The location of the Dan's Mountain Wind Farm project in Allegany County, Maryland is shown in Figure 2 and Figure 4. Given that the proposed turbines will have a hub height of approximately 117 meters and a rotor diameter of approximately 158 meters, the overall maximum height of the wind turbines is 196 meters above ground level. There are 9 turbines proposed for the Dan's Mountain Wind Farm project.

Table 20 contains the technical parameters of the 8 commercial Doppler radar systems located within 250 kilometers of the center of the project area, while Table 21 contains their location and ownership information. A map depiction of the Doppler radar systems relative to the project boundaries is shown in Figure 55.

Table 20. Commercial Interest and Television Station Doppler Radar Systems

Technical Data for Systems within 250 Kilometers of Dan's Mountain Wind Farm

ID	Call Sign	Frequency (MHz)	Ground Elevation (m)	Antenna Height (m)	Output Power (Watts)	Distance to Nearest Turbine (km)
1	WPKX987	5450.0-5600.0	402.0	39.0	1000000	125.02
2	WPKW203	5400.0-5650.0	399.8	46.0	350000	137.47
3	WPUK613	5400.0-5600.0	85.1	35.3	350000	178.70
4	WQBU383	5500.0-5600.0	68.6	36.0	350000	183.37
5	WPPE429	5554.7	162.0	42.0	250000	185.93
6	WPRV205	5575.0	48.7	35.7	350000	196.06
7	WPKW696	5550.0-5600.0	311.0	36.0	280500	198.75
8	WPSR220	5350.0-5460.0	508.0	31.0	200	219.01

Table 21. Ownership of Commercial Interest and Television Station Doppler Radar Systems

Location and Ownership of Systems within 250 km of Dan's Mountain Wind Farm

ID	Call Sign	Owner- Operator	Location	Latitude (NAD83)	Longitude (NAD83)
1	WPKX987	WPXI, LLC	BETHEL PARK, PA	40.29341667	-80.05116667
2	WPKW203	CBS Broadcasting Inc.	PITTSBURGH, PA	40.49366667	-80.01783333
3	WPUK613	WUSA-TV, Inc.	COLLEGE PARK, MD	39.00127778	-76.96166667
4	WQBU383	FOX TELEVISION STATIONS, LLC	BELTSVILLE, MD	39.05686111	-76.87511111
5	WPPE429	Scripps Broadcasting Holdings LLC	CATONSVILLE, MD	39.28761111	-76.75775000
6	WPRV205	ACC Licensee, LLC	HILLMEADE, MD	38.94416667	-76.77527778

ID	Call Sign	Owner- Operator	Location	Latitude (NAD83)	Longitude (NAD83)
7	WPKW696	Hearst Properties Inc.	HELLAM, PA	40.03452778	-76.61775000
8	WPSR220	WYTV Television, LLC	YOUNGSTOWN, OH	41.06172222	-80.63508333

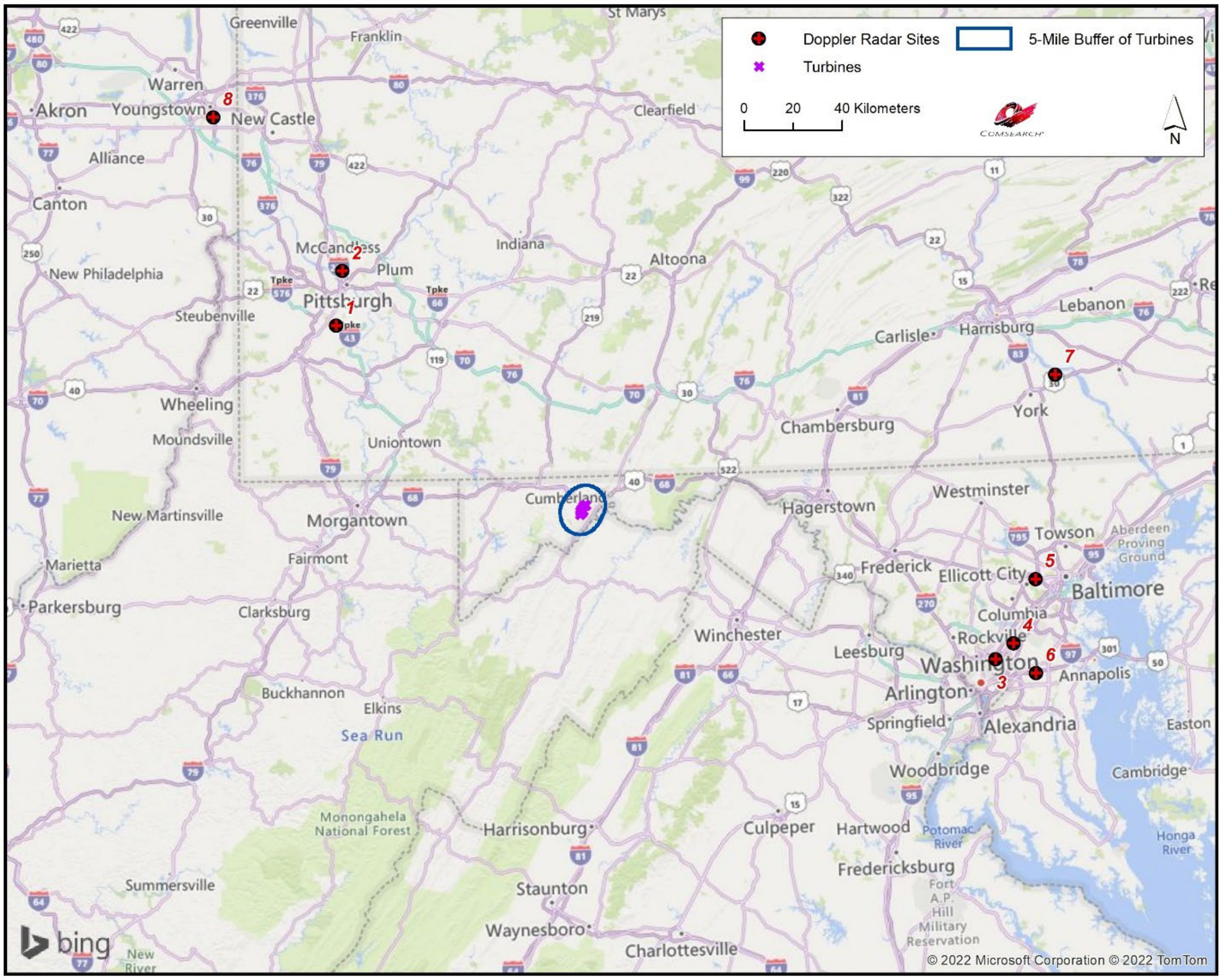


Figure 55. Doppler Radar Systems within 250 km of the project

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 Dan's Mountain Wind Farm 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 Dan's Mountain Wind Farm wind energy project and the Doppler radar systems identified in Table 20, LOS coverage plots were generated for each of the radar systems as shown in Figure 56, Figure 57, Figure 58, Figure 59, Figure 60, Figure 61, Figure 62, Figure 63. 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.

Figure 56. Line-of-Sight Coverage of WPKX987 Relative to Dan's Mountain Wind Farm

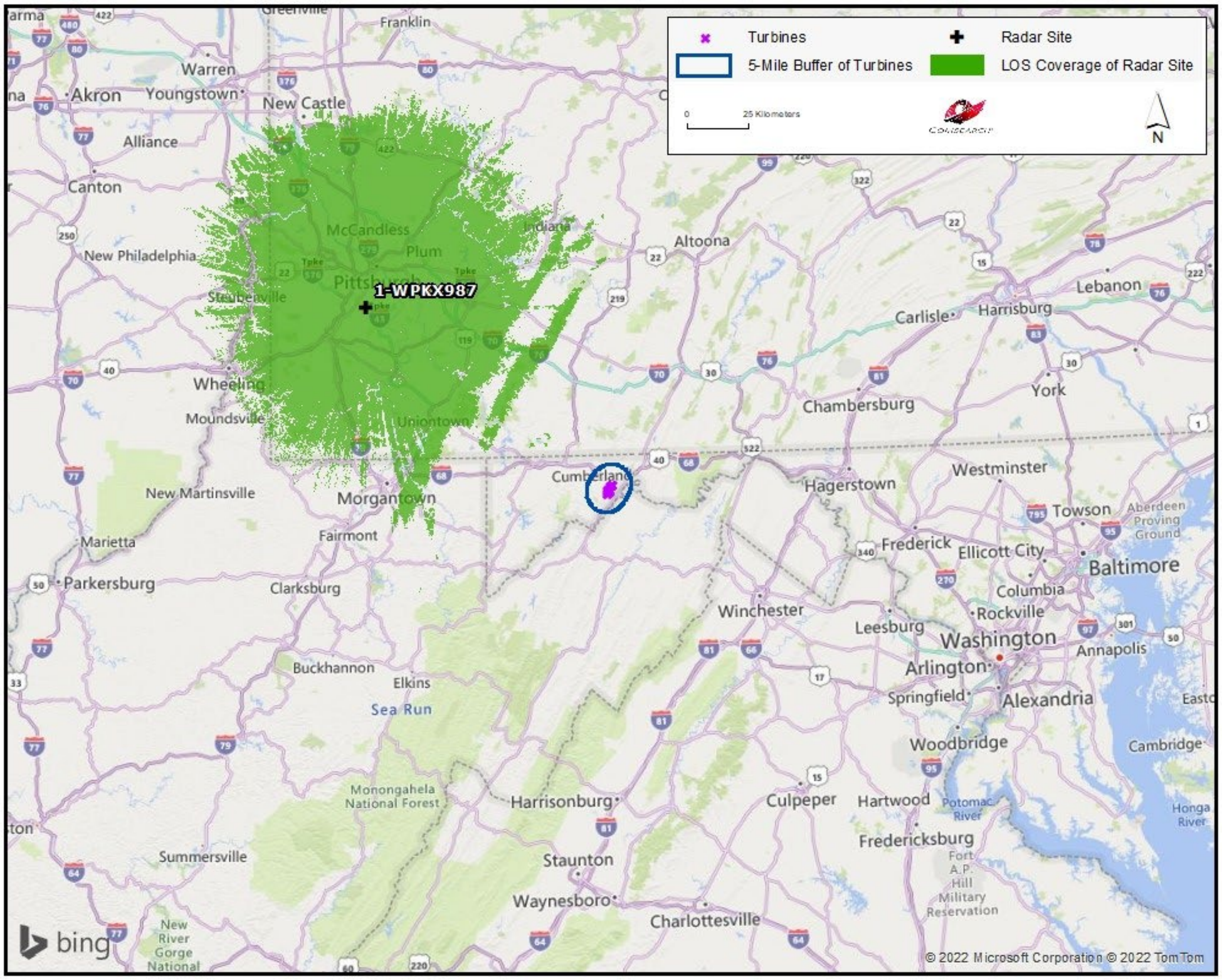


Figure 57. Line-of-Sight Coverage of WPKW203 Relative to Dan's Mountain Wind Farm

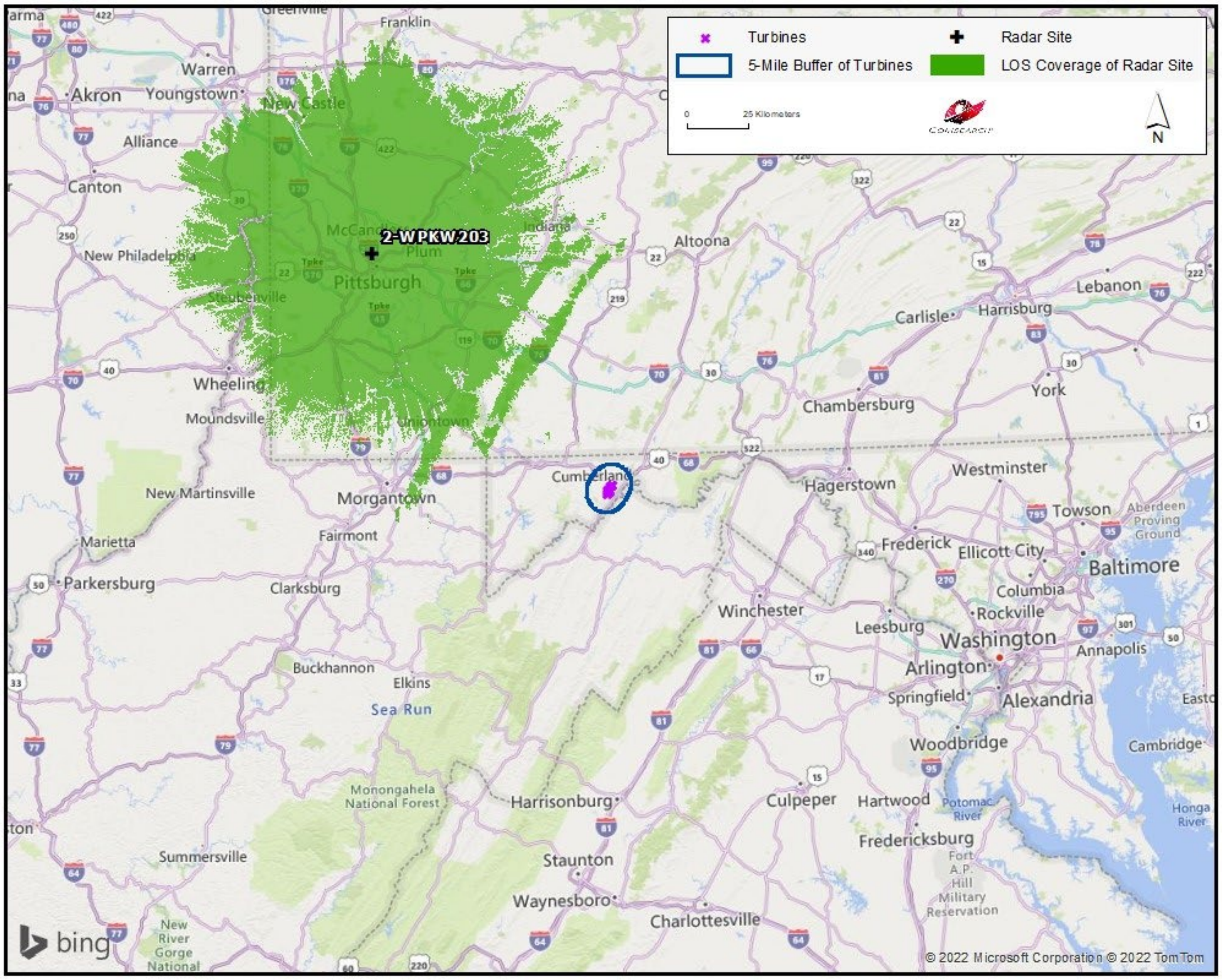


Figure 58. Line-of-Sight Coverage of WPUK613 Relative to Dan's Mountain Wind Farm

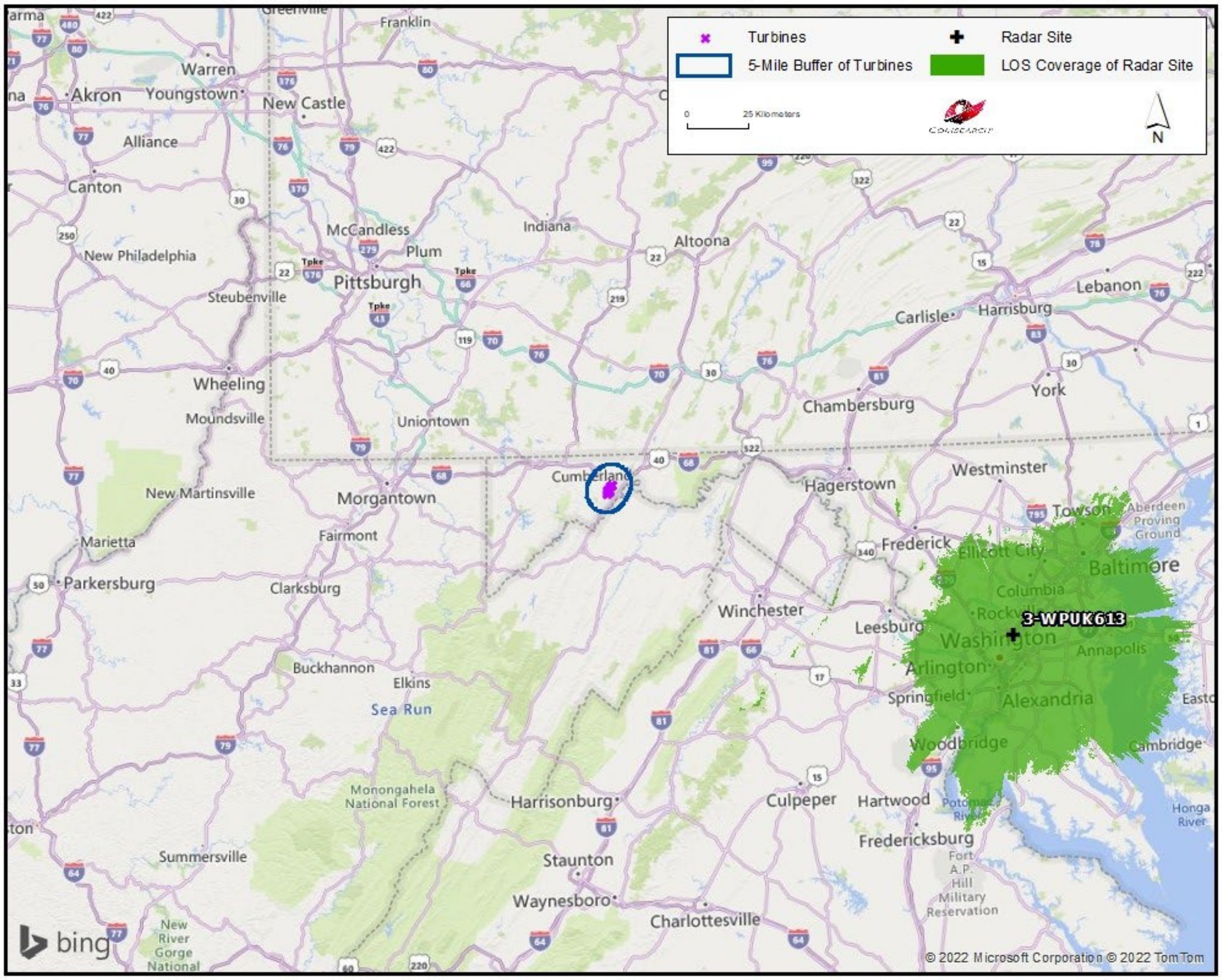


Figure 59. Line-of-Sight Coverage of WQBU383 Relative to Dan's Mountain Wind Farm

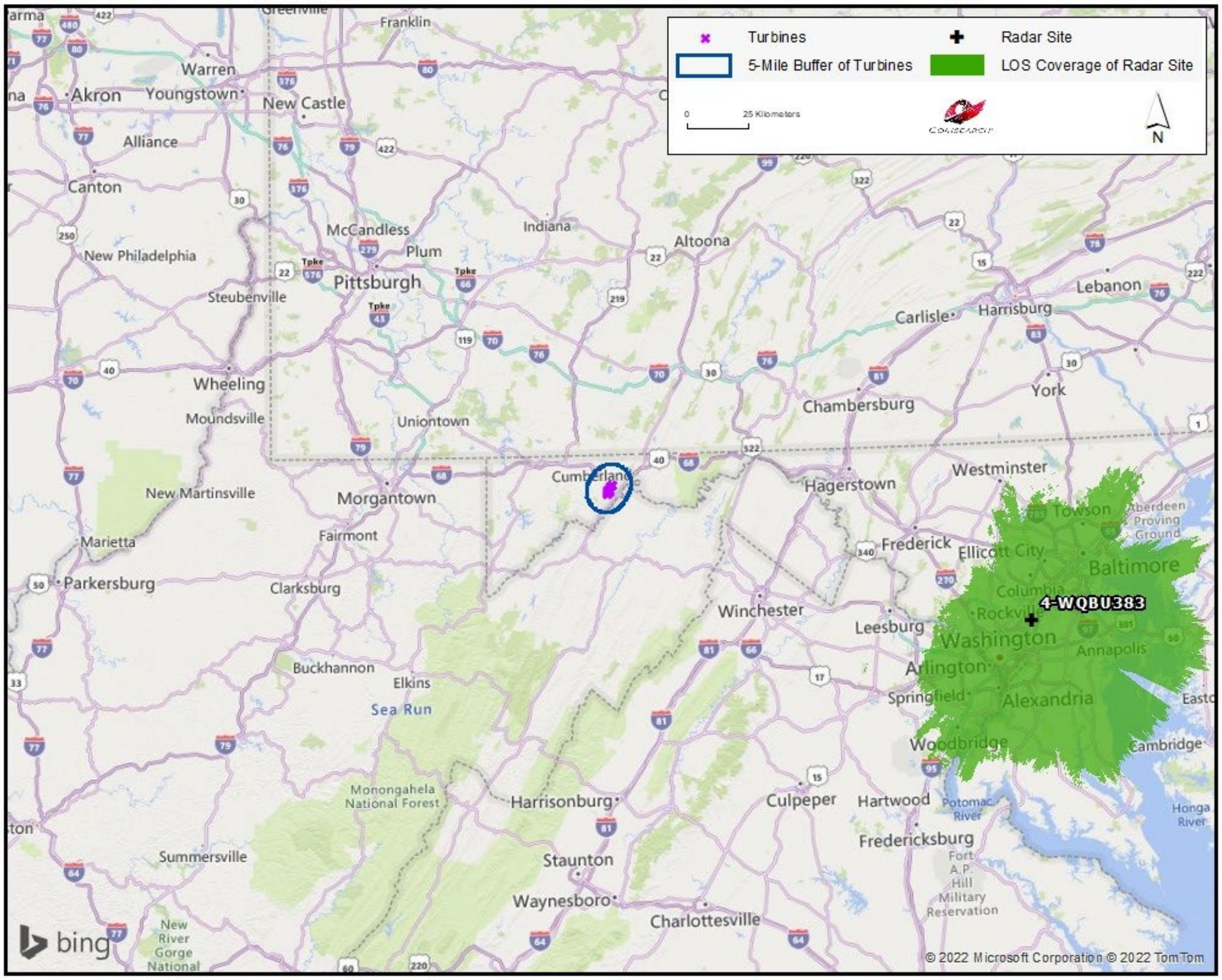


Figure 60. Line-of-Sight Coverage of WPPE429 Relative to Dan's Mountain Wind Farm

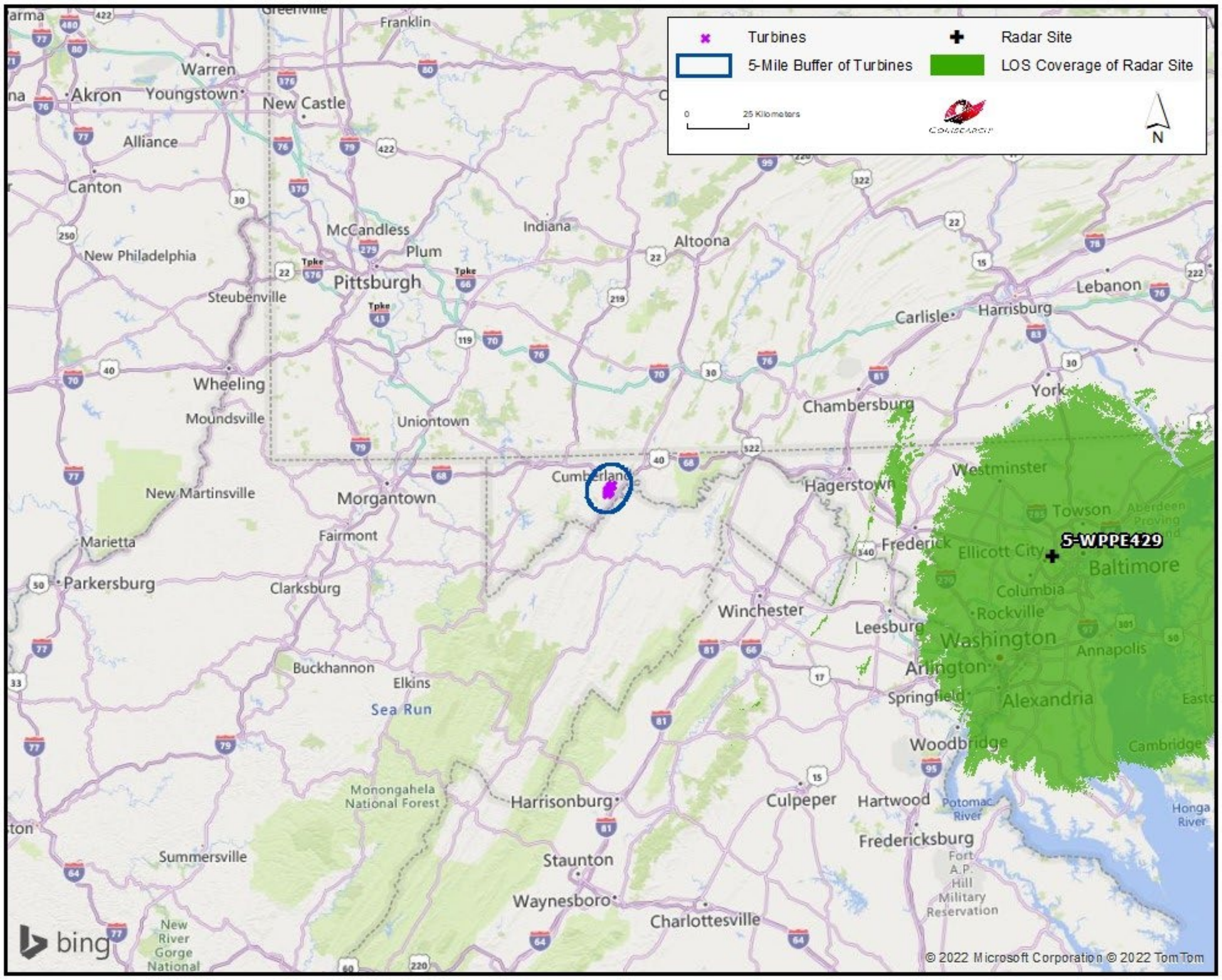


Figure 61. Line-of-Sight Coverage of WPRV205 Relative to Dan's Mountain Wind Farm

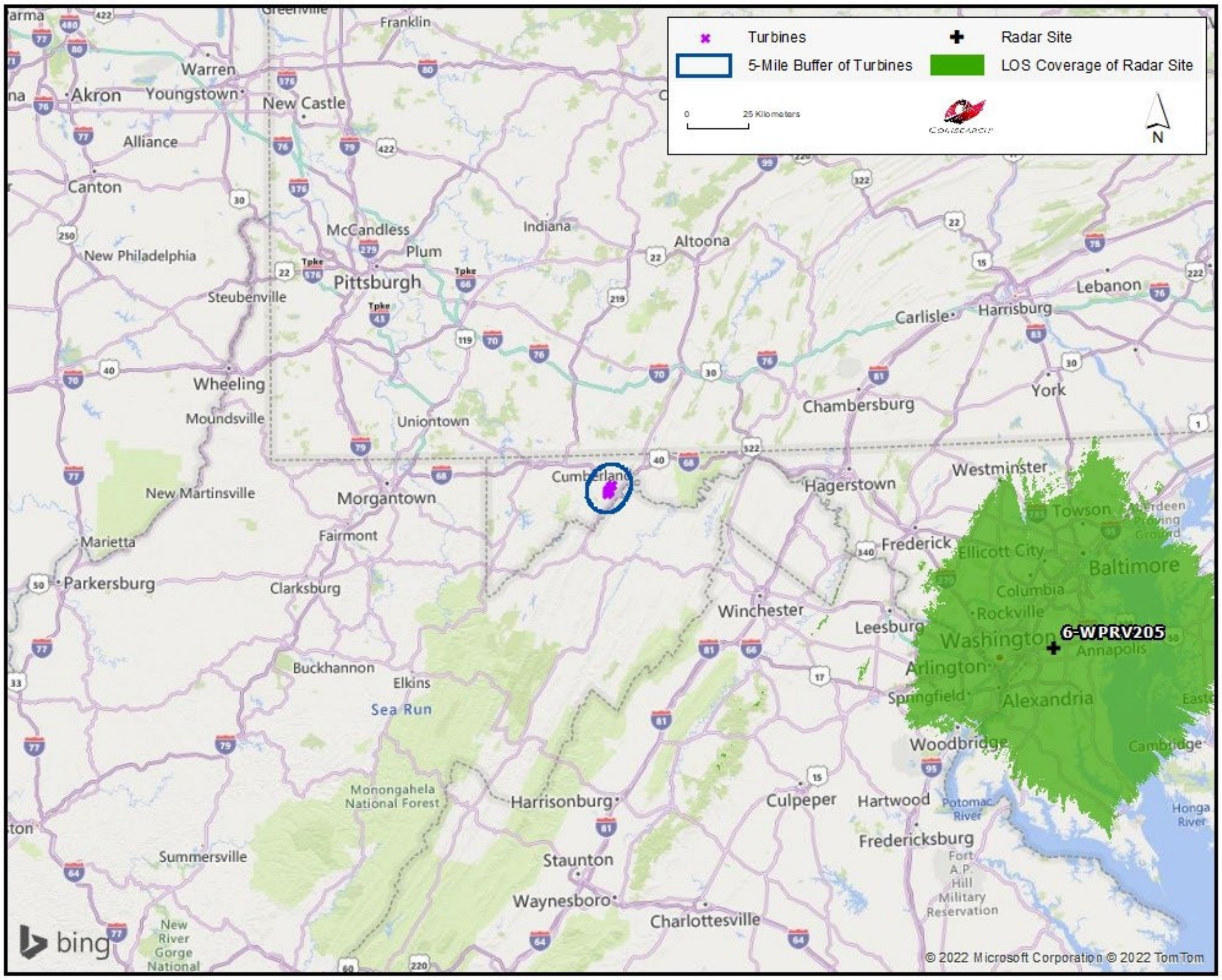


Figure 62. Line-of-Sight Coverage of WPKW696 Relative to Dan's Mountain Wind Farm

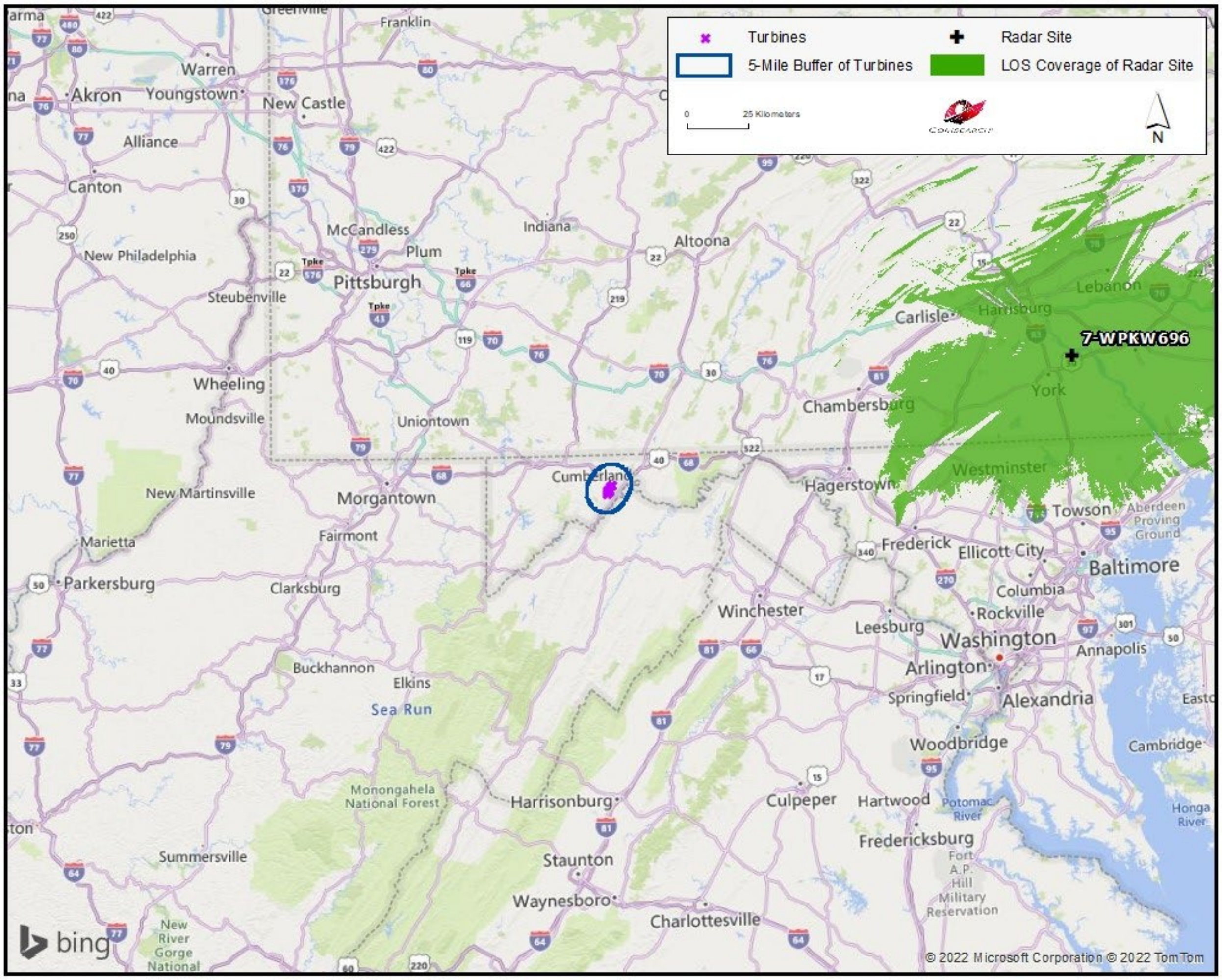
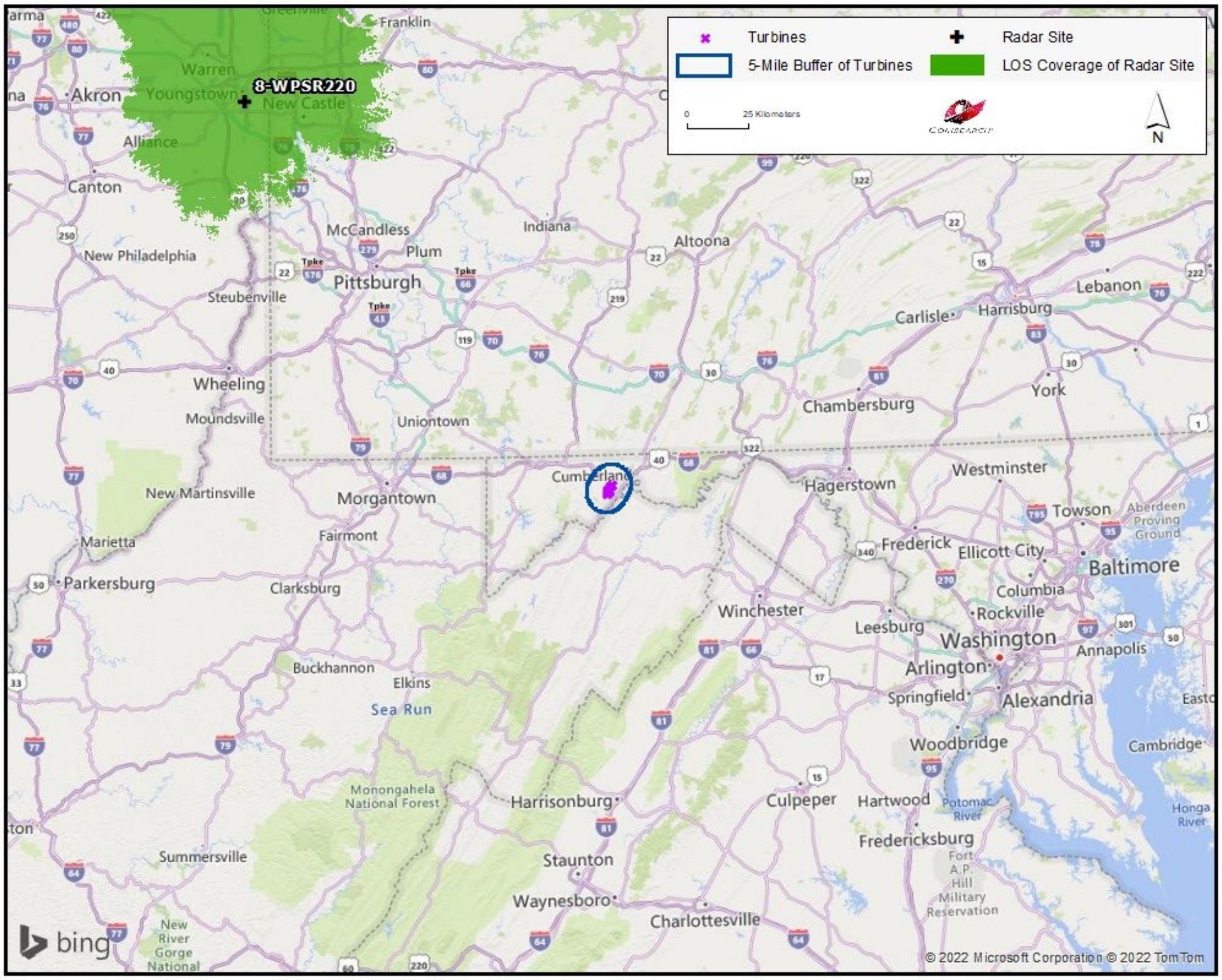


Figure 63. Line-of-Sight Coverage of WPSR220 Relative to Dan's Mountain Wind Farm



B. Results

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.

C. Impact Assessment

Based on the analysis described in this report, none of the eight Doppler radar systems in the vicinity of the Dan's Mountain Wind Farm could be impacted by the project's planned wind turbines.

For more detailed information see Comsearch's report *Doppler Weather Radar Study* in Appendix A.

XVI. TELECOMMUNICATION TOWERS AND ANTENNAS

A study was performed to identify communication systems (Licensed and Unlicensed) within the 5-mile Area of Interest around the planned industrial wind energy conversion systems (IWECS). This study identifies known communication tower structures and antennas. The respective ownership information for each of these facilities is provided where available. This information is useful in the planning stages of wind energy facilities to identify turbine setbacks and mitigate against disruption to the services provided by these facilities. This data can be used in support of the wind energy facility's communications needs, in addition to avoiding any potential impact to the current communications services provided in the region.

A. Methodology

The communication towers in Table 22 were derived from a variety of sources including the FCC's Antenna Structure Registration (ASR) database, the Universal Licensing System (ULS), national and regional tower owner databases, local planning and zoning boards, and through field investigation efforts including visual inspections and various interviews with communication tower and antenna owners or their representatives. The data was imported into GIS software and the structures were mapped according to their respective geographic locations. Each tower location is identified with a unique ID number associated with structural details and owner information.

1. Antenna Structures

The FCC Rules define "antenna structure" to include "The radiating and/or receive system, its supporting structures, and any appurtenances mounted thereon." In practical terms, an antenna structure could be a free-standing structure, built specifically to support antennas or act as an antenna, or it could be a structure mounted on some other man-made object (such as a building or bridge). If the structure is mounted on some other man-made object such as a building or bridge, the structure must be registered with the FCC, not the building or bridge.

Objects such as buildings, observation towers, bridges, windmills, and water towers that do not have an antenna mounted on them are not antenna structures and should not be registered. Keep in mind that the FCC only has jurisdiction over antenna structures, and thus, other objects that do not house antennas are not required to be registered with the FCC -- regardless of their location or height.

2. Antenna Structure Registration (ASR) System

The Antenna Structure Registration (ASR) System is an online system that stores the location, height, marking and lighting, and other information on all antenna structures that are registered with the FCC. Antenna structure owners must use the ASR system to file new antenna structure registrations. Antenna structure owners also use the system to file updates to registrations such as modifications to existing structures, notifications of construction, and ownership changes.[45]

The ASR program requires owners of antenna structures to register with the FCC any antenna structure that requires notice of proposed construction to the Federal Aviation Administration (FAA). In general, this includes structures that are taller than 200 feet above ground level or that may interfere with the

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[45] This Help Article titled ASR Overview is an excerpt from the Federal Communications Commission website http://www.fcc.gov/help/antenna-structure-registration-asr-overv iew

flight path of a nearby airport. The antenna structure owner must obtain painting and lighting specifications from the FAA and include those specifications in its registration prior to construction. The ASR program allows the FCC to fulfill its statutory responsibility to require the painting and lighting of antenna structures that may pose a hazard to air navigation.

The FCC's antenna structure registration, marking, and lighting rules are located in Part 17 of the FCC's rules.

B. Results

A total of 42 tower structures, 143 FCC-licensed communication antennas, and 21 unlicensed microwave antennas were identified within five miles of the Dan's Mountain Wind Farm using the data sources described in our methodology above. Twenty-five of the structures found were registered with the FCC. The structures identified contain 48 of the 143 communication antennas. The remaining antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops, or portable structures.

Detailed information about the tower structures and licensed communication antennas is provided in Table 22 and Table 23, including location coordinates, structure height above ground level, and owner-operator or licensee's name[46]. Some communication towers and antennas were found to have inaccurate coordinates and above-ground heights in the FCC licenses. They have been corrected using aerial imagery and the surveyed information provided by Dan's Mountain Wind Force's contract surveyor, CME.

In addition to the 143 FCC-licensed antennas identified above, 21 unlicensed microwave antennas were identified within five miles of the project area based on information supplied by the surveyor, CME. Detailed information is provided in Table 22 including location coordinates and distance to the nearest turbine.

[46] 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.

Table 22. Tower Structures within the 5-mile AOI

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
Tower001	1269618	GLOBAL TOWER, LLC. THROUGH AMERICAN TOWERS, LLC	59.4	39.546583	-78.942389	5.48
Tower002	1258082	VB-S1 ASSETS, LLC	79.3	39.557056	-78.981111	7.51
Tower003	1301346	MARYLAND STATE HIGHWAY ADMINISTRATION	100.0	39.578917	-78.900250	0.59
Tower004	N/A	UNKNOWN	Unknown	39.579661	-78.900438	0.51
Tower005	N/A	UNKNOWN	Unknown	39.580092	-78.901093	0.46
Tower006	1036042	POTOMAC EDISON	69.5	39.580422	-78.899451	0.45
Tower007	N/A	UNKNOWN	Unknown	39.580778	-78.899093	0.42
Tower008	1036217	VB-S1 ASSETS, LLC	54.8	39.580787	-78.899885	0.40
Tower009	N/A	UNKNOWN	Unknown	39.581155	-78.899456	0.37
Tower010	N/A	SBA COMMUNICATIONS	30.5	39.581376	-78.898174	0.41
Tower011	N/A	UNKNOWN	Unknown	39.581521	-78.897825	0.41
Tower012	N/A	AMERICAN TOWER CORP	Unknown	39.581597	-78.897706	0.41
Tower013	N/A	UNKNOWN	Unknown	39.581703	-78.897778	0.40
Tower014	N/A	UNKNOWN	Unknown	39.581791	-78.898424	0.36
Tower015	N/A	SBA COMMUNICATIONS	30.5	39.581838	-78.897882	0.38
Tower016	N/A	UNKNOWN	Unknown	39.582145	-78.898731	0.31
Tower017	N/A	SBA COMMUNICATIONS	32.0	39.582257	-78.897879	0.35
Tower018	N/A	UNKNOWN	Unknown	39.582352	-78.898551	0.30
Tower019	1036996	BROADCAST COMMUNICATIONS, INC.	54.8	39.583326	-78.897393	0.34
Tower020	1036978	UNITED STATES CELLULAR CORPORATION	73.8	39.584343	-78.896619	0.39
Tower021	1290790	SBA TOWERS X, LLC	55.2	39.585194	-78.915806	1.27
Tower022	N/A	US CELLULAR	Unknown	39.588974	-78.836193	4.47
Tower023	1248101	ALLEGANY COUNTY OF MARYLAND	26.2	39.593833	-78.800889	6.86
Tower024	N/A	UNKNOWN	Unknown	39.601500	-78.887100	0.43
Tower025	1290791	SBA TOWERS X, LLC	58.0	39.626639	-78.925694	3.79

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
Tower026	1225803	UNITED STATES CELLULAR CORPORATION	73.5	39.628472	-78.841222	3.06
Tower027	1011508	GLOBAL TOWER, LLC. THROUGH AMERICAN TOWERS, LLC	85.3	39.638611	-78.910833	3.61
Tower028	1284272	UNITED STATES CELLULAR CORPORATION	54.8	39.638639	-78.912000	3.67
Tower029	1229362	SPECTRASITE COMMUNICATIONS, LLC. THROUGH AMERICAN TOWERS, LLC.	91.7	39.639028	-78.850861	3.07
Tower030	1212706	MARYLAND STATE POLICE	36.0	39.639639	-78.830083	4.48
Tower031	1299618	TARPON TOWERS II, LLC	60.7	39.639667	-78.820528	5.20
Tower032	1309599	DEPARTMENT OF MARYLAND STATE POLICE	100.6	39.640194	-78.830556	4.48
Tower033	1262031	UNITED STATES CELLULAR CORPORATION	36.5	39.640194	-78.789083	7.71
Tower034	1306992	AMERICAN TOWERS LLC	51.8	39.640278	-78.789083	7.72
Tower035	1210142	LAVALE SANITARY COMMISSION	12.2	39.640917	-78.823056	5.07
Tower036	1208270	COLUMBIA GAS OF MARYLAND	24.4	39.644528	-78.805278	6.61
Tower037	1036215	NORTHEAST TOWER RENTAL	24.6	39.646111	-78.803889	6.79
Tower038	1290787	SBA TOWERS X, LLC	58.0	39.648389	-78.882444	3.43
Tower039	N/A	UNKNOWN	Unknown	39.649083	-78.940917	6.25
Tower040	N/A	UNKNOWN	36.6	39.649086	-78.940911	6.25
Tower041	1259435	UNITED STATES CELLULAR CORPORATION	33.5	39.649972	-78.939389	6.21
Tower042	1310708	AMERICAN TOWERS LLC	59.4	39.650722	-78.808833	6.68

Figure 64 shows the tower locations on a map of the region.

Additional information about the tower structures including location coordinates, structure height above ground, and owner's name is provided in the CME report, which is included in Appendix B.[47]

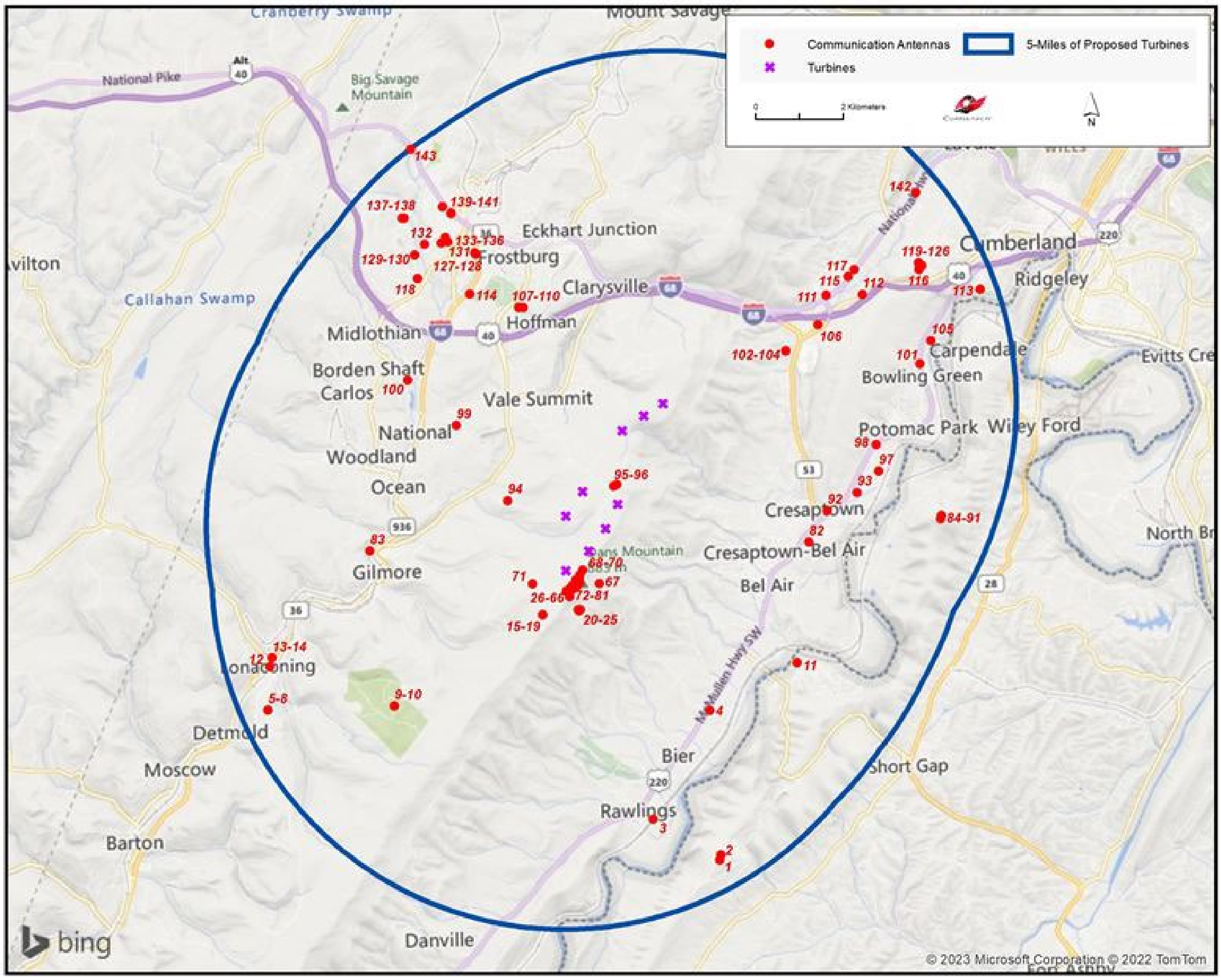

Figure 64. Forty-Two communication towers within the 5-mile AOI

47 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.

Table 23. Communication Antennas within 5-mile AOI

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
1		RXONLY	Microwave	CUMBERLAND BROADCASTING COMPANY	6.1	39.523972	-78.861972	7.49
2		WCBC-FM	FM	PROSPERITAS BROADCASTING SYSTEM, LP	21.3	39.525083	-78.861667	7.39
3		KCO633	Land Mobile	CSX TRANSPORTATION INC	15.0/21.3	39.532722	-78.879417	6.02
4		WQCA884	Land Mobile	AMERICAN WOODMARK CORPORATION	12.2	39.554806	-78.863639	4.58
5	Tower002	WRDT898	Microwave	ALLEGANY COUNTY GOVERNMENT	22.9	39.557056	-78.981111	7.51
6	Tower002	WRCN429	Microwave	MOUNTAIN VIEW COMMUNICATIONS, LLC	74.7/76.2	39.557056	-78.981111	7.51
7	Tower002	KNKA570	Cellular	NEW CINGULAR WIRELESS PCS, LLC	Unknown	39.557056	-78.981111	7.51
8	Tower002	WRMN200	Microwave	T-MOBILE LICENSE LLC	71.63	39.557056	-78.981111	7.51
9		KNHT494	Land Mobile	MARYLAND, STATE OF - DNR	12.0	39.557306	-78.947528	4.98
10		KNHT493	Land Mobile	MARYLAND, STATE OF - DNR	12.0	39.557306	-78.947528	4.98
11		WQZI397	Microwave	CONXX, INC.	6.1	39.564222	-78.840194	5.35
12		KTK612	Land Mobile	LONACONING VOL FIRE CO	24.0	39.565917	-78.980306	7.10
13		WQHV525	Land Mobile	ALLEGANY COUNTY BOARD OF EDUCATION	18.3	39.567778	-78.979722	7.00
14		WQQD629	Land Mobile	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	10.7	39.567778	-78.979722	7.00
15		WQHV525	Land Mobile	ALLEGANY COUNTY BOARD OF EDUCATION	49.0	39.575278	-78.907500	1.14
16		WQIR601	Land Mobile	ALLEGANY COUNTY OF	49.0	39.575278	-78.907500	1.14
17		WQFD361	Land Mobile	ALLEGANY COUNTY OF	49.0	39.575278	-78.907500	1.14
18		WNJM820	Land Mobile	ALLEGANY, COUNTY OF	37.0	39.575361	-78.907528	1.13
19		KTG669	Land Mobile	ALLEGANY, COUNTY OF	49.0	39.575361	-78.907528	1.13
20		WNNN469	Land Mobile	T & T PUMPCO.,INC	46.0	39.575917	-78.897806	0.97
21		WQEW534	Land Mobile	MARYLAND, STATE OF	19.8/20.7	39.576194	-78.898083	0.93
22		KDG881	Land Mobile	ALLEGANY, COUNTY OF	43.0	39.576194	-78.897528	0.94
23		KGA910	Land Mobile	MARYLAND, STATE OF	36.0	39.576194	-78.897528	0.94
24		WAM29	Land Mobile	MARYLAND, STATE OF - DNR	12.0/20.0	39.576194	-78.897528	0.94
25		KBU667	Land Mobile	MARYLAND, STATE OF - DNR	12.0	39.576194	-78.897528	0.94
26	Tower003	WRDT897	Microwave	ALLEGANY COUNTY GOVERNMENT	28.1/30.5	39.578917	-78.900250	0.59
27	Tower003	WRCN287	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	74.7	39.578917	-78.900250	0.59

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
28	Tower003	WRCJ556	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40.2	39.578917	-78.900250	0.59
29	Tower003	WRCN287	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	70.1	39.578917	-78.900250	0.59
30	Tower003	WRCJ556	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	34.7	39.578917	-78.900250	0.59
31	Tower003	WRJB242	Land Mobile	STATE OF MARYLAND - DEPT OF INFORMATION TECHNOLOGY	33.5	39.578917	-78.900250	0.59
32	Tower003	WQZR472	Microwave	STATE OF MARYLAND, MIEMSS	76.2-91.4	39.578917	-78.900250	0.59
33		WNTJ750	Microwave	STATE OF MARYLAND, MIEMSS	23.65/28.06	39.579652	-78.900444	0.51
34		WLVV	FM	EDUCATIONAL MEDIA FOUNDATION	Unknown	39.580083	-78.900833	0.46
35		KAB226	Land Mobile	STATE OF MARYLAND, MIEMSS	52.0	39.580083	-78.900583	0.46
36	Tower005	WRCL314	Microwave	T-MOBILE LICENSE LLC	57.62/57.99	39.580092	-78.901093	0.46
37	Tower006	WNEN347	Microwave	FELHC, INC.	24.46-49.89	39.580422	-78.899451	0.45
38	Tower006	WNTI291	Microwave	FELHC, INC.	15.2	39.580422	-78.899451	0.45
39	Tower007	WRFM318	Microwave	FELHC, INC.	37.2	39.580778	-78.899093	0.42
40	Tower007	WNEN347	Microwave	FELHC, INC.	24.5	39.580778	-78.899093	0.42
41	Tower008	WQCW375	Microwave	ALLEGANY COUNTY GOVERNMENT	25.03/28.96	39.580787	-78.899885	0.40
42	Tower008	WQVX430	Microwave	ALLEGANY COUNTY GOVERNMENT	29.35/31.84	39.580787	-78.899885	0.40
43	Tower008	WQZI396	Microwave	CONXX, INC.	26.1	39.580787	-78.899885	0.40
44	Tower008	W278BL	FM	CEDAR RIDGE CHILDREN'S HOME & SCHOOL, INC	38.0	39.580787	-78.899885	0.40
45	Tower006	WQOW665	Land Mobile	FELHC INC	64.6	39.580422	-78.899451	0.45
46		WRQE	FM	FM RADIO LICENSES, LLC	51.0	39.581139	-78.899444	0.37
47	Tower009	WQXT395	Microwave	FM RADIO LICENSE, LLC	33.12	39.581155	-78.899456	0.37
48	Tower009	RXONLY	Microwave	FM RADIO LICENSE, LLC	28.75-31.58	39.581155	-78.899456	0.37
49		W289BR	FM	FM RADIO LICENSES, LLC	37.0	39.581194	-78.899444	0.37
50		W294CF	FM	FM RADIO LICENSES, LLC	44.0	39.581194	-78.899444	0.37
51		KGG931	Land Mobile	MARYLAND STATE HIGHWAY ADMINISTRATION	37.0	39.581194	-78.898083	0.43
52	Tower010	WQQI930	Microwave	TWO WAY RADIO INC.	30.6	39.581376	-78.898174	0.41
53		W43BP	TV	DIGITAL NETWORKS-NORTHEAST, LLC	13.0	39.581472	-78.897778	0.42

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
54		WPMF429	Land Mobile	ALLEGANY, COUNTY OF	30.0	39.581472	-78.897806	0.42
55		WPRS598	Land Mobile	ALLEGANY, COUNTY OF	30.0	39.581472	-78.897806	0.42
56		WNVH555	Land Mobile	NORTHROP GRUMMAN SYSTEMS CORPORATION	6.0	39.581472	-78.897806	0.42
57		WPGB605	Land Mobile	TWO WAY RADIO SERVICE INC	46.0	39.581472	-78.897806	0.42
58		WPGG609	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
59		WPET570	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
60		WPEY303	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
61		WNJY543	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
62		WPIE995	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
63		WNDR708	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
64		WPGB739	Land Mobile	TWO WAY RADIO SERVICE INC	46.0	39.581472	-78.897806	0.42
65		WPWC727	Land Mobile	TWR COMMUNICATIONS	38.0	39.581472	-78.897806	0.42
66		WPOX749	Land Mobile	TWR COMMUNICATIONS	38.0	39.581472	-78.897806	0.42
67		WPEG518	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.892250	0.78
68	Tower011	WQJT598	Microwave	WEST VIRGINIA RADIO CORPORATION	15.24	39.581521	-78.897825	0.41
69	Tower011	RXONLY	Microwave	WITF, INC.	6.1	39.581521	-78.897825	0.41
70	Tower011	RXONLY	Microwave	WITF, INC.	22.9	39.581521	-78.897825	0.41
71		WNCM956	Land Mobile	CARL BELT INC	30.0	39.581750	-78.910028	0.81
72		KPM488	Land Mobile	FROSTBURG STATE UNIVERSITY	15.0	39.581750	-78.897806	0.40
73		WFWM	FM	FROSTBURG STATE UNIVERSITY	35.0	39.581750	-78.897778	0.40
74		KTE668	Land Mobile	STATE OF MARYLAND, DNR	27.0	39.581750	-78.897528	0.41
75		RXONLY	Microwave	HE'S ALIVE INC.	30.5	39.582306	-78.897806	0.36
76		KGC602	Paging	AMS SPECTRUM HOLDINGS, LLC	32.0	39.582306	-78.897500	0.38
77	Tower018	RXONLY	Microwave	FROSTBURG STATE UNIVERSITY	15.4	39.582352	-78.898551	0.30
78	Tower019	WQQL435	Microwave	THOUGHT TRANSMISSIONS, LLC	27.55/34.87	39.583326	-78.897393	0.34
79		KNKA570	Cellular	NEW CINGULAR WIRELESS PCS, LLC	Unknown	39.583333	-78.897389	0.34
80	Tower020	WMR416	Microwave	USCOC OF CUMBERLAND, INC.	39.36-62.48	39.584343	-78.896619	0.39
81	Tower020	KNKA786	Cellular	USCOC OF CUMBERLAND, LLC	76.8	39.584343	-78.896619	0.39
82		WQUU265	Microwave	USCOC OF CUMBERLAND, INC.	30.48	39.588972	-78.836278	4.46

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
83		WPCS783	Land Mobile	MIDLAND VOLUNTEER FIRE COMPANY	14.0	39.589250	-78.953083	4.50
84		WQCI629	Land Mobile	ALLEGANY, COUNTY OF	15.0	39.593139	-78.801139	6.87
85		WNQI770	Land Mobile	MINERAL COUNTY EMERGENCY SERVICES	24.0	39.593139	-78.801139	6.87
86	Tower023	WQHV525	Land Mobile	ALLEGANY COUNTY BOARD OF EDUCATION	18.3	39.593833	-78.800889	6.86
87	Tower023	WQCW374	Microwave	ALLEGANY COUNTY GOVERNMENT	18.29-23.77	39.593833	-78.800889	6.86
88	Tower023	KDG881	Land Mobile	ALLEGANY, COUNTY OF	18.3	39.593833	-78.800889	6.86
89	Tower023	WQQD629	Land Mobile	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	18.3	39.593833	-78.800889	6.86
90	Tower023	WQXU874	Microwave	CONXX, INC.	26.2	39.593833	-78.800889	6.86
91	Tower023	WQOT448	Land Mobile	MINERAL COUNTY EMERGENCY SERVICES	24.0	39.593833	-78.800889	6.86
92		KUB997	Land Mobile	CRESAPTOWN VOLUNTEER FIRE DEPT INC	21.0	39.595361	-78.831139	4.49
93		WQPV747	Land Mobile	ALLEGANY, COUNTY OF	12.0	39.598944	-78.823194	4.88
94		WPDV708	Land Mobile	ALLEGANY, COUNTY OF	46.0	39.598972	-78.916139	1.37
95		KVD573	Land Mobile	ALLEGANY COUNTY 911 JOINT COMMUNICATIONS DIVISION	45.0	39.601472	-78.887806	0.43
96		WLIC	FM	CALVARY CHAPEL CUMBERLAND, INC.	44.0	39.601750	-78.886944	0.46
97		WQGJ235	Land Mobile	STATE OF MARYLAND, DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONAL SERVICES	35.0	39.603278	-78.817306	5.17
98		KNNV447	Land Mobile	MARYLAND STATE DEPARTMENT OF PUBLIC SAFETY & CORRECTIONAL SERVICES	15.0	39.608694	-78.817806	4.96
99		WQRZ888	Land Mobile	VINDEX ENERGY LLC	10.0	39.614722	-78.929361	3.25
100		WNYV803	Land Mobile	STATE OF MARYLAND - FROSTBURG UNIVERSITY	18.0	39.624250	-78.941972	4.73
101		WQFI398	Land Mobile	BOWLING GREEN VOLUNTEER FIRE DEPT	14.0	39.625083	-78.805583	5.95
102		WROM724	Land Mobile	COUNTRY CLUB MALL REALTY, LLC	28.0	39.628417	-78.841250	3.06
103	Tower026	KNKA786	Cellular	USCOC OF CUMBERLAND, LLC	Unknown	39.628472	-78.841222	3.06
104	Tower026	WQQA260	Microwave	USCOC OF CUMBERLAND, INC.	42.67	39.628472	-78.841222	3.06
105		WPIH295	Land Mobile	CSX TRANSPORTATION INC	2.0	39.629806	-78.802528	6.30

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
106		WPFM943	Land Mobile	MARYLAND STATE HIGHWAY ADMINISTRATION	32.0	39.633694	-78.832528	3.98
107	Tower027	WQTR920	Microwave	NEW CINGULAR WIRELESS PCS - MARYLAND	44.2/59.44	39.638611	-78.910833	3.61
108	Tower027	WRCN600	Microwave	T-MOBILE LICENSE LLC	68.58/87.48	39.638611	-78.910806	3.61
109	Tower028	WQQC524	Microwave	USCOC OF CUMBERLAND, INC.	27.43-42.67	39.638639	-78.912000	3.67
110		KNKA786	Cellular	USCOC OF CUMBERLAND, LLC	55.2	39.638694	-78.911972	3.68
111	Tower030	KGA910	Land Mobile	MARYLAND, STATE OF	40.0	39.639639	-78.830083	4.48
112	Tower031	WQYB986	Microwave	USCOC OF CUMBERLAND, INC.	54.86	39.639667	-78.820444	5.20
113	Tower033	WQPM993	Microwave	USCOC OF CUMBERLAND, INC.	33.53/34.75	39.640194	-78.789083	7.71
114		WQHE659	Land Mobile	FROSTBURG STATE UNIVERSITY	40.7	39.641667	-78.925000	4.68
115		KGJ642	Land Mobile	LAVALE VOLUNTEER FIRE DEPARTMENT INC	21.0	39.643417	-78.824194	5.13
116	Tower036	WPQD657	Land Mobile	COLUMBIA GAS OF MARYLAND	27.4	39.644528	-78.805278	6.61
117		KNFJ222	Land Mobile	LAVALE VOLUNTEER RESCUE SQUAD INC	15.0	39.644806	-78.822528	5.34
118		WPRV884	Microwave	FROSTBURG STATE UNIVERSITY	5.1	39.645083	-78.938750	5.82
119		KGJ642	Land Mobile	LAVALE VOLUNTEER FIRE DEPARTMENT INC	25.0	39.645194	-78.805083	6.66
120		KNFJ222	Land Mobile	LAVALE VOLUNTEER RESCUE SQUAD INC	25.0	39.645194	-78.805083	6.66
121		WDZN-FM1	FM	WEST VIRGINIA RADIO CORPORATION OF THE ALLEGHENIES	20.0	39.645333	-78.804444	6.71
122		WQVX737	Microwave	ALLEGANY COUNTY GOVERNMENT	9.14-24.7	39.645333	-78.805000	6.67
123		WQCW387	Microwave	ALLEGANY COUNTY GOVERNMENT	27.13	39.645389	-78.804972	6.67
124		KGA886	Land Mobile	ALLEGANY COUNTY OF	40.0	39.645917	-78.805306	6.68
125		WQCI629	Land Mobile	ALLEGANY, COUNTY OF	15.0	39.645917	-78.805306	6.68
126		WPPV765	Land Mobile	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	40.0	39.645917	-78.805306	6.68
127		KJD307	Land Mobile	FROSTBURG, CITY OF	20.0	39.649806	-78.923083	5.23
128		KJL891	Land Mobile	MARYLAND, STATE OF	12.0	39.649806	-78.923083	5.23
129	Tower041	WQXY359	Microwave	T-MOBILE LICENSE LLC	33.53	39.649972	-78.939389	6.21
130	Tower041	WQQC526	Microwave	USCOC OF CUMBERLAND, INC.	24.38	39.649972	-78.939389	6.21
131		KGD459	Land Mobile	FROSTBURG FIRE DEPARTMENT NO 1 INC	24.0	39.650083	-78.923361	5.27
132		WQYT905	Microwave	NEW CINGULAR WIRELESS PCS - MARYLAND	21.34	39.652111	-78.936639	6.20

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
133		WLG299	Microwave	FROSTBURG STATE UNIVERSITY	16.7	39.652250	-78.932194	5.95
134		RXONLY	Microwave	FROSTBURG STATE UNIVERSITY	15.2	39.652250	-78.932194	5.95
135		WQQC751	Microwave	USCOC OF CUMBERLAND, INC.	7.77	39.652528	-78.930528	5.88
136		WQNC803	Land Mobile	ALLEGANY, COUNTY OF	17.0	39.653444	-78.931167	5.99
137		KVN610	Land Mobile	MARYLAND, STATE OF	18.0	39.657583	-78.942528	6.99
138		WPDA208	Land Mobile	MARYLAND, STATE OF - FROSTBURG STATE UNIVERSITY	18.0	39.657583	-78.941972	6.96
139		WQQC525	Microwave	USCOC OF CUMBERLAND, INC.	15.24	39.658306	-78.929444	6.32
140		KNEC959	Land Mobile	TROUTMAN, ROY E	15.0	39.658417	-78.929472	6.33
141		WPTL759	Land Mobile	ALLEGANY COUNTY OF	15.0	39.659722	-78.931667	6.56
142		KGJ642	Land Mobile	LAVALE VOLUNTEER FIRE DEPARTMENT INC	15.0/23.0	39.660361	-78.805583	7.53
143		KJD307	Land Mobile	FROSTBURG, CITY OF	20.0	39.671750	-78.939750	8.04

Table 24. Unlicensed Microwave Antennas within 5-mile AOI

Tower ID	Latitude (NAD83)	Longitude (NAD83)	Distance to the Nearest Turbine (km)
1	39.524900	-78.861800	7.40
2	39.534700	-78.877900	5.85
3	39.557000	-78.981100	7.51
4	39.579652	-78.900444	0.51
5	39.580787	-78.899885	0.40
6	39.580787	-78.899885	0.40
7	39.580787	-78.899885	0.40
8	39.580787	-78.899885	0.40
9	39.581376	-78.898174	0.41
10	39.581376	-78.898174	0.41
11	39.581376	-78.898174	0.41
12	39.581376	-78.898174	0.41
13	39.581376	-78.898174	0.41
14	39.581703	-78.897778	0.40
15	39.581703	-78.897778	0.40
16	39.581703	-78.897778	0.40
17	39.582300	-78.968300	5.78
18	39.601500	-78.887100	0.43
19	39.601500	-78.887100	0.43
20	39.633600	-78.832200	4.00
21	39.668300	-78.812900	7.66

The locations of the unlicensed microwave antennas in the AOI are shown on the map of the region in Figure 65

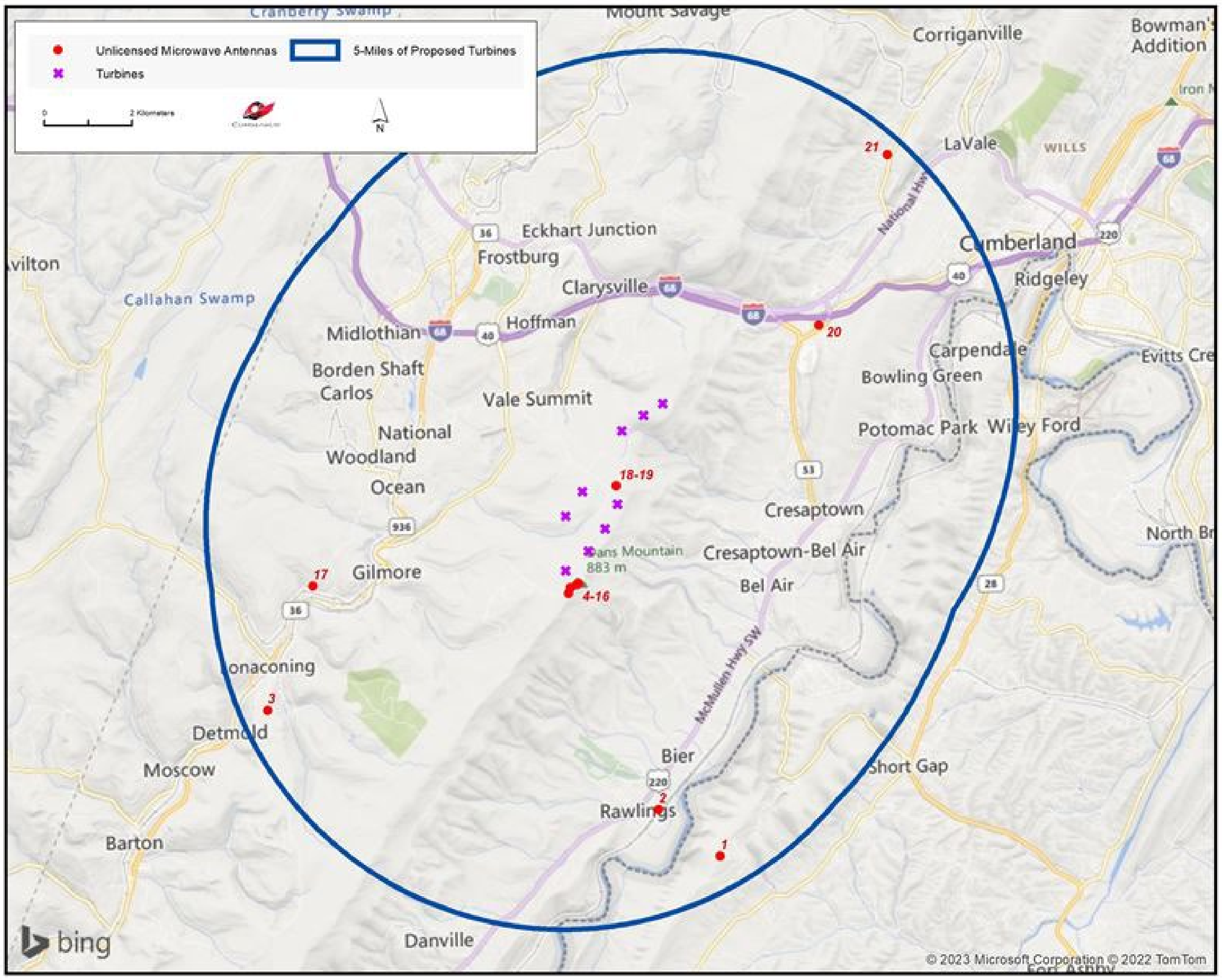

Figure 65. Unlicensed communication antennas in the 5 Mile AOI

The impacts of the communication towers and antennas identified in the AOI are covered in the sections of this report that deal with the individual communications, radar, and broadcasting services.

XVII. OTHER GOVERNMENT SYSTEMS

The siting of turbines in a wind farm involves consultation with government agencies whose radars and/or communications systems may be adversely affected by a wind project.

A. Radar

Potential interference with aircraft safety is considered by the Federal Aviation Administration (FAA) through its hazard determination process. Depending on location, wind turbines may interfere with some types of civilian and military radar, causing "clutter" or other interference. The FAA has jurisdiction over structures that are 200 feet tall or higher. As utility-scale turbines are typically over 200 feet tall, wind energy developers must submit an application to the FAA for each wind turbine or other structure over 200 feet tall before construction. Other federal agencies with Radar assets, such as the DoD, the DHS, and the NOAA, are notified of proposed projects through the FAA process and have the opportunity to raise concerns with the FAA, on which a Notice of Presumed Findings may be based.

The FAA has issued Determinations of No Hazard to Air Navigation on multiple occasions for the project – including as recently as December 2022. These determinations expire after 18 months if construction is not started. Dan's Mountain refiled with FAA for new Determinations in February 2023 in substantially the same locations as previously filed. Dan's Mountain therefore, expects the FAA's studies to conclude that the proposed structures will have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities and radar systems.

B. Telecommunications

Telecommunications systems operated by the Federal Government fall under the jurisdiction of the National Telecommunications and Information Administration (NTIA), which is part of the United States Department of Commerce. Within the NTIA, the Inter-department Radio Advisory Committee[48] (IRAC) is responsible for the coordination of all federal telecommunication system activities. The NTIA recently completed its review of the wind farm proposal, which included circulating it among the members of the IRAC, and on April 11, 2023, issued a compliance letter to Dan's Mountain stating that the… "IRAC agencies did not identify any concerns regarding radiofrequency blockage…" and confirmed that no further communication with Dan's Mountain is necessary.

C. Impact Assessment

No impact is expected.

In the event that the FAA determines corrective action is needed, the existence of prior approvals to previous applications that are essentially the same indicates that suitable corrections can be made with at most minor adjustments to turbine placements. Dan's Mountain Wind Force will make any needed adjustments to comply with FAA requirements.

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[48] IRAC Members include: Department of Agriculture, Air Force, Army, Coast Guard, Department of Commerce, Department of Energy, FAA, Department of Homeland Security, Department of the Interior, Department of Justice, National Aeronautics and Space Administration, Navy, National Science Foundation, Department of State, Department of Transportation, Department of the Treasury, the United States Agency for Global Media, United States Postal Service, Department of Veterans Affairs, it has a liaison relationship with the Federal Communications Commission.

XVIII. STUDY AUTHORS & CONTRIBUTORS

The wind energy developer, Dan's Mountain Wind Force, LLC, engaged Broadcast Wind, LLC, an engineering consulting company, to prepare an interference assessment with analysis and contributions from Meintel, Sgrignoli & Wallace, LLC, a consulting firm that specializes in television and radio engineering, Comsearch, a telecommunication consulting company, CME Engineering LP, an engineering and surveying company, Bennett Brewer and Associates, an engineering and surveying company, and Hatfield and Dawson, a telecommunications and electromagnetic engineering consulting firm.

See Appendix F for additional details about EIA contributors.

A. Broadcast Wind – EIA Author

Broadcast Wind, with its subcontractor MSW, performed desk-top studies of television and FM radio signal propagation with and without wind turbines to identify areas of potential signal impairment, and a population analysis to estimate the number of listeners and viewers whose reception might be affected. Broadcast Wind also installed long-term remote FM and DTV sensing probes in potentially sensitive locations, which will continuously measure and report actual signal strength before, during, and after turbine construction.

Broadcast Wind is an engineering company founded in 2010 by broadcast industry veterans to provide interference analysis for the wind and broadcasting industries, to support the growth of renewable energy in broadcasting environments, and to establish the standards needed to help ensure the non-interference of turbine blades with RF signals. Clients include the United States Department of Agriculture, NextEra Energy Resources LLC, the largest wind developer in the United States, and Invenergy LLC, a major wind farm owner/operator. Projects included AM, FM, and television interference and mitigation case studies, baseline RF field studies (taken before build-out), AM interference modeling oversight, and the development of signal interference mitigation strategies. Broadcast Wind personnel have presented to wind energy and broadcast industry trade groups, teaching the importance of identifying radio and television interference issues in advance of wind turbine construction and the new tools being developed through its USDA-funded research.

B. MSW – Electrical Engineers

Meintel, Sgrignoli & Wallace, LLC (MSW) performed terrain-based simulations of the field strength of the television and FM radio broadcast signals with service areas in the vicinity of Dan's Mountain both with and without the turbines of the wind farm in place. These simulations identified areas where existing signal strength is weak and has the potential to be degraded below the reception threshold.

MSW has been at the center of the development of digital television for over two decades with responsibility for designing and conducting field tests of interference to the digital signal. Its staff has served as consultants to the Advanced Television Standards Committee (ATSC) and the Association for Maximum Service Television (MSTV) and as advisors to the FCC Office of Engineering Technology regarding digital television interference prediction.

C. Comsearch – Professional Consultants

Comsearch performed a desk-top signal interference analysis of government and commercial microwave (point-to-point and point-to-multipoint) beam path crossings over and through the wind farm, communications (mobile emergency and public safety radio, cellular phone, Internet and military), and radar (air traffic control, weather, navigation, and surveillance).

For the past thirteen years, Comsearch has utilized its expertise to allow wind energy facilities to be installed without causing harmful interference to commercial and governmental communication systems throughout the United States and Canada. In recognition of its experience and service, Comsearch was invited to assist the American Wind Energy Association (AWEA), now American Clean Power (ACP) in the development of its official Siting Handbook. Comsearch has gained a reputation for professionalism, balance, and integrity and is respected by all parties in dealing with telecommunication issues in the presence of wind energy facilities.

D. CME Engineering – Civil Engineers and Surveyors

CME Engineering surveyed the site of the wind farm to establish and verify the precise locations of the existing telecommunications facilities on and nearby to Dan's Mountain that are relevant to the determination of potential signal interference that may be caused by the wind farm. CME also plotted the beam paths relative to the proposed turbines to confirm, and correct (when actual facility locations differed from locations of record) Comsearch's desktop studies of beam intersections with proposed turbines.

CME is a civil engineering and surveying company based in nearby Somerset, PA, with expertise in Engineering, surveying, GPS technology, and mapping.

E. Bennett Brewer & Associates – Engineers and Surveyors

Bennet Brewer & Associates (BBA) was responsible for the preparation of the Special Exception application for the project, of which, this EIA is a component, and assisted in the creation of EIA figures - mapping each of the licensed and unlicensed microwave beam paths in both a two-dimensional and three-dimensional analysis.

Bennett Brewer & Associates is a multi-disciplined, consulting engineering firm based in Frostburg, Maryland. Over the last 25 years, BBA has provided engineering, planning, surveying, and consulting services for architectural and engineering firms, contractors, developers, financial institutions, individual landowners, and a host of local, state, and federal government agencies.

XIX. TURBINE MANUFACTURERS SPECIFICATIONS

Model(s): The turbines planned for the project are a combination of General Electric (GE) wind turbines: 9 - GE 6.1-158 turbines on 117 m towers (117 m hub height). GE's nomenclature for turbine models includes the capacity of the machine in megawatts (6.1 MW), followed by the rotor diameter (158 m). The tower height refers to "hub height", as shown in Figure 5.

Model Year: The model year of the specific units is not common nomenclature used to describe wind turbines. Wind turbine offerings by major manufacturers are continually updated and improved. The GE turbines used in the project will be of recent manufacture and will be new, that is, they will have never been placed in service prior to deployment at Dan's Mountain.

Table 25. Turbine Dimensions

Turbine	Power Rating	Hub Height	Tip Height
GE 6.1-158	6.1 MW [49]	117 m	196 m

Mfg. Brochure: See Appendix D for a technical brochure for the turbines.

Mfg. Installation Specifications:

The wind turbines will be installed according to detailed manufacturer specifications and procedures, both of which are proprietary and confidential. The erection contractor will be contractually required to install the turbines in accordance with GE's installation manual. Dan's Mountain will also employ QA/QC personnel to inspect the installation to ensure turbines are installed in accordance with the GE Manual. GE will be responsible for the commissioning of the turbines.

Mfg. Recommended Maintenance Schedule:

Dan's Mountain plans to contract with the wind turbine manufacturer, GE, to maintain the turbines. The services will include:

- 24/7 remote monitoring and diagnostic services
- All scheduled maintenance required by the Operating Manual in accordance with the scheduled maintenance calendar
- Daily visual inspections of the serviced equipment
- Diagnostic services required to address any issues that arise with the equipment
- Repair or replace all parts that fail
- Implement any upgrades required
- All required manual resets required
- All required troubleshooting for any failure of or damage to serviced equipment

[49] 6,100,000 Watts

During the life of the project, Dan's Mountain may elect to extend the contract with GE or it will contract with a competing service provider or self-perform the maintenance. Regardless of who is performing the service the scope of services will be similar to the above and all services will be completed in accordance with the GE Operations & Maintenance manual by qualified personnel.

The services provided by GE during the coverage period will also include off-site remote monitoring in real-time with reset capability. At the end of the coverage period, the remote monitoring in real-time with reset capability will be provided by Dan's Mountain Wind Force or an affiliate. The on-site maintenance technicians also have access to the real-time data generated by the wind turbines. When the GE coverage period ends and maintenance and repair services are assumed by the project operator, GE will perform an end-of-warranty inspection of each wind turbine.

A copy of the table of contents from the installation manual is available in Appendix E.

XX. POST CONSTRUCTION TESTING

The turbines are individually run through a battery of inspections and a series of standard operational tests before they are synchronized to the grid and certified as safe for continuous and reliable operation. This commissioning process is performed by the turbine manufacturer and reflects the lessons learned in commissioning more than 49,000 wind turbines[50] throughout the world. The purpose of the commissioning program is to (1) ensure all critical equipment is installed to industry standards prior to energization, and (2) provide a baseline data set for future maintenance. Post-commissioning testing is performed in accordance with GE recommendations and procedures.

[50] https://www.ge.com/renewableenergy/wind-energy

XXI. APPENDICES

Appendix A. Comsearch Geoplanner

Wind Power GeoPlanner™

Microwave Study

Dan's Mountain Wind Farm

Prepared on Behalf of Dan's Mountain Wind Force, LLC

March 2, 2023

COMSEARCH
A CommScope Company

Table of Contents

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, unlicensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Dan's Mountain Wind Farm

County: Allegany

State: Maryland

Number of Turbines: 9

Blade Diameter: 158 meters

Hub Height: 117 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 GHz. First, we determined all microwave paths within 5 miles of the proposed turbines and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

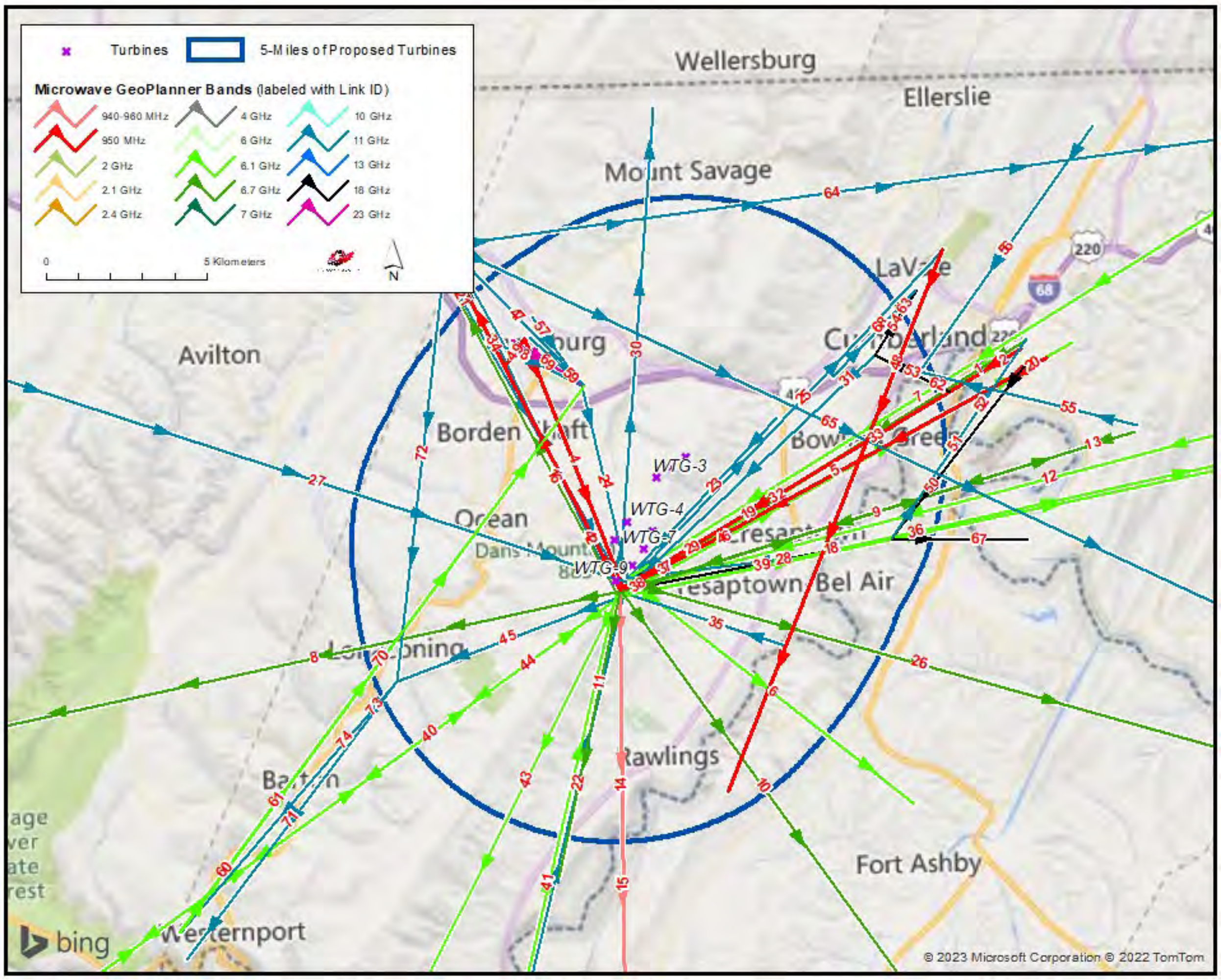


Figure 2: Licensed Microwave Paths within 5 miles of Proposed Turbines

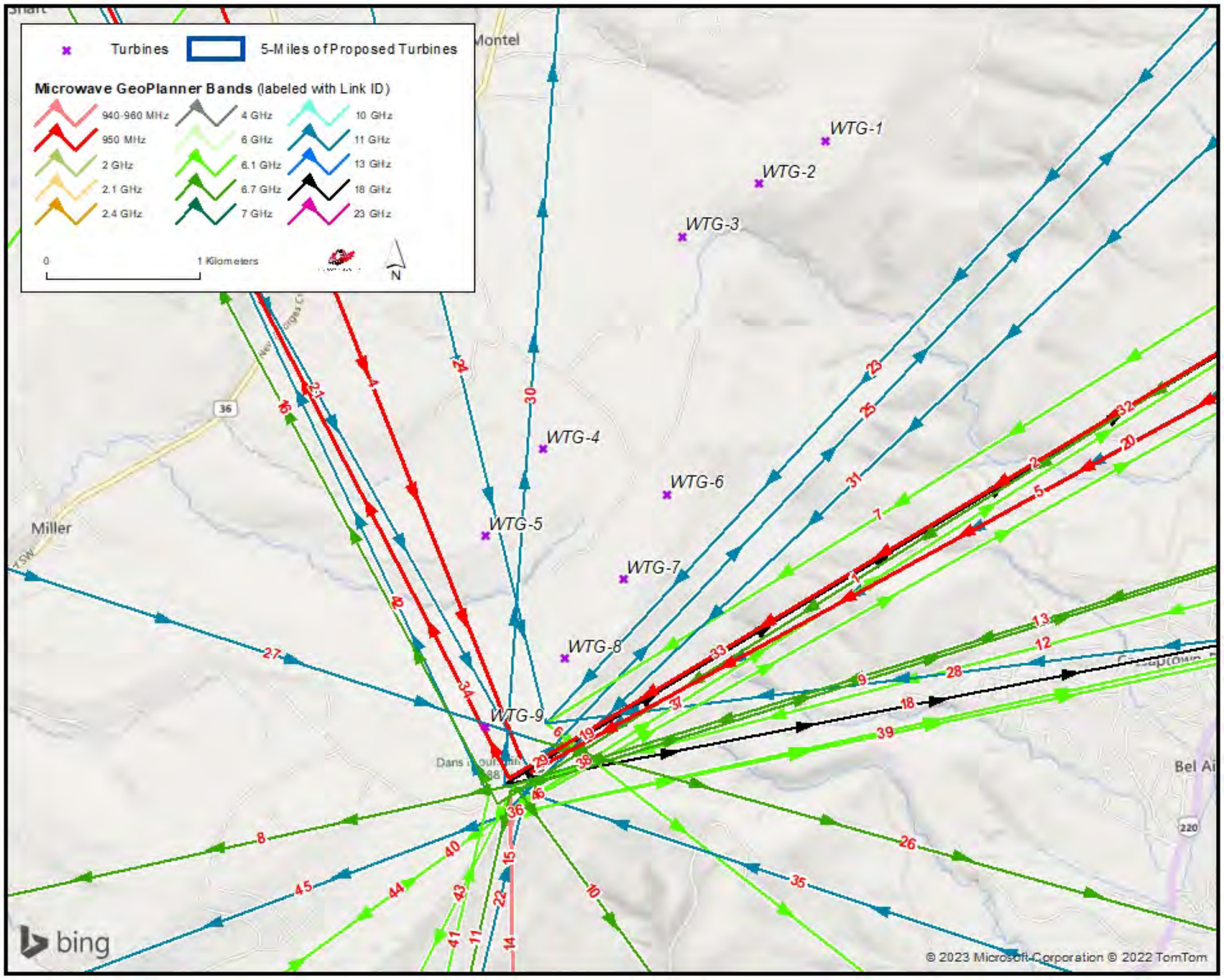


Figure 3: Licensed Microwave Paths on Dans Mountain

ID	Status	Callsign 1[1]	Callsign 2[1]	Band	Path Length (km)	Licensee
1	Licensed	WBX365	WNTJ750(1)	6.7 GHz	15.03	State of Maryland, MIEMSS
2	Licensed	WHB707	RXONLY(4)	950 MHz	14.58	FM Radio License, LLC
3[2]	Non-Operational	WLD321	RXONLY(4)	950 MHz	21.44	He's Alive Inc.
4	Licensed	WLG299	RXONLY(9A)	950 MHz	8.37	Frostburg State University
5	Licensed	WLJ664	RXONLY(6B)	950 MHz	14.98	WITF, Inc.
6	Licensed	WMR416(12)	WQKA700	6.1 GHz	11.35	USCOC of Cumberland, Inc.
7	Licensed	WMT232	WMR416(12)	6.1 GHz	26.89	USCOC of Cumberland, Inc.
8	Licensed	WNEN347(5A)	WNEN348	6.7 GHz	35.32	FELHC, Inc.
9	Licensed	WNEN347(5)	WNEN360P	6.7 GHz	16.68	FELHC, Inc.
10	Licensed	WNEN347(5A)	WNEX908	6.7 GHz	37.31	FELHC, Inc.
11	Licensed	WNEN347(5)	WQNA362P	6.7 GHz	9.20	FELHC, Inc.
12	Licensed	WNEN355	WNEN347(5A)	6.1 GHz	52.80	FELHC, Inc.
13	Licensed	WNEN360P	WNEN347(5A)	6.7 GHz	16.68	FELHC, Inc.
14	Licensed	WNTI291(5)	WNTI290	940-960 MHz	66.42	FELHC, Inc.
15	Licensed	WNTI291(5)	WNTI290	940-960 MHz	66.42	FELHC, Inc.
16	Licensed	WNTJ750(1)	WNTM695	6.7 GHz	11.70	State of Maryland, MIEMSS
17[3]	Non-Operational	WPYJ824	RXONLY	950 MHz	15.52	WITF, Inc.
18	Licensed	WQCW375(3)	WQCW374	18 GHz	8.70	Allegany County Government
19	Licensed	WQCW375(3)	WQCW383	18 GHz	12.15	Allegany County Government
20	Licensed	WQJT762	WQJT598(6B)	11 GHz	15.07	West Virginia Radio Corporation
21	Licensed	WQJT763	WQJT598(6B)	11 GHz	11.70	West Virginia Radio Corporation
22	Licensed	WQJT764	WQJT598(6B)	11 GHz	18.66	West Virginia Radio Corporation
23	Licensed	WQQA260	WMR416(12)	11 GHz	6.83	USCOC of Cumberland, Inc.
24	Licensed	WQQC524	WMR416(12)	11 GHz	6.17	USCOC of Cumberland, Inc.
25	Licensed	WQQI930(6A)	WQQM666	11 GHz	14.56	Two Way Radio Inc.
26	Licensed	WQQL435(11)	WQQL347	6.7 GHz	49.54	Thought Transmissions, LLC
27	Licensed	WQQL437	WQQL435(11)	11 GHz	33.19	Thought Transmissions, LLC
28	Licensed	WQUU265	WMR416(12)	11 GHz	5.21	USCOC of Cumberland, Inc.
29	Licensed	WQVX430(3)	WQVX433	18 GHz	12.05	Allegany County Government
30	Licensed	WQVX430(3)	WQXB565	11 GHz	15.11	Allegany County Government
31	Licensed	WQVX737	WRDT897(14A)	11 GHz	11.01	Allegany County Government
32	Licensed	WQXR845	RXONLY(4)	950 MHz	14.58	FM Radio License, LLC
33	Licensed	WQXR847	RXONLY(4)	950 MHz	14.58	FM Radio License, LLC
34	Licensed	WQXT395(4)	RXONLY	950 MHz	12.79	FM Radio License, LLC
35	Licensed	WQZI397	WQZI396(3)	11 GHz	5.45	Conxx, Inc.
36	Licensed	WQZR472(14A)	WNTY925	6.1 GHz	24.48	State of Maryland, MIEMSS
37	Licensed	WQZR472(14A)	WQBZ627	6.1 GHz	15.07	State of Maryland, MIEMSS
38	Licensed	WQZR472(14A)	WQBZ627	6.1 GHz	15.07	State of Maryland, MIEMSS

[1] Tower IDs on Dan's Mountain shown in parenthesis
[2] This path is no longer operational per telephone conversation with a representative of the licensee, 'HE'S ALIVE, INC." on May 23, 2013.
[3] This path is no longer operational per CME Engineering December 2021 Dan's Mountain survey data.

ID	Status	Callsign 1[1]	Callsign 2[1]	Band	Path Length (km)	Licensee
39	Licensed	WQZR472(14A)	WQZR489	6.1 GHz	24.65	State of Maryland, MIEMSS
40	Licensed	WQZY419	WQZR472(14A)	6.1 GHz	53.83	State of Maryland, MIEMSS
41	Licensed	WRCK206	WRCL314(2)	6.1 GHz	18.77	T-Mobile License LLC
42	Questionable	WRCL314(2)	WRCL315	11 GHz	8.40	T-Mobile License LLC
43	Licensed	WRFM318(14A)	WRFM317	6.1 GHz	22.29	FELHC, Inc.
44	Licensed	WQZR472(14A)	WQZY419	6.1 GHz	53.83	State of Maryland, MIEMSS
45	Licensed	WRDT897(14A)	WRDT898	11 GHz	7.36	Allegany County Government
46	Licensed	WQZR472(14A)	WRJD755	6.1 GHz	16.25	State of Maryland, MIEMSS
47	Questionable	69240	WRCN600	11 GHz	6.10	T-Mobile License LLC
48	Licensed	WLP783	RXONLY	950 MHz	18.15	Cumberland Broadcasting Company
49	Licensed	WPRV884	RXONLY	950 MHz	0.97	Frostburg State University
50	Licensed	WQCW372	WQCW374	18 GHz	7.17	Allegany County Government
51	Licensed	WQCW374	WQXD603	11 GHz	7.53	Allegany County Government
52	Licensed	WQCW374	WQXD603	11 GHz	7.53	Allegany County Government
53	Licensed	WQCW387	WQCW383	18 GHz	2.61	Allegany County Government
54	Licensed	WQCW387	WQCW390	18 GHz	2.38	Allegany County Government
55	Licensed	WQPM992	WQPM993	11 GHz	7.00	USCOC of Cumberland, Inc.
56	Licensed	WQPM994	WQPM993	11 GHz	9.41	USCOC of Cumberland, Inc.
57	Licensed	WQQC525	WQQC524	11 GHz	2.65	USCOC of Cumberland, Inc.
58	Licensed	WQQC526	WQQC524	11 GHz	2.67	USCOC of Cumberland, Inc.
59	Licensed	WQQC751	WQQC524	11 GHz	2.22	USCOC of Cumberland, Inc.
60	Licensed	WQTR919	WQTR920	6.1 GHz	21.19	New Cingular Wireless PCS - Maryland
61	Proposed	WQTR919	WQTR920	6.1 GHz	21.19	New Cingular Wireless PCS - Maryland
62	Licensed	WQVX737	WQVX433	18 GHz	2.61	Allegany County Government
63	Licensed	WQVX737	WQVX734	18 GHz	2.38	Allegany County Government
64	Licensed	WQXG674	WQXG803	11 GHz	28.81	T-Mobile License LLC
65	Licensed	WQXG674	WQXP920	11 GHz	33.88	T-Mobile License LLC
66	Licensed	WQXG674	WQXY359	11 GHz	3.62	T-Mobile License LLC
67	Licensed	WQXU874	WQXU293	18 GHz	4.27	Conxx, Inc.
68	Licensed	WQYB986	WQXY412	11 GHz	3.73	USCOC of Cumberland, Inc.
69	Licensed	WQYT905	WQTR920	23 GHz	2.67	New Cingular Wireless PCS - Maryland
70	Licensed	WRCK230	WRCN600	6.1 GHz	21.20	T-Mobile License LLC
71	Licensed	WRCN429	WRDJ363	11 GHz	10.87	Mountain View Communications, LLC
72	Licensed	WRCN996	WRCN429	11 GHz	13.41	Mountain View Communications, LLC
73	Licensed	WRMN200	WRMN201	11 GHz	10.36	T-Mobile License LLC
74	Proposed	WRMN200	WRMN201	11 GHz	10.36	T-Mobile License LLC

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 and other beam path attributes may differ from those on the FCC license. To correct for the inaccuracies, the beam paths on Dan's Mountain (IDs 1 – 46) were surveyed by CME Engineering, LP. Comsearch updated the microwave dataset with the surveyed data for each path.

Secondly, Comsearch used the survey data from CME Engineering to identify and determine the unlicensed microwave beam paths on Dan's Mountain. These beam paths are listed in Table 2 and shown in Figure 4.

ID	Unlicensed Band	Path Length (km)	Owner
100	4.9 GHz	15.24	State of Maryland, MIEMSS
101	5.8 GHz	5.88	Allconet
102	5.8 GHz	7.46	Allconet
103	5.8 GHz	17.29	Allconet
105	5.8 GHz	50.94	Unknown
106	24.2 GHz	7.01	Oldies 107 Radio Station
107	5.8 GHz	14.15	Allegany College of Maryland
108[4]	5.8 GHz	2.43	Unknown
110	Unknown	5.49	Allconet
111	2.4 GHz	8.06	State of Maryland, MIEMSS
113	Unknown	12.06	Allconet

Table 2: Microwave Paths in Unlicensed Bands on Dan's Mountain

[4] Path to be converted to fiber according to CME Microwave Beam Path Study 12/23/2021

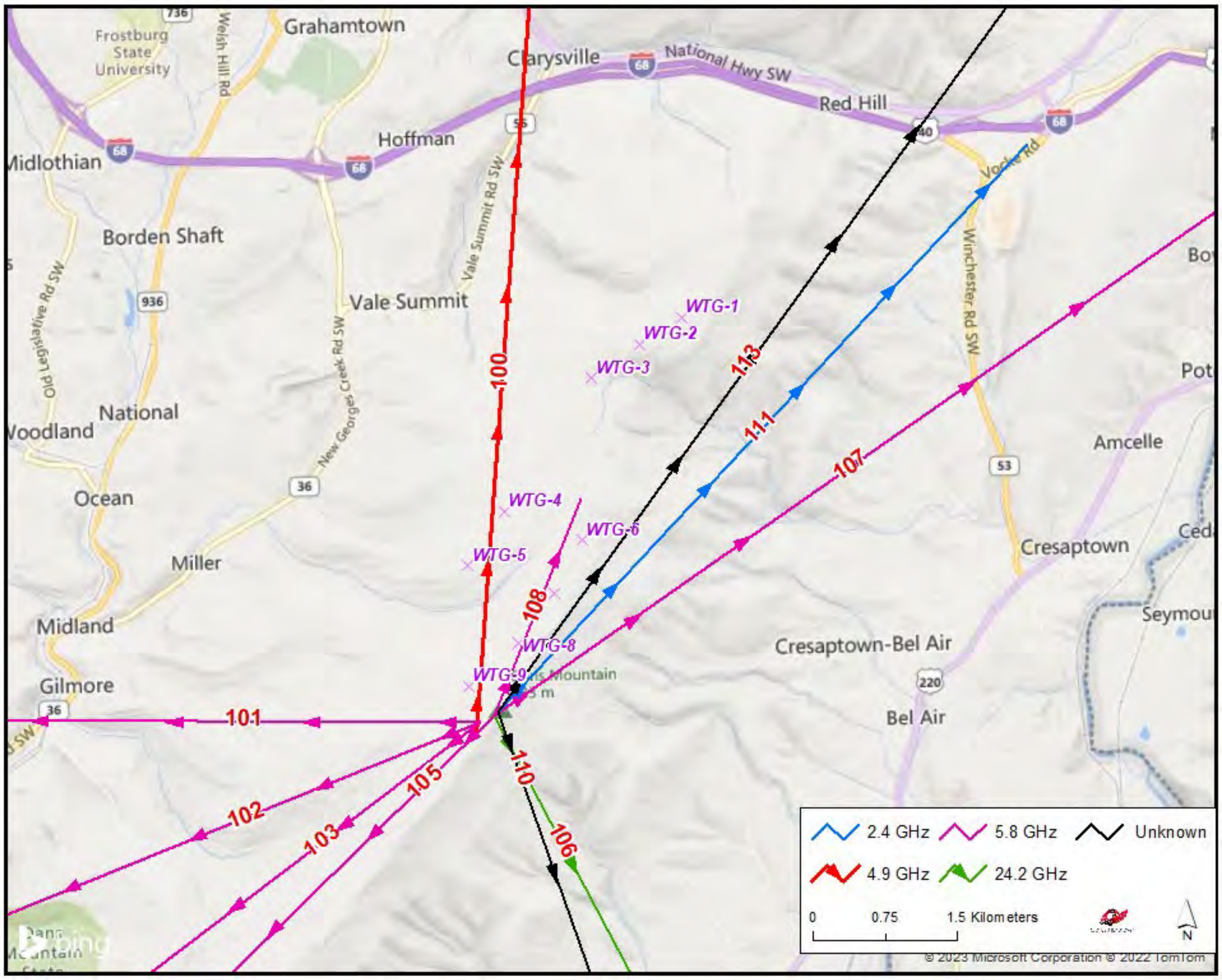
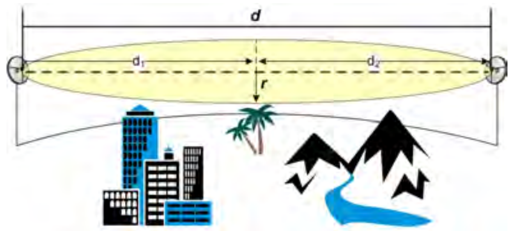


Figure 4: Unlicensed Microwave Paths

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

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



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. 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 Fresnel Zones and Consultation Zones for each microwave path listed can be found in Figure 5, and is also included in the enclosed shapefiles[5,6].

[5] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 17 projected coordinate system.

[6] 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.

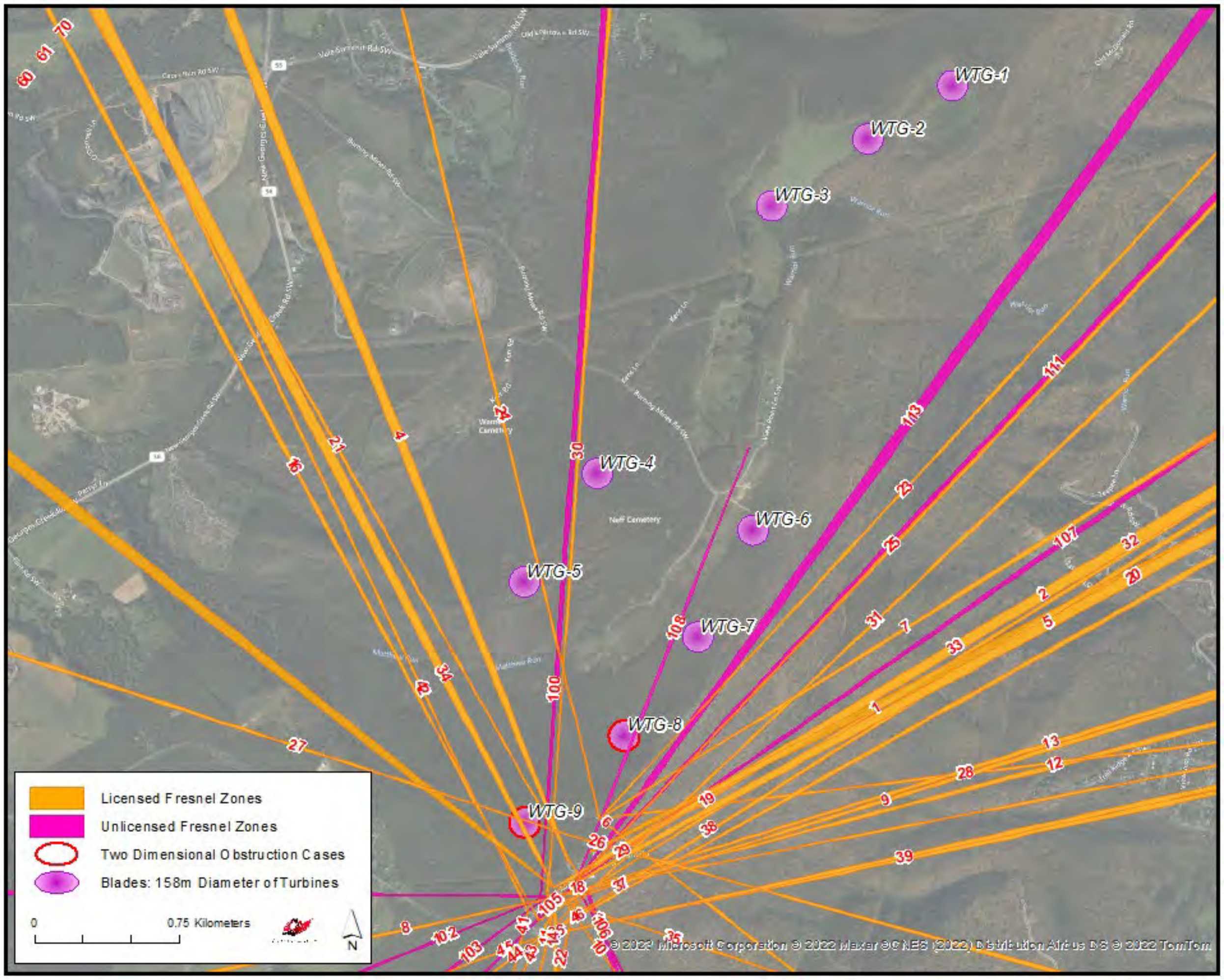


Figure 5: Fresnel Zones and Consultation Zones in the Area of Interest

Discussion of Potential Two Dimensional Obstructions

	Total Microwave Paths	Paths (Operational) with Affected Fresnel Zones	Total Turbines Analyzed	Turbines Intersecting Fresnel Zones
Licensed Bands	74	2	9	1
Unlicensed Bands	11	1	9	1

For this project, 9 turbines were considered in the analysis, each with a blade diameter of 158 meters and turbine hub height of 117 meters. Of those turbines, two were found to intersect the two dimensional Fresnel Zones of two licensed and one unlicensed microwave path. Table 3 contains a summary of the affected turbines. A cross sectional analysis was performed in Section 4 to determine the diagonal clearance value for these cases.

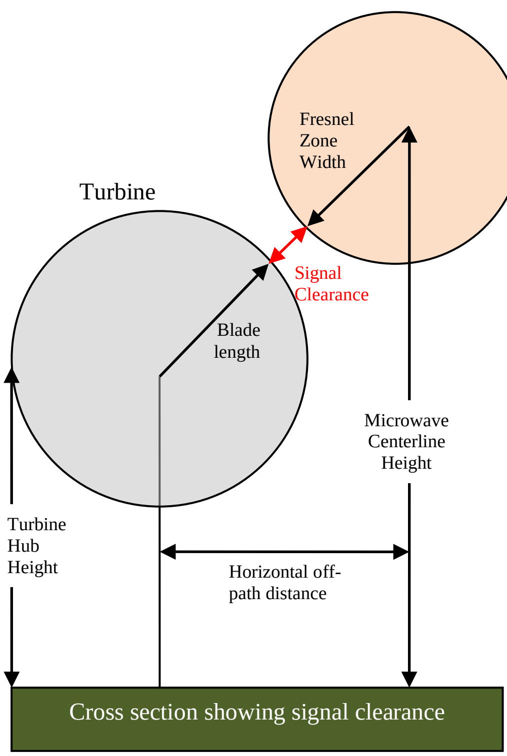
Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Affected Microwave Path ID	Fresnel Zone Radius at Turbine Location (m)	Horizontal off-path Distance (m)	Distance along the path from site 1 (km)	Horizontal Clearance (m)
9	39.584258	-78.901149	27	3.01	9	32.85	-73.01
9	39.584258	-78.901149	34	10.64	21	0.37	-68.64
8	39.588177	-78.895018	108	5.26	46	0.80	-38.26

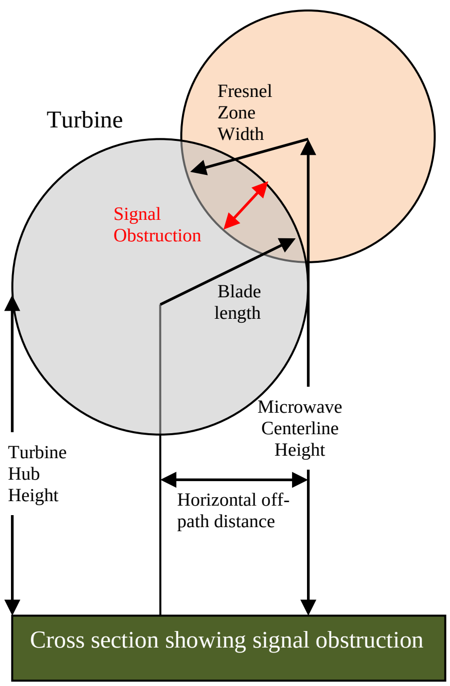
Table 3: Turbines that Intersect Two-Dimensional Fresnel Zones

4. Cross Sectional Analysis

Our Fresnel Zone analysis in the previous section identified 3 potential obstruction cases that need to be further examined from a cross sectional perspective. The cases that will be analyzed in this section can be found in Table 3.

Our cross sectional analysis calculates the precise height and width of 100% of the first Fresnel Zone at the turbine location based on the antenna heights of the two link endpoints and the earth curvature bulge at the specific turbine location. The horizontal off-path distance was calculated in the previous section and the turbine hub height and blade length were provided by the client. The cross sectional analysis uses these values to calculate the clearance between the blades and the microwave Fresnel Zone as shown in the two diagrams below.





The results of the cross sectional calculations can be seen in Table 4. It shows negative clearance values indicating obstruction of the Fresnel zones.

Microwave Path ID	Fresnel Zone Radius at Turbine Location (m)	Microwave Centerline Height at Turbine Location (m)	Turbine ID	Hub Height (m)	Blade Length (m)	Cross Sectional Clearance (m)
27	3.01	54.84	9	117	79	-19.20
34	10.64	63.19	9	117	79	-31.88
108	5.26	67.54	8	117	79	-16.72

Table 4: Cross Sectional Analysis Results

5. Conclusion

Our study identified 74 licensed microwave paths within the Dan's Mountain Wind Farm project area. Eleven additional unlicensed paths were considered in this report. The Fresnel Zones for these microwave paths were calculated and mapped. One turbine, WTG-9, was found to intersect the Fresnel Zones of one licensed path, 34, based on the cross sectional analysis. Turbine WTG-9 was also found to intersect the Fresnel Zone of another licensed beam path, 27, but surveys by CME Engineering show that there are currently no microwave dishes located on communication tower #11, as shown in the November 2021 Tower Investigation completed by CME. Additionally, turbine WTG-8 was found to intersect the Fresnel Zone of unlicensed path 108. This path is planned to be replaced with fiber according to CME Microwave Beam Path Study findings on 12/23/2021.

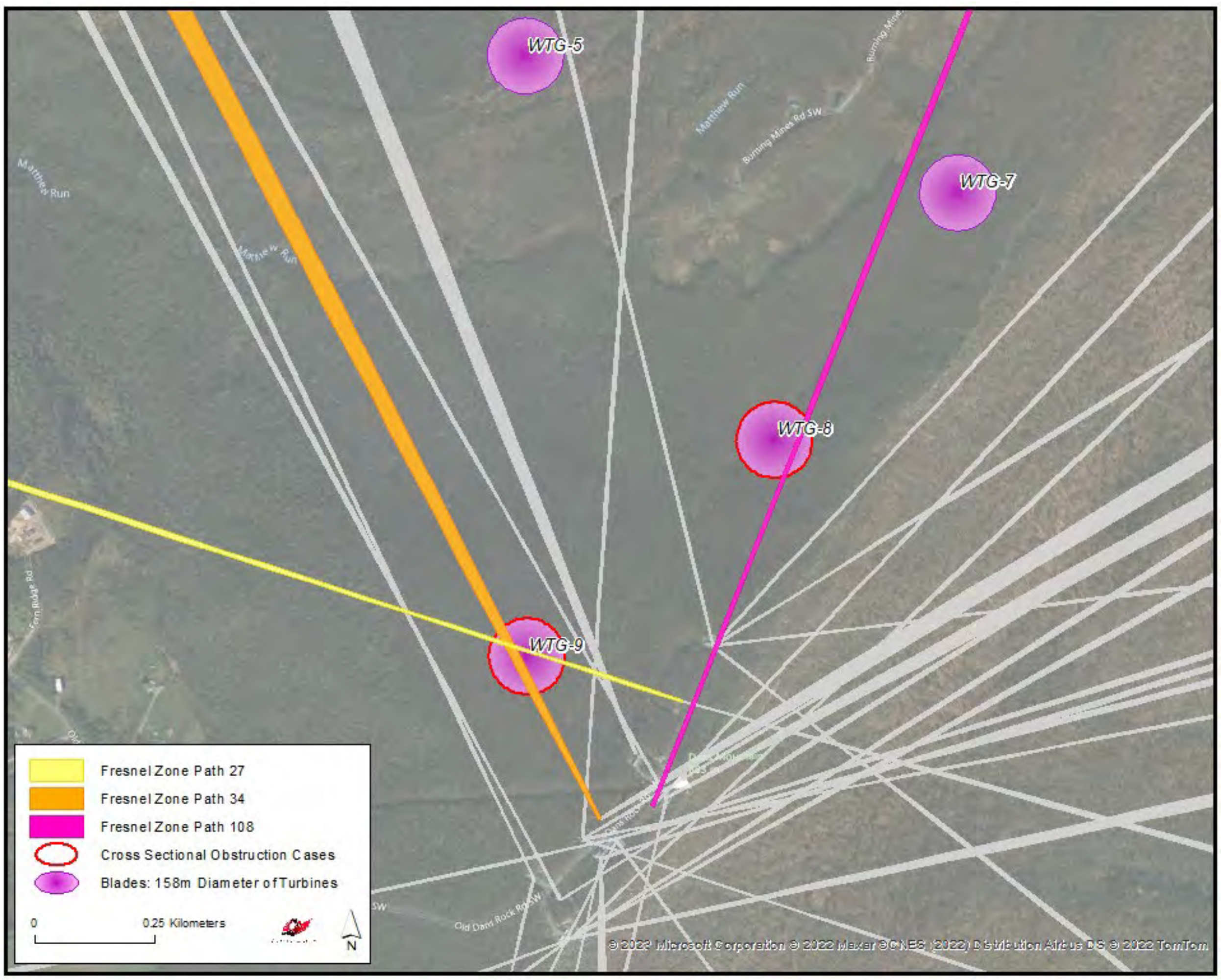


Figure 6: Obstruction Cases

6. Contact

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

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Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Appendix A: Turbine Locations

ID	Hub Height (m)	Elevation (m)	Elevation (ft)	Latitude	Longitude
WTG-1	117	772.44	2534.266	39.618173	-78.874295
WTG-2	117	759.64	2492.26	39.615775	-78.879492
WTG-3	117	757.19	2484.219	39.612764	-78.885369
WTG-4	117	817.31	2681.469	39.600463	-78.896277
WTG-5	117	802.17	2631.793	39.595475	-78.900825
WTG-6	117	816.48	2678.729	39.597641	-78.886969
WTG-7	117	826.14	2710.437	39.592718	-78.890449
WTG-8	117	809.61	2656.191	39.588177	-78.895018
WTG-9	117	833.97	2736.11	39.584258	-78.901149

Appendix B: Licensed Microwave Paths

Information updated from CME Survey in bold

Path ID	Site	CME Tower ID	Callsign	Elevation (m)	Latitude	Longitude	Antenna Height (m)
1	1		WBX365	281.94	39.648694	-78.749722	15.24
1	2	1	WNTJ750	**861.18**	39.579652	-78.900444	**28.06**
2	1		WHB707	265.20	39.646028	-78.751806	8.00
2	2	4	RXONLY	**864.39**	**39.581155**	**-78.899456**	**31.58**
3	1		WLD321	829.06	39.703972	-79.091694	30.48
3	2	4	RXONLY	**864.39**	**39.581155**	**-78.899456**	30.48
4	1		WLG299	600.80	39.652250	-78.932194	16.70
4	2	9A	RXONLY	**865.49**	**39.582352**	**-78.898551**	**15.40**
5	1		WLJ664	254.50	39.643417	-78.742778	12.80
5	2	6B	RXONLY	874.60	**39.581521**	**-78.897825**	6.10
6	1	12	WMR416	**854.22**	**39.584343**	**-78.896619**	**23.47**
6	2		WQKA700	296.54	39.519306	-78.794750	47.24
7	1		WMT232	556.14	39.707278	-78.626667	36.58
7	2	12	WMR416	**854.22**	**39.584343**	**-78.896619**	**15.60**
8	1	5A	WNEN347	**865.95**	39.580778	-78.899093	**49.89**
8	2		WNEN348	916.84	39.519250	-79.301694	62.48 / 49.99
9	1	5	WNEN347	**865.95**	**39.580422**	**-78.899451**	**24.46**
9	2		WNEN360P	534.92	39.622028	-78.711694	4.88
10	1	5A	WNEN347	**865.95**	39.580778	-78.899093	**28.47**
10	2		WNEX908	378.00	39.303972	-78.653611	62.48
11	1	5	WNEN347	**865.95**	**39.580422**	**-78.899451**	**24.46**
11	2		WQNA362P	463.60	39.500750	-78.924417	9.14
12	1		WNEN355	498.35	39.689528	-78.299722	41.148 / 27.432
12	2	5A	WNEN347	**865.95**	39.580778	-78.899093	**49.14**
13	1		WNEN360P	534.90	39.622028	-78.711667	4.57
13	2	5A	WNEN347	**865.95**	39.580778	-78.899093	**24.46**
14	1	5	WNTI291	**865.95**	**39.580422**	**-78.899451**	15.20
14	2		WNTI290	995.20	38.982861	-78.908056	15.20
15	1	5	WNTI291	**865.95**	**39.580422**	**-78.899451**	15.24
15	2		WNTI290	995.20	38.982861	-78.908056	15.24
16	1	1	WNTJ750	**861.18**	39.579652	-78.900444	**23.65**
16	2		WNTM695	867.77	39.673972	-78.962500	15.24
17	1		WPYJ824	265.20	39.643611	-78.734444	10.70
17	2	6B	RXONLY	865.60	**39.581521**	**-78.897825**	22.90
18	1	3	WQCW375	**863.68**	**39.580787**	**-78.899885**	**25.03**
18	2		WQCW374	560.83	39.593833	-78.800889	19.81
19	1	3	WQCW375	864.11	**39.580787**	**-78.899885**	28.96
19	2		WQCW383	332.23	39.634472	-78.778056	19.81
20	1		WQJT762	341.38	39.643889	-78.742222	12.19
20	2	6B	WQJT598	876.30	**39.581521**	**-78.897825**	15.24
21	1		WQJT763	891.24	39.674444	-78.961944	21.34

Path ID	Site	CME Tower ID	Callsign	Elevation (m)	Latitude	Longitude	Antenna Height (m)
21	2	6B	WQJT598	876.30	**39.581521**	**-78.897825**	15.24
22	1		WQJT764	623.93	39.418889	-78.953611	25.91
22	2	6B	WQJT598	876.30	**39.581521**	**-78.897825**	15.24
23	1		WQQA260	369.42	39.628472	-78.841222	42.67
23	2	12	WMR416	**854.22**	**39.584343**	**-78.896619**	62.48
24	1		WQQC524	676.60	39.638639	-78.912000	42.67
24	2	12	WMR416	**854.22**	**39.584343**	**-78.896619**	**39.36**
25	1	6A	WQQI930	**868.73**	**39.581376**	**-78.898174**	**30.63**
25	2		WQQM666	490.00	39.674611	-78.778972	9.10
26	1	11	WQQL435	**862.03**	**39.583326**	**-78.897393**	**27.55**
26	2		WQQL347	763.01	39.451667	-78.346417	28.35
27	1		WQQL437	910.40	39.681556	-79.262056	99.97
27	2	11	WQQL435	**862.03**	**39.583326**	**-78.897393**	**34.87**
28	1		WQUU265	266.40	39.588972	-78.836278	30.48
28	2	12	WMR416	**854.22**	**39.584343**	**-78.896619**	**46.70**
29	1	3	WQVX430	**863.68**	**39.580787**	**-78.899885**	**31.84**
29	2		WQVX433	332.20	39.634472	-78.778028	18.29
30	1	3	WQVX430	**863.68**	**39.580787**	**-78.899885**	**29.35**
30	2		WQXB565	618.10	39.716167	-78.883556	22.09
31	1		WQVX737	435.90	39.645333	-78.805000	24.70
31	2	14A	WRDT897	**860.27**	39.578917	-78.900250	30.50
32	1		WQXR845	265.20	39.646028	-78.751806	6.10
32	2	4	RXONLY	**864.39**	**39.581155**	**-78.899456**	**28.75**
33	1		WQXR847	265.20	39.646028	-78.751806	6.10
33	2	4	RXONLY	**864.39**	**39.581155**	**-78.899456**	**28.75**
34	1	4	WQXT395	**864.39**	**39.581155**	**-78.899456**	**33.12**
34	2		RXONLY	835.20	39.684556	-78.965028	67.10
35	1		WQZI397	203.61	39.564222	-78.840194	6.10
35	2	3	WQZI396	**863.68**	**39.580787**	**-78.899885**	**26.12**
36	1	14A	WQZR472	**860.27**	39.578917	-78.900250	91.4 / 82.3
36	2		WNTY925	666.00	39.621194	-78.620556	25.9 / 18.3
37	1	14A	WQZR472	**860.27**	39.578917	-78.900250	76.20
37	2		WQBZ627	281.90	39.648694	-78.749722	38.40
38	1	14A	WQZR472	**860.27**	39.578917	-78.900250	76.20
38	2		WQBZ627	281.90	39.648694	-78.749722	38.40
39	1	14A	WQZR472	**860.27**	39.578917	-78.900250	91.4 / 82.3
39	2		WQZR489	641.00	39.619694	-78.618194	76.2 / 67.1
40	1		WQZY419	964.00	39.302722	-79.414167	91.4 / 76.2
40	2	14A	WQZR472	860.00	39.578917	-78.900250	91.4 / 76.2
41	1		WRCK206	581.80	39.416250	-78.955444	94.90
41	2	2	WRCL314	**858.50**	**39.580092**	**-78.901093**	**57.99**
42	1	2	WRCL314	**858.50**	**39.580092**	**-78.901093**	**57.62**
42	2		WRCL315	621.09	39.649083	-78.940917	30.48
43	1	5A	WRFM318	**865.94**	39.580778	-78.899093	**37.24**
43	2		WRFM317	298.00	39.403389	-79.020611	44.20
44	1	14A	WQZR472	860.00	39.578917	-78.900250	91.4 / 76.2
44	2		WQZY419	964.00	39.302722	-79.414167	91.4 / 76.2

Path ID	Site	CME Tower ID	Callsign	Elevation (m)	Latitude	Longitude	Antenna Height (m)
45	1	14A	WRDT897	860.00	39.578917	-78.900250	28.10
45	2		WRDT898	625.70	39.557056	-78.981111	22.90
46	1	14A	WQZR472	860.00	39.578917	-78.900250	86.87
46	2		WRJD755	208.07	39.647611	-78.733139	43.89
47	1		69240	885.90	39.678833	-78.959250	84.43
47	2		WRCN600	665.57	39.638611	-78.910806	87.48
48	1		WLP783	490.73	39.674528	-78.779750	499.87
48	2		RXONLY	597.80	39.523972	-78.861972	6.10
49	1		WPRV884	578.90	39.645083	-78.938750	5.10
49	2		RXONLY	600.80	39.652250	-78.932194	15.20
50	1		WQCW372	271.88	39.643944	-78.748167	15.24
50	2		WQCW374	560.83	39.593833	-78.800889	23.77
51	1		WQCW374	560.83	39.593833	-78.800889	18.29
51	2		WQXD603	281.90	39.648917	-78.749750	28.96
52	1		WQCW374	560.83	39.593833	-78.800889	18.30
52	2		WQXD603	281.90	39.648917	-78.749750	29.00
53	1		WQCW387	439.83	39.645389	-78.804972	27.13
53	2		WQCW383	332.23	39.634472	-78.778056	23.77
54	1		WQCW387	439.83	39.645389	-78.804972	27.13
54	2		WQCW390	456.59	39.663139	-78.789528	39.93
55	1		WQPM992	541.00	39.623694	-78.710417	27.43
55	2		WQPM993	316.00	39.640194	-78.789083	34.75
56	1		WQPM994	456.00	39.708306	-78.723833	36.58
56	2		WQPM993	316.00	39.640194	-78.789083	33.53
57	1		WQQC525	635.80	39.658306	-78.929444	15.24
57	2		WQQC524	676.60	39.638639	-78.912000	27.43
58	1		WQQC526	608.90	39.649972	-78.939389	24.38
58	2		WQQC524	676.60	39.638639	-78.912000	30.48
59	1		WQQC751	616.73	39.652528	-78.930528	7.77
59	2		WQQC524	676.60	39.638639	-78.912000	28.96
60	1		WQTR919	537.00	39.487806	-79.061944	60.96
60	2		WQTR920	668.12	39.638611	-78.910833	44.20
61	1		WQTR919	537.06	39.487806	-79.061944	61.57
61	2		WQTR920	668.12	39.638611	-78.910833	44.20
62	1		WQVX737	435.86	39.645333	-78.805000	18.29
62	2		WQVX433	332.20	39.634472	-78.778028	18.29
63	1		WQVX737	435.86	39.645333	-78.805000	9.14
63	2		WQVX734	457.50	39.663111	-78.789500	9.14
64	1		WQXG674	883.30	39.678806	-78.959167	60.96
64	2		WQXG803	566.56	39.707972	-78.625389	48.16
65	1		WQXG674	883.30	39.678806	-78.959167	60.96
65	2		WQXP920	201.20	39.543361	-78.605694	54.86
66	1		WQXG674	883.30	39.678806	-78.959167	60.96
66	2		WQXY359	608.90	39.649972	-78.939389	33.53
67	1		WQXU874	560.83	39.593833	-78.800889	26.20
67	2		WQXU293	194.00	39.592361	-78.751250	9.14
68	1		WQYB986	307.80	39.639667	-78.820444	54.86

Path ID	Site	CME Tower ID	Callsign	Elevation (m)	Latitude	Longitude	Antenna Height (m)
68	2		WQXY412	454.76	39.663222	-78.789528	38.71
69	1		WQYT905	586.13	39.652111	-78.936639	21.34
69	2		WQTR920	668.12	39.638611	-78.910833	59.44
70	1		WRCK230	536.53	39.487833	-79.062222	87.17
70	2		WRCN600	665.57	39.638611	-78.910806	68.58
71	1		WRCN429	625.70	39.557056	-78.981111	76.20
71	2		WRDJ363	471.20	39.480333	-79.059722	76.20
72	1		WRCN996	883.00	39.676750	-78.960194	30.50
72	2		WRCN429	625.70	39.557056	-78.981111	74.70
73	1		WRMN200	625.70	39.557056	-78.981111	71.63
73	2		WRMN201	537.00	39.487806	-79.061944	73.15
74	1		WRMN200	625.70	39.557056	-78.981111	71.63
74	2		WRMN201	537.00	39.487806	-79.061944	70.71

Wind Power GeoPlanner™

Wireless Internet Services Report

Dan's Mountain Wind Farm

Prepared on Behalf of Dan's Mountain Wind Force, LLC

January 27, 2023

COMSEARCH®
A CommScope Company

Table of Contents

1. Introduction

Wireless internet providers, often called WISPs (Wireless Internet Service Providers), deliver internet services via radio transmission to business and/or residential subscribers. They compete with wired internet service providers such as the local phone and cable companies. Wireless internet providers can use various frequency bands in both licensed and unlicensed spectrum. Many rural community WISPs operate in the unlicensed spectrum since there is a lower barrier to entry without the costs associated with acquiring licensed spectrum. The most common unlicensed bands for this purpose are the 900 MHz, 2.4 GHz, and 5.8 GHz bands. There is also some activity in the "lite-licensed" 3.65 GHz band.

This report attempts to identify wireless internet providers in proximity to the Dan's Mountain Wind Farm project and evaluates the potential impact of wind turbines on their operations in and around the project area.

Figure 1: Dan's Mountain Wind Farm Project Area

2. Summary of Results

Methodology

Most bands used for wireless internet services (primarily the unlicensed bands) have no reliable data source available since according to FCC rules, these systems are not required to license or register their transmitter locations. Therefore, the only band with a reliable data set to evaluate is the 3.65 GHz WBS (Wireless Broadband Systems) band, which by FCC rule requires registration of base and fixed transmitters. Our analysis will include any providers found in this band, as well as two unlicensed systems in the 5.8 GHz band that were identified through a field survey and field verification work product provided by CME Engineering, MD. The firm is based in nearby Somerset, PA

Results of 3.65 GHz Licensed Systems

Our 3.65 GHz band search identified the wireless internet system with the closest proximity to the Dan's Mountain Wind Farm. Our search results are shown in the map below. This system is licensed to Williamson Enterprise, LLC dba Winchester Wireless under the call sign WQQI560. It consists of twenty-seven base stations in the Winchester VA region.

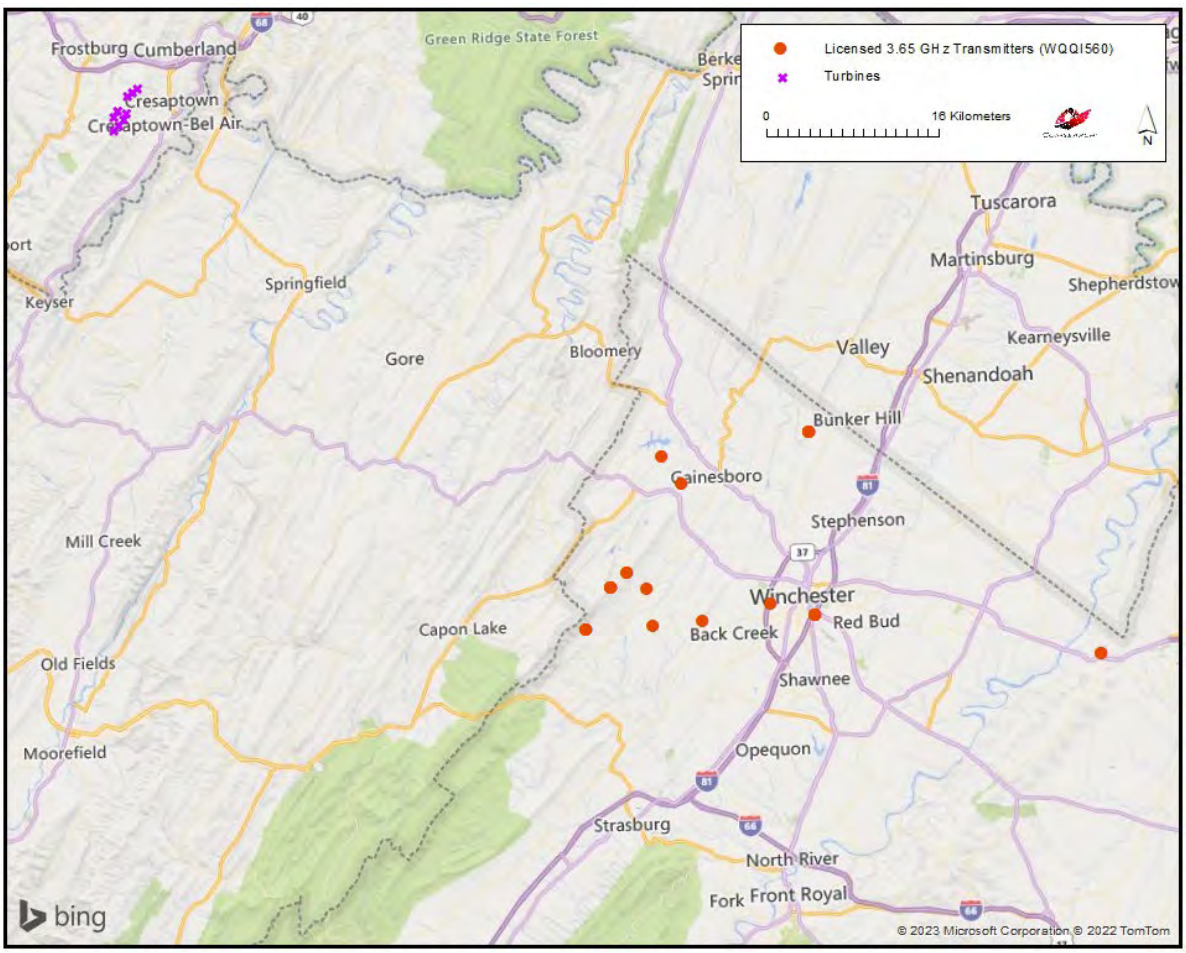


Figure 2: Licensed 3.65 GHz Transmitters

Unlicensed Bands

As mentioned previously, there are no reliable data sources for unlicensed wireless internet systems because they are not required to license or register their transmitter locations according to FCC rules. Detailed data for unlicensed point-to-multipoint Wireless Internet service systems operating in and around the Dan's Mountain project area was gathered by a local surveying team from CME Engineering, LP. Comsearch performed an obstruction analysis on these surveyed systems using the planned wind turbine locations as discussed below.

Fresnel Zone Analysis

Our obstruction analysis for the wireless Internet service systems identified in the Dan's Mountain project area is based on field survey data provided by a local engineering firm, CME Engineering, LP. The data includes point-to-multipoint paths located in the project area, all of which operate in the unlicensed 5.8 GHz band according to the survey report. A total of 29 such paths were surveyed, each served by one of two tower hub stations. These paths and their corresponding hub station and operators are listed in Table 1.

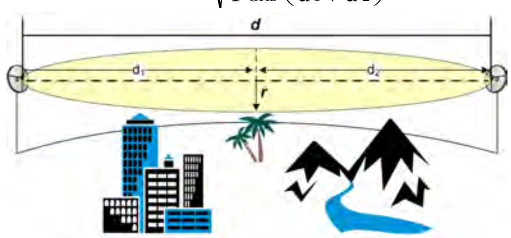
CME Path ID	Operator	CME Tower Hub ID	Tower Hub Height (meters)	Tower Hub LAT (NAD83)	Tower Hub LON (NAD83)	Subscriber LAT (deg)	Subscriber LON (deg)	Band (GHz)	Path Length (km)
104-1	AllCoNet	3	32.9	39.58079	-78.89989	39.65403	-78.93208	5.8	8.6
104-2	AllCoNet	3	32.9	39.58079	-78.89989	39.66064	-78.80540	5.8	12.0
104-3	AllCoNet	3	32.9	39.58079	-78.89989	39.62854	-78.91704	5.8	5.5
104-4	AllCoNet	3	32.9	39.58079	-78.89989	39.67121	-78.93028	5.8	10.4
104-5	AllCoNet	3	32.9	39.58079	-78.89989	39.65734	-78.93016	5.8	8.9
104-6	AllCoNet	3	32.9	39.58079	-78.89989	39.65708	-78.92721	5.8	8.8
104-7	AllCoNet	3	32.9	39.58079	-78.89989	39.65611	-78.92664	5.8	8.7
104-8	AllCoNet	3	32.9	39.58079	-78.89989	39.65923	-78.92054	5.8	8.9
104-9	AllCoNet	3	32.9	39.58079	-78.89989	39.62724	-78.94039	5.8	6.2
104-10	AllCoNet	3	32.9	39.58079	-78.89989	39.64335	-78.90879	5.8	7.0
104-11	AllCoNet	3	32.9	39.58079	-78.89989	39.63112	-78.80106	5.8	10.2
104-12	AllCoNet	3	32.9	39.58079	-78.89989	39.58923	-78.68567	5.8	18.4
104-13	AllCoNet	3	32.9	39.58079	-78.89989	39.51112	-78.93291	5.8	8.2
104-14	AllCoNet	3	32.9	39.58079	-78.89989	39.49182	-79.12328	5.8	21.6
104-15	AllCoNet	3	32.9	39.58079	-78.89989	39.49219	-79.12363	5.8	21.6
104-16	AllCoNet	3	32.9	39.58079	-78.89989	39.58923	-78.68567	5.8	18.4
104-17	AllCoNet	3	32.9	39.58079	-78.89989	39.52132	-78.86501	5.8	7.3
104-18	AllCoNet	3	32.9	39.58079	-78.89989	39.57771	-78.81554	5.8	7.3
104-19	AllCoNet	3	32.9	39.58079	-78.89989	39.52943	-78.85874	5.8	6.7
104-20	AllCoNet	3	32.9	39.58079	-78.89989	39.54454	-79.04463	5.8	13.1
104-21	AllCoNet	3	32.9	39.58079	-78.89989	39.64529	-78.68942	5.8	19.4
104-22	AllCoNet	3	32.9	39.58079	-78.89989	39.48157	-78.89930	5.8	11.0
104-23	AllCoNet	3	32.9	39.58079	-78.89989	39.61065	-78.92623	5.8	4.0

CME Path ID	Operator	CME Tower Hub ID	Tower Hub Height (meters)	Tower Hub LAT (NAD83)	Tower Hub LON (NAD83)	Subscriber LAT (deg)	Subscriber LON (deg)	Band (GHz)	Path Length (km)
109-1	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.65552	-78.92456	5.8	8.5
109-2	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.66177	-78.93453	5.8	9.5
109-3	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.65819	-78.90912	5.8	8.6
109-4	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.63470	-78.95480	5.8	7.7
109-5	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.57859	-78.91462	5.8	1.5
109-6	Two-Way Radio Service, Inc.	6a	20.6	39.58138	-78.89817	39.5945	-78.8932	5.8	1.5

Table 1: Summary of Point-to-Multipoint Beam Paths Surveyed

We calculated a Fresnel Zone for each path based on the following formula:

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



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. 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 Fresnel Zones for each microwave path listed can be found in Figure 5 followed by a list of the obstructing turbines in Table 2.

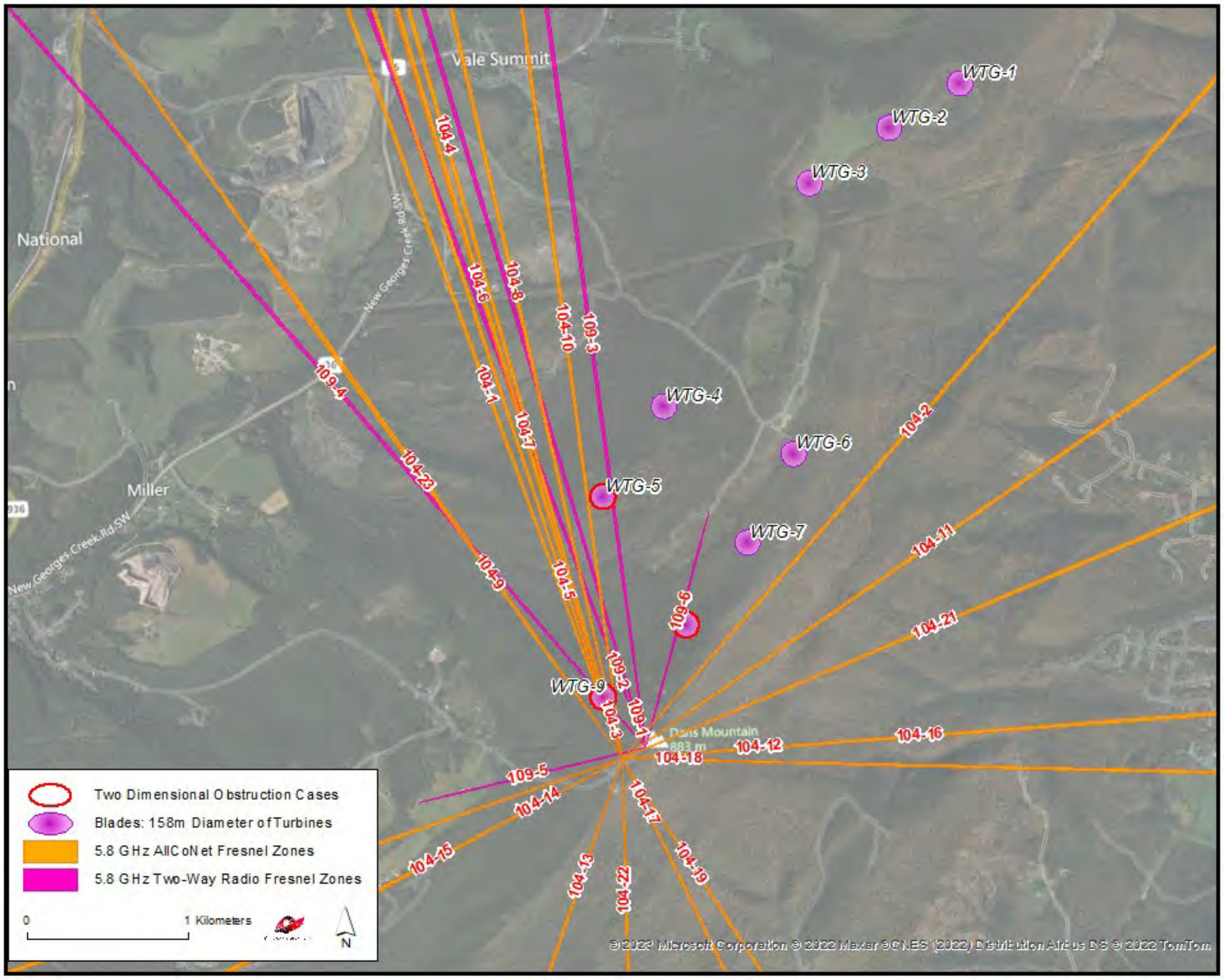


Figure 3: Unlicensed 5.8 GHz Fresnel Zones and Turbine Blades

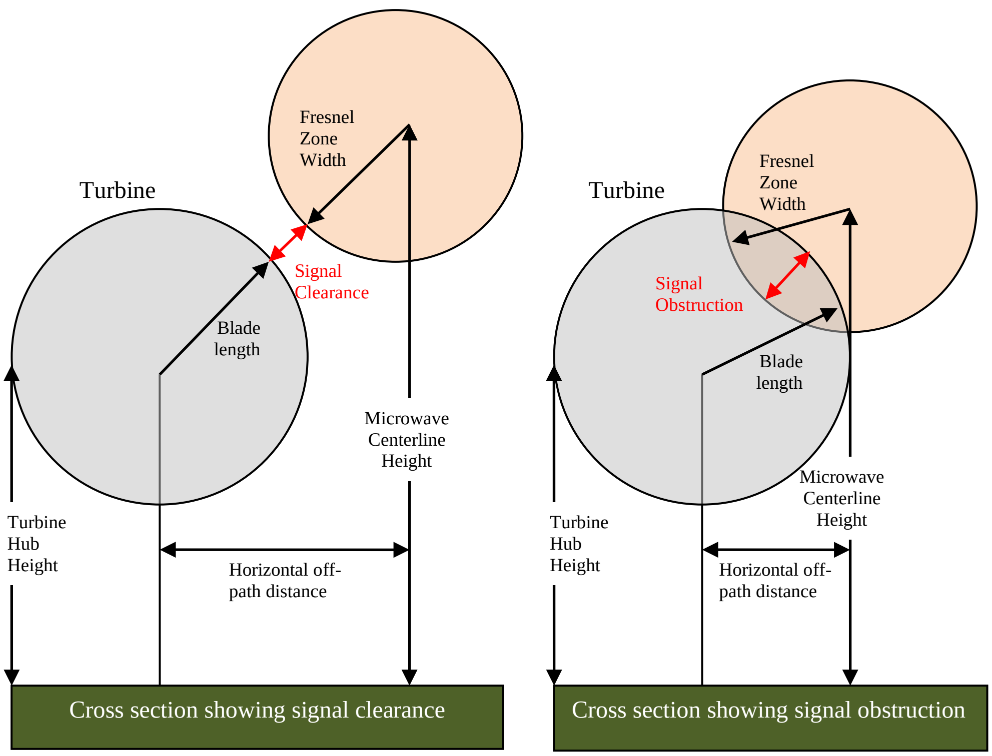
Turbine ID	Latitude (NAD83)	Longitude (NAD83)	CME Path ID Affected	Fresnel Zone Radius at Turbine Location (m)	Horizontal Off-Path Distance (m)	Distance Along Path from Hub (km)	Horizontal Clearance (m)
WTG-5	39.595475	-78.900825	109-3	8.16	55	1.58	-32.16
WTG-8	39.588177	-78.895018	109-6	4.42	48	0.80	-35.42
WTG-9	39.584258	-78.901149	109-4	4.47	7	0.41	-76.77
WTG-9	39.584258	-78.901149	104-1	4.42	22	0.40	-61.42
WTG-9	39.584258	-78.901149	104-3	4.36	0	0.40	-83.36
WTG-9	39.584258	-78.901149	104-4	4.44	7	0.40	-76.74
WTG-9	39.584258	-78.901149	104-5	4.42	10	0.40	-73.42
WTG-9	39.584258	-78.901149	104-6	4.42	1	0.40	-82.42
WTG-9	39.584258	-78.901149	104-7	4.42	1	0.40	-82.42
WTG-9	39.584258	-78.901149	104-8	4.42	28	0.40	-55.42
WTG-9	39.584258	-78.901149	104-10	4.40	64	0.40	-19.40

Table 2: Turbines that Intersect 2-D Fresnel Zones

Cross-Sectional Analysis

Our Fresnel Zone analysis in the previous section identified 11 potential obstruction cases that need to be further examined from a cross sectional perspective. The cases that will be analyzed in this section can be found in Table 3.

Our cross sectional analysis calculates the precise height and width of 100% of the first Fresnel Zone at the turbine location based on the antenna heights of the two link endpoints and the earth curvature bulge at the specific turbine location. The horizontal off-path distance was calculated in the previous section and the turbine hub height and blade length were provided by the client. The cross sectional analysis uses these values to calculate the clearance between the blades and the microwave Fresnel Zone as shown in the two diagrams below.



The results of the cross sectional calculations can be seen in Table 3. It shows negative clearance values indicating obstruction of the Fresnel zones and positive clearance values indicating clearance of the Fresnel Zones.

Microwave Path ID	Fresnel Zone Radius at Turbine Location (m)	Microwave Centerline Height at Turbine Location (m)	Turbine ID	Hub Height (m)	Blade Length (m)	Cross Sectional Clearance (m)
109-3	8.16	46.77	WTG-5	117	79	2.05
109-6	4.42	43.49	WTG-8	117	79	4.38
109-4	4.47	40.70	WTG-9	117	79	-6.88
104-1	4.42	50.10	WTG-9	117	79	-12.99
104-3	4.36	42.71	WTG-9	117	79	-9.07
104-4	4.44	54.26	WTG-9	117	79	-20.34
104-5	4.42	51.24	WTG-9	117	79	-16.91
104-6	4.42	50.80	WTG-9	117	79	-17.22
104-7	4.42	50.14	WTG-9	117	79	-16.56
104-8	4.42	47.58	WTG-9	117	79	-8.57
104-10	4.40	47.74	WTG-9	117	79	10.91

Table 3: Cross Sectional Analysis Results

3. Conclusion

The 3.65 GHz licensed Systems search found no systems servicing the region of the Dan's Mountain Wind Farm project. The closest licensed transmitter was found to be 59 km to the southeast and therefore not subject to obstruction from the proposed turbines.

An additional examination of unlicensed 5.8 GHz microwave links was performed using a Fresnel Zone obstruction analysis. These microwave links were surveyed by CME Engineering in Dec 2021 which also sited potential impact from turbines. In total this analysis found eight paths expected to experience signal obstruction by turbine WTG-9.

In the event that a WISP carrier believes that 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. This includes the optimization of surrounding base stations or the addition of a new sector or cell site. Utility towers, other communications towers, or even a turbine tower within the wind project area can serve as the platform for a new base station, cell enhancer, or repeater.

4. Contact

For questions or information regarding the Wireless Internet Services Report, please contact:

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Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Appendix A: Turbine Locations

ID	Hub Height (m)	Elevation (m)	Latitude	Longitude
WTG-1	117	772.44	39.618173	-78.874295
WTG-2	117	759.64	39.615775	-78.879492
WTG-3	117	757.19	39.612764	-78.885369
WTG-4	117	817.31	39.600463	-78.896277
WTG-5	117	802.17	39.595475	-78.900825
WTG-6	117	816.48	39.597641	-78.886969
WTG-7	117	826.14	39.592718	-78.890449
WTG-8	117	809.61	39.588177	-78.895018
WTG-9	117	834.13	39.584232	-78.901123

Wind Power GeoPlanner™

Land Mobile & Emergency Services Report

Dan's Mountain Wind Farm

Prepared on Behalf of
Dan's Mountain Wind Force, LLC

March 2, 2023

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

An assessment of the emergency services within five miles of the Dan's Mountain Wind Farm 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 appears below in Figure 1. The project area is defined as five miles from the proposed turbines which covers Allegany and Garrett Counties, Maryland, as well as Mineral County, West Virginia.

Figure 1: Project Area and Surrounding Counties

2. Summary of Results

Our land mobile and emergency services incumbent data[1] 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 within five miles of the proposed turbines appears in Figure 2.

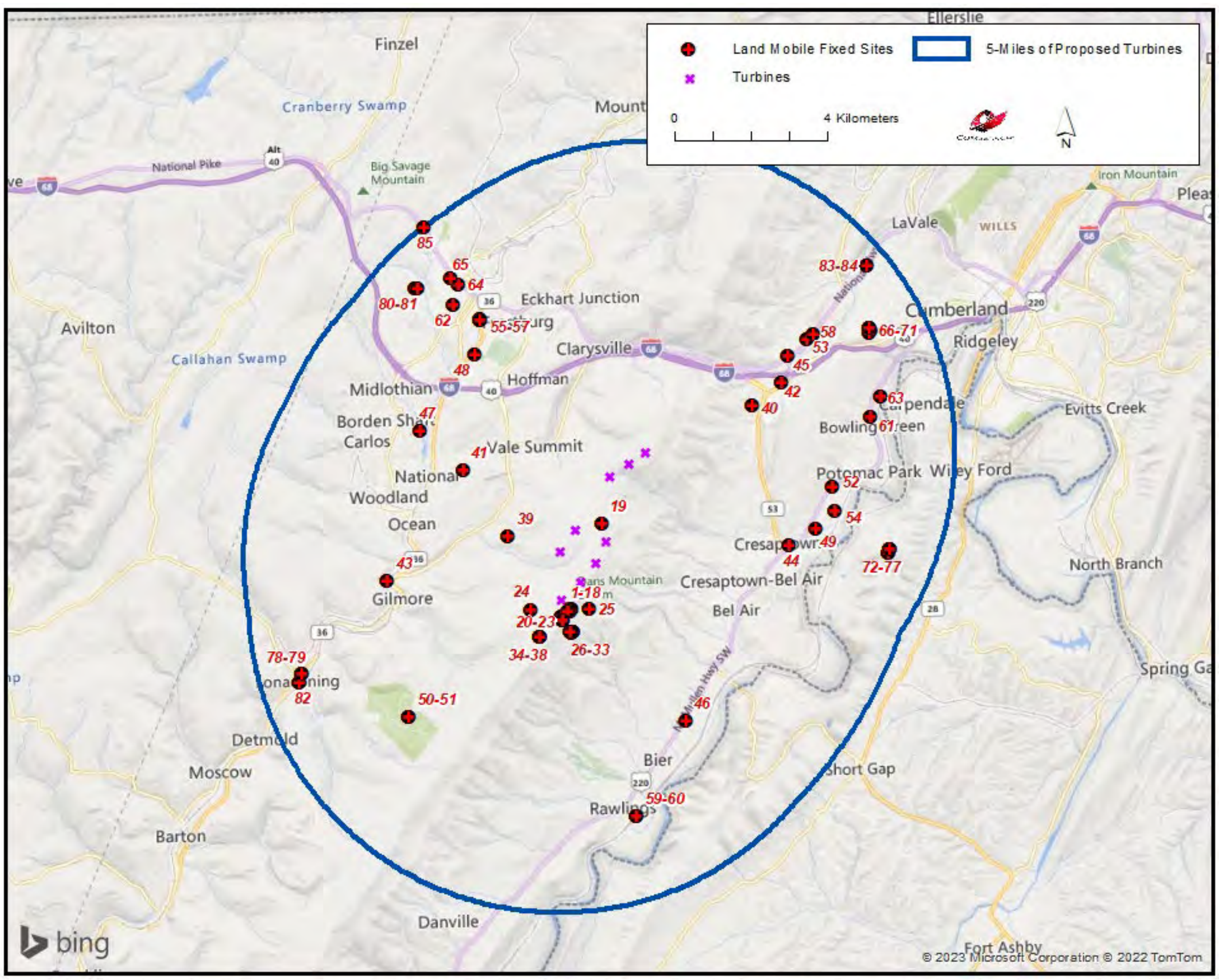

Figure 2: Land Mobile & Emergency Service Sites within Five Miles of Proposed Turbines

Figure 2 identifies eighty-five site-based licenses within five miles of the proposed turbines in the Dan's Mountain Wind Farm project. 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)	Distance to Nearest Turbine (meters)
1	WQOW665	150-174	FELHC INC	64.6	39.581111	-78.898611	408
2	KAB226	150-174, 450-470	State of Maryland, MIEMSS	52	39.580083	-78.900583	463
3	KPM488	450-470	FROSTBURG STATE UNIVERSITY	15	39.581750	-78.897806	396
4	KGG931	25-50	Maryland State Highway Administration	37	39.581194	-78.898083	427
5	WNDR708	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
6	WNJY543	150-174	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
7	WNVH555	450-470	Northrop Grumman Systems Corporation	6	39.581472	-78.897806	419
8	WPET570	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
9	WPEY303	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
10	WPGB605	450-470	TWO WAY RADIO SERVICE INC	46	39.581472	-78.897806	419
11	WPGB739	450-470	TWO WAY RADIO SERVICE INC	46	39.581472	-78.897806	419
12	WPGG609	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
13	WPIE995	72-76	TWO WAY RADIO SERVICE INC	30	39.581472	-78.897806	419
14	WPMF429	450-470	ALLEGANY, COUNTY OF	30	39.581472	-78.897806	419
15	WPOX749	450-470	TWR COMMUNICATIONS	38	39.581472	-78.897806	419
16	WPRS598	800/900	ALLEGANY, COUNTY OF	30	39.581472	-78.897806	419
17	WPWC727	450-470	TWR COMMUNICATIONS	38	39.581472	-78.897806	419
18	KTE668	150-174	State of Maryland, DNR	27	39.581750	-78.897528	414
19	KVD573	150-174	Allegany County 911 Joint Communications Division	45	39.601472	-78.887806	431
20	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	34.7	39.578917	-78.900250	595

[1] 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

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
21	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40.2	39.578917	-78.900250	595
22	WRCN287	150-174	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	70.1	39.578917	-78.900250	595
23	WRCN287	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	74.7	39.578917	-78.900250	595
24	WNCM956	150-174	CARL BELT INC	30	39.581750	-78.910028	813
25	WPEG518	450-470	TWO WAY RADIO SERVICE INC	30	39.581472	-78.892250	781
26	WQEW534	150-174	MARYLAND, STATE OF	19.8	39.576194	-78.898083	930
27	WQEW534	450-470	MARYLAND, STATE OF	20.7	39.576194	-78.898083	930
28	KBU667	150-174	Maryland, State of - DNR	12	39.576194	-78.897528	944
29	KDG881	25-50	ALLEGANY, COUNTY OF	43	39.576194	-78.897528	944
30	KGA910	25-50	MARYLAND, STATE OF	36	39.576194	-78.897528	944
31	WAM29	150-174	Maryland, State of - DNR	12	39.576194	-78.897528	944
32	WAM29	150-174	Maryland, State of - DNR	20	39.576194	-78.897528	944
33	WNNN469	150-174	T & T PUMPCO.,INC	46	39.575917	-78.897806	966
34	KTG669	25-50	ALLEGANY, COUNTY OF	49	39.575361	-78.907528	1128
35	WNJM820	450-470	ALLEGANY, COUNTY OF	37	39.575361	-78.907528	1128
36	WQFD361	450-470	ALLEGANY COUNTY OF	49	39.575278	-78.907500	1135
37	WQHV525	450-470	Allegany County Board of Education	49	39.575278	-78.907500	1135
38	WQIR601	450-470	ALLEGANY COUNTY OF	49	39.575278	-78.907500	1135
39	WPDV708	450-470	ALLEGANY, COUNTY OF	46	39.598972	-78.916139	1372
40	WROM724	450-470	COUNTRY CLUB MALL REALTY, LLC	28	39.628417	-78.841250	3057
41	WQRZ888	450-470	Vindex Energy LLC	10	39.614722	-78.929361	3252
42	WPFM943	25-50	Maryland State Highway Administration	32	39.633694	-78.832528	3979
43	WPCS783	25-50	MIDLAND VOLUNTEER FIRE COMPANY	14	39.589250	-78.953083	4498
44	KUB997	25-50, 450-470	CRESAPTOWN VOLUNTEER FIRE DEPT INC	21	39.595361	-78.831139	4489
45	KGA910	25-50	MARYLAND, STATE OF	40	39.639639	-78.830083	4482

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
46	WQCA884	450-470	American Woodmark Corporation	12.2	39.554806	-78.863639	4582
47	WNYV803	450-470	State of Maryland - Frostburg University	18	39.624250	-78.941972	4730
48	WQHE659	150-174	FROSTBURG STATE UNIVERSITY	40.7	39.641667	-78.925000	4677
49	WQPV747	450-470	ALLEGANY, COUNTY OF	12	39.598944	-78.823194	4880
50	KNHT493	150-174	Maryland, State of - DNR	12	39.557306	-78.947528	4984
51	KNHT494	150-174	Maryland, State of - DNR	12	39.557306	-78.947528	4984
52	KNNV447	150-174	MARYLAND STATE DEPARTMENT OF PUBLIC SAFETY & CORRECTIONAL SERVICES	15	39.608694	-78.817806	4964
53	KGJ642	25-50	LAVALE VOLUNTEER FIRE DEPARTMENT INC	21	39.643417	-78.824194	5134
54	WQGJ235	25-50	STATE OF MARYLAND, DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONAL SERVICES	35	39.603278	-78.817306	5166
55	KJD307	150-174	FROSTBURG, CITY OF	20	39.649806	-78.923083	5234
56	KJL891	25-50	MARYLAND, STATE OF	12	39.649806	-78.923083	5234
57	KGD459	25-50	FROSTBURG FIRE DEPARTMENT NO 1 INC	24	39.650083	-78.923361	5273
58	KNFJ222	150-174, 450-470	LAVALE VOLUNTEER RESCUE SQUAD INC	15	39.644806	-78.822528	5338
59	KCO633	150-174	CSX Transportation Inc	15	39.532722	-78.879417	6016
60	KCO633	150-174	CSX Transportation Inc	21.3	39.532722	-78.879417	6016
61	WQFI398	450-470	BOWLING GREEN VOLUNTEER FIRE DEPT	14	39.625083	-78.805583	5950
62	WQNC803	450-470	Allegany, County of	17	39.653444	-78.931167	5988
63	WPIH295	800/900	CSX Transportation Inc	2	39.629806	-78.802528	6296
64	KNEC959	150-174	TROUTMAN, ROY E	15	39.658417	-78.929472	6327
65	WPTL759	150-174	Allegany County of	15	39.659722	-78.931667	6556
66	WPQD657	450-470	COLUMBIA GAS OF MARYLAND	27.4	39.644528	-78.805278	6609
67	KGJ642	450-470	LAVALE VOLUNTEER FIRE DEPARTMENT INC	25	39.645194	-78.805083	6657
68	KNFJ222	450-470	LAVALE VOLUNTEER RESCUE SQUAD INC	25	39.645194	-78.805083	6657
69	KGA886	450-470	ALLEGANY COUNTY OF	40	39.645917	-78.805306	6676

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance to Nearest Turbine (meters)
70	WPPV765	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	40	39.645917	-78.805306	6676
71	WQCI629	450-470	ALLEGANY, COUNTY OF	15	39.645917	-78.805306	6676
72	KDG881	450-470	ALLEGANY, COUNTY OF	18.3	39.593833	-78.800889	6859
73	WQHV525	450-470	Allegany County Board of Education	18.3	39.593833	-78.800889	6859
74	WQOT448	150-174, 450-470	Mineral County Emergency Services	24	39.593833	-78.800889	6859
75	WQQD629	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	18.3	39.593833	-78.800889	6859
76	WNQI770	150-174	Mineral County Emergency Services	24	39.593139	-78.801139	6870
77	WQCI629	450-470	ALLEGANY, COUNTY OF	15	39.593139	-78.801139	6870
78	WQHV525	450-470	Allegany County Board of Education	18.3	39.567778	-78.979722	6996
79	WQQD629	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	10.7	39.567778	-78.979722	6996
80	WPDA208	25-50	MARYLAND, STATE OF - FROSTBURG STATE UNIVERSITY	18	39.657583	-78.941972	6955
81	KVN610	25-50	MARYLAND, STATE OF	18	39.657583	-78.942528	6989
82	KTK612	25-50	LONACONING VOL FIRE CO	24	39.565917	-78.980306	7101
83	KGJ642	450-470	LAVALE VOLUNTEER FIRE DEPARTMENT INC	15	39.660361	-78.805583	7532
84	KGJ642	25-50	LAVALE VOLUNTEER FIRE DEPARTMENT INC	23	39.660361	-78.805583	7532
85	KJD307	150-174	FROSTBURG, CITY OF	20	39.671750	-78.939750	8042

Table 1: Land Mobile & Emergency Service Sites in Area of Interest

Mobile Licenses

In addition to the fixed-site licenses above, 415 mobile licenses defined by center point and radius were found to intersect the Dan's Mountain Wind Farm 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 project area. The project area is located in Allegany and Garrett Counties part of Public Safety Region #20, which contains all the counties in Maryland, as well as Mineral County, park of Public Safety Region #44, which contains all the counties in West Virginia. The regional public safety operations are overseen by the entities listed below.

Charles V. Bryson
Chairperson, Public Safety Region #20
5740 Executive Dr., Suite 110 Catonsville, MD 21228
phone: 410-807-8102
email: charles.bryson@maryland.gov

David W. Saffel
Chairperson, Public Safety Region #44
West Virginia State Police 1300 Harrison Ave., Elkins, WV 26241
Phone: 304-637-0200
Fax: 304-637-0203
Email: dwsaffel@suddenlink.net

The chairpersons for these regions serve 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, twenty-nine licenses were found for the State of Maryland, six for the County of Allegany, two for the county of Garrett, twenty-eight for the state of West Virginia, and one for the County of Mineral (see Table 2). These area-wide licenses are designated for mobile use only.

ID	Licensee	Area of Operation	Frequency Band (MHz)
1	Allegany County	Countywide: ALLEGANY, MD	4940-4990
2	Allegany County 911 Joint Communications Division	Countywide: ALLEGANY, MD	150-174
3	ALLEGANY, COUNTY OF	Countywide: ALLEGANY, MD	25-50, 150-174
4	ALLEGANY, COUNTY OF	Statewide: MD	450-470
5	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	Countywide: ALLEGANY, MD	450-470
6	AMERICAN NATIONAL RED CROSS	Statewide: WV	25-50, 450-470
7	American National Red Cross	Statewide: MD	25-50
8	American National Red Cross	Statewide: WV	25-50
9	BALTIMORE, COUNTY OF	Statewide: MD	2450-2500
10	CITY OF SALISBURY POLICE DEPT SALISBURY MD 21801	Statewide: MD	2450-2500
11	DELMARVA SEARCH AND RESCUE GROUP INC.	Statewide: MD	150-174
12	DNR, State of Maryland	Statewide: MD	150-174
13	DNR, State of Maryland	Statewide: WV	150-174
14	ELLERSLIE VOL FIRE DEPT	Countywide: ALLEGANY, MD	25-50, 450-470
15	Garrett County Public Safety	Countywide: GARRETT, MD	150-174, 450-470
16	GARRETT, COUNTY OF	Countywide: GARRETT, MD	150-174
17	Howard, County of MD	Statewide: MD	2450-2500
18	Jackson County Commission	Statewide: WV	0-10
19	Lewis County	Statewide: WV	0-10
20	Marion County Central Communications 911	Statewide: WV	25-50
21	MARYLAND AND MID-ATLANTIC WILDERNESS RESCUE SQUAD, INC.	Statewide: MD	25-50, 150-174
22	MARYLAND AND MID-ATLANTIC WILDERNESS RESCUE SQUAD, INC.	Statewide: WV	25-50, 150-174
23	Maryland Department of Public Safety and Correctional Services	Statewide: MD	25-50, 150-174
24	MARYLAND STATE HIGHWAY ADMINISTRATION	Statewide: MD	450-470
25	Maryland State Highway Administration	Statewide: MD	0-10, 25-50, 150-174, 4940-4990

ID	Licensee	Area of Operation	Frequency Band (MHz)
26	MARYLAND STATE POLICE	Statewide: MD	25-50, 450-470, 2450-2500
27	Maryland State Police	Statewide: MD	2450-2500
28	Maryland Urban Search and Rescue	Statewide: MD	4940-4990
29	MARYLAND, STATE OF	Statewide: MD	25-50, 150-174, 450-470, 2450-2500
30	Maryland, State of	Statewide: MD	4940-4990
31	Maryland, State of - DNR	Statewide: MD	25-50, 150-174
32	Mineral County Emergency Services	Countywide: ALLEGANY, MD	150-174
33	Mineral County Emergency Services	Countywide: MINERAL, WV	150-174, 450-470
34	MORGANTOWN, CITY OF	Statewide: WV	2450-2500
35	NATIONAL SKI PATROL SYSTEM INC	Statewide: MD	150-174
36	NATIONAL SKI PATROL SYSTEM INC	Statewide: WV	150-174
37	Pleasants County Emergency Management	Statewide: WV	25-50
38	State of Maryland - Department of Information Technology	Statewide: MD	4940-4990
39	State of Maryland - DGS	Statewide: MD	2450-2500
40	State of Maryland - DGS - Westminster District Ct	Statewide: MD	150-174
41	State of Maryland - DoIT	Statewide: MD	25-50, 150-174, 450-470
42	State of Maryland - MDOT - MTA	Statewide: MD	2450-2500
43	State of Maryland - MEMA	Statewide: MD	150-174
44	State Of Maryland, DNR	Statewide: MD	150-174
45	State of Maryland, DNR	Statewide: MD	25-50, 150-174, 450-470, 4940-4990
46	State of Maryland, MIEMSS	Statewide: MD	25-50, 150-174, 450-470, 4940-4990
47	STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION	Statewide: WV	150-174, 450-470
48	STATE OF WEST VIRGINIA DIVISION OF HIGHWAYS	Statewide: WV	25-50, 150-174
49	STATE OF WEST VIRGINIA, DIVISION OF HIGHWYS	Statewide: WV	450-470

ID	Licensee	Area of Operation	Frequency Band (MHz)
50	Tucker Co Commission/911	Statewide: WV	0-10
51	UPSHUR, COUNTY OF	Statewide: WV	450-470
52	Urgent Ambulance	Statewide: MD	150-174
53	WASHINGTON, COUNTY OF	Statewide: MD	150-174, 450-470
54	Webster County Emergency Services	Statewide: WV	0-10
55	WEST VIRGINIA DIVISION OF HIGHWAYS	Statewide: WV	25-50
56	WEST VIRGINIA PARKWAYS, ECONOMIC DEVELOPMENT AND TOURISM AUTHORITY	Statewide: WV	4940-4990
57	WEST VIRGINIA STATE POLICE	Statewide: WV	421-430
58	West Virginia State Police	Statewide: WV	25-50, 150-174, 450-470
59	WEST VIRGINIA, STATE OF	Statewide: WV	25-50, 450-470
60	West Virginia, State of	Statewide: WV	150-174
61	WEST VIRGINIA, STATE OF - WV DIV OF CORRECTIONS	Statewide: WV	25-50
62	WEST VIRGINIA, STATE OF DIVISION OF CORRECTIONS	Statewide: WV	150-174
63	WEST VIRGINIA, STATE OF OFFICE OF EMERGENCY SERVICES	Statewide: WV	450-470
64	WEST VIRGINIA, STATE OF, OFFICE OF EMERG SVCS	Statewide: WV	450-470
65	WEST VIRGINIA, STATE OF/WEST VIRGINIA DEPARTMENT OF AGRICULTURE	Statewide: WV	150-174
66	WV DIVISION OF EMERGENCY MANAGEMENT	Statewide: WV	150-174, 450-470

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 Allegany County, MD, Garrett County, MD, and Mineral County, WV, in Table 3.

Mobile Phone Carrier	Service[2]
AT&T	700 MHz, AWS, Cellular, PCS, WCS
DISH Network	700 MHz, AWS
TerreStar	AWS
T-Mobile	700 MHz, AWS, PCS
US Cellular	700 MHz, AWS, Cellular, PCS
Verizon	700 MHz, AWS, 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 Dan's Mountain Wind Farm 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 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

[2] 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

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 at least 77.5 meters from the land mobile stations, they will meet the setback distance criteria for FCC interference emissions in the land mobile bands.

The closest proposed turbine to a licensed Land Mobile fixed site is 408 meters away. Considering the turbine diameter of 158 meters and the recommended separation distance of 77.5 meters, the nearest turbine is more than 4 times the recommended setback distance. Therefore no adverse effects are expected from this wind project.

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:

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Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Appendix A

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
1	WQHT277	450-470	A.D. NAYLOR & CO., INC.	6	39.652861	-78.762528
2	WNBK868	450-470	Advanced Communications	121	40.368111	-79.804778
3	WNKJ565	450-470	Advanced Communications	64	39.832861	-79.672833
4	WQUM662	450-470	AES Warrior Run, Inc.	32	39.594528	-78.745028
5	WPFI385	220-222	AGILE RADIO MGMT INC	80	39.651194	-77.970556
6	WRPQ435	450-470	Allegany College of Maryland	13	39.653972	-78.729000
7	WQHV525	450-470	Allegany County Board of Education	1	39.560889	-78.987972
8	WQHV525	450-470	Allegany County Board of Education	32	39.567778	-78.979722
9	WQHV525	450-470	Allegany County Board of Education	1	39.578083	-78.962639
10	WQHV525	450-470	Allegany County Board of Education	1	39.654222	-78.931861
11	WQHV525	450-470	Allegany County Board of Education	1	39.671333	-78.930333
12	WQHV525	450-470	Allegany County Board of Education	1	39.650694	-78.913028
13	WQHV525	450-470	Allegany County Board of Education	32	39.575278	-78.907500
14	WQHV525	450-470	Allegany County Board of Education	1	39.653694	-78.901750
15	WQHV525	450-470	Allegany County Board of Education	1	39.578778	-78.853722
16	WQHV525	450-470	Allegany County Board of Education	1	39.589806	-78.831361
17	WQHV525	450-470	Allegany County Board of Education	1	39.644028	-78.828417
18	WQHV525	450-470	Allegany County Board of Education	1	39.600500	-78.825028
19	WQHV525	450-470	Allegany County Board of Education	1	39.669250	-78.802583
20	WQHV525	450-470	Allegany County Board of Education	32	39.593833	-78.800889
21	KGA886	450-470	ALLEGANY COUNTY OF	16	39.650083	-78.746694
22	KSE713	450-470	ALLEGANY COUNTY OF	16	39.650083	-78.746694
23	WPTL759	150-174	Allegany County of	32	39.659722	-78.931667
24	WQFD361	450-470	ALLEGANY COUNTY OF	25	39.480556	-79.059722

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
25	WQFD361	450-470	ALLEGANY COUNTY OF	32	39.674361	-78.962389
26	WQFD361	450-470	ALLEGANY COUNTY OF	25	39.575278	-78.907500
27	WQFD361	450-470	ALLEGANY COUNTY OF	25	39.648694	-78.749722
28	WQFD361	450-470	ALLEGANY COUNTY OF	25	39.620833	-78.620556
29	WQIR601	450-470	ALLEGANY COUNTY OF	32	39.575278	-78.907500
30	WQIR601	450-470	ALLEGANY COUNTY OF	32	39.700056	-78.630611
31	WNJM820	450-470	ALLEGANY, COUNTY OF	80	39.575361	-78.907528
32	WPDV708	450-470	ALLEGANY, COUNTY OF	48	39.598972	-78.916139
33	WPIP207	450-470	ALLEGANY, COUNTY OF	17	39.642306	-78.770861
34	WPRS598	800/900	ALLEGANY, COUNTY OF	40	39.480639	-79.025028
35	WPRS598	800/900	ALLEGANY, COUNTY OF	40	39.581472	-78.897806
36	WPRS598	800/900	ALLEGANY, COUNTY OF	40	39.700361	-78.879750
37	WPRS598	800/900	ALLEGANY, COUNTY OF	40	39.620917	-78.620583
38	WPRS598	800/900	ALLEGANY, COUNTY OF	40	39.690639	-78.406389
39	WQCI629	450-470	ALLEGANY, COUNTY OF	32	39.645917	-78.805306
40	WQCI629	450-470	ALLEGANY, COUNTY OF	32	39.593139	-78.801139
41	WQNC803	450-470	Allegany, County of	24	39.653444	-78.931167
42	WQPJ228	450-470	ALLEGANY, COUNTY OF	32	39.562944	-79.039722
43	WQPJ228	450-470	ALLEGANY, COUNTY OF	32	39.716167	-78.883556
44	WQPV747	450-470	ALLEGANY, COUNTY OF	25	39.598944	-78.823194
45	WQTV438	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNCIATIONS DIVISION	8	39.609111	-78.798722
46	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.480333	-79.059722
47	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.578917	-78.900250

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
48	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.716167	-78.883556
49	WRCJ556	800/900	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.701083	-78.632667
50	WRCN287	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	32	39.480333	-79.059722
51	WRCN287	150-174	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.480333	-79.059722
52	WRCN287	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	32	39.578917	-78.900250
53	WRCN287	150-174	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.578917	-78.900250
54	WRCN287	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	32	39.716167	-78.883556
55	WRCN287	150-174	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.716167	-78.883556
56	WRCN287	450-470	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	32	39.701083	-78.632667
57	WRCN287	150-174	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40	39.701083	-78.632667
58	WPPV765	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	32	39.645917	-78.805306
59	WQQD629	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	32	39.567778	-78.979722
60	WQQD629	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	32	39.593833	-78.800889
61	WQRD909	450-470	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	16	39.666667	-78.666667
62	KNGG920	450-470	ALTOONA, CITY OF	121	40.567833	-78.440306
63	WQCA884	450-470	American Woodmark Corporation	32	39.554806	-78.863639
64	KD27566	150-174	Arco Enterprises, Inc.	120.7	40.301444	-79.533639
65	WRBR965	450-470	ARJ Construction Company	32	39.517444	-79.085944
66	WQBF493	450-470	ATCHISON ELECTRIC, INC DBA ATCHISON ELECTRIC	65	39.902222	-79.163194

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
67	WQKH635	72-76, 150-174, 450-470, 470-512	Audacy License, LLC	160	40.493944	-80.018944
68	WPCE937	25-50	AUGUSTA VOLUNTEER FIRE COMPANY	48	39.294556	-78.639167
69	WQVM361	450-470	AUTOMATED PACKING SYSTEMS, INC.	15	39.438611	-78.957778
70	KME826	450-470	B R Communications, Inc.	121	38.601500	-78.632250
71	WNGA903	450-470	B R Communications, Inc.	121	38.601500	-78.632250
72	WNLW596	150-174	Baptist Convention of Maryland/Delaware T/A Skycroft	121	39.497333	-77.608056
73	WPGP815	450-470	Barber Oil comany	121	40.440361	-78.901139
74	KUE646	25-50, 150-174	BARTON HOSE COMPANY NUMBER 1	40	39.528417	-79.016972
75	WPMZ637	150-174	BARTON HOSE COMPANY NUMBER 1	24	39.518972	-79.001972
76	WNRP816	450-470	Bear Communications, Inc.	121	39.159000	-78.175833
77	WPGD257	450-470	Bear Communications, Inc.	80	39.420667	-78.088889
78	WPJY688	450-470	Bear Communications, Inc.	80	39.420667	-78.088889
79	BLP01089	150-174	BEASLEY MEDIA GROUP LICENSES, LLC	48	39.950083	-79.163083
80	BLP01118	470-512	BEASLEY MEDIA GROUP LICENSES, LLC	48	39.950000	-79.163333
81	BLP01216	150-174	BEASLEY MEDIA GROUP LICENSES, LLC	48	39.950083	-79.151972
82	KCS336	450-470	BEDFORD, COUNTY OF	32	39.887972	-78.661806
83	KCS336	450-470	BEDFORD, COUNTY OF	32	39.829722	-78.542778
84	WNLA780	450-470	BEDFORD, COUNTY OF	80	39.924806	-77.955833
85	KGD722	25-50	BERLIN FIRE DEPARTMENT, INC.	48	39.921472	-78.956139
86	WQRC967	450-470	Big Savage, LLC.	25	39.765444	-78.876472
87	WRTR950	450-470	Black Hawk Farms	80	39.900861	-78.418833
88	WNLI947	150-174, 450-470	Blackhawk Mining, LLC	121	39.667028	-80.261472
89	WNNI552	450-470	BOARD OF EDUCATION OF THE COUNTY OF HARRISON	121	39.275639	-80.295083
90	WQFI398	450-470	BOWLING GREEN VOLUNTEER FIRE DEPT	30	39.625083	-78.805583

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
91	KNEU518	25-50, 150-174	BOWMANS ADDITION VOLUNTEER FIRE CO INC	40	39.668972	-78.761139
92	WRP976	450-470	BRAIS, RONALD N:HARSH, ROBERT E DBA R & R ENTERPISES	121	39.661194	-77.966389
93	WQXJ583	150-174	BRIMROSE TECHNOLOGY CORP	40	39.284194	-79.145917
94	WQXJ583	150-174	BRIMROSE TECHNOLOGY CORP	65	39.284194	-79.145917
95	KD28658	450-470	BRINK'S INCORPORATED	121	40.326472	-78.917250
96	WSO302	25-50	BRUFFEY TRUCKING CO INC	160	38.823167	-80.463972
97	WNXJ900	150-174	BURLINGTON VOL FIRE DEPT INC	32	39.335944	-78.823361
98	WNGS798	150-174	CAMPBELL, JAMES	121	39.662583	-77.891944
99	WQBZ967	450-470	CAREFIRST / BLUE CROSS BLUE SHIELD	8	39.680500	-78.737167
100	WNCM956	150-174	CARL BELT INC	121	39.581750	-78.910028
101	WQSK800	450-470	Casselman Windpower, LLC	32	39.864861	-79.104528
102	WRCK794	450-470	Casselman Windpower, LLC	32	39.864917	-79.104556
103	WQKT870	150-174	Cave Mt Ranch LLC	80	38.932583	-79.198917
104	WQKH779	72-76, 150-174, 450-470, 470-512	CBS BROADCASTING INC.	160	40.493944	-80.018944
105	WNDE442	800/900	CELCO SND COMM INC DBA LINDEN SMR ASSOCIATES	113	38.933889	-78.029167
106	WQYC251	150-174	CENTER FOR EMERGENCY MEDICINE	80	39.854722	-79.657222
107	WQYC251	150-174	CENTER FOR EMERGENCY MEDICINE	80	40.063889	-79.260833
108	KQL934	150-174, 450-470	CENTER FOR EMERGENCY MEDICINE OF WESTERN PENNSYLVANIA	80	40.063972	-79.260861
109	WNMJ779	450-470	CHERRY COMMUNICATIONS	121	40.497306	-78.132222
110	WNQF436	450-470	CHERRY COMMUNICATIONS	80	40.238417	-78.657528
111	WRFA848	450-470	CHESAPEAKE FOODS INC	80	39.450361	-77.988194
112	KNBI780	25-50	Citgo Petroleum Corporation	80	39.180389	-78.168333
113	KAW513	150-174	CITY OF CUMBERLAND	24	39.650083	-78.746694

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
114	WPCA327	150-174	CLARK, RANDY A:CLARK, RONALD G DBA GERALD W CLARK WELL DRILLING & PUMPS	121	40.001194	-78.400861
115	KB9298	150-174	COLUMBIA GAS OF MARYLAND	40.2	39.527861	-79.083083
116	WPPZ509	450-470	COLUMBIA GAS OF MARYLAND	64	39.677583	-78.960028
117	WPQD657	450-470	COLUMBIA GAS OF MARYLAND	32	39.644528	-78.805278
118	WPOZ869	450-470	COLUMBIA GAS of PENNSYLVANIA	32	39.937861	-79.042250
119	WPYF320	150-174	Commonwealth of PA Dept. of Conservation & Natural Resources	40	39.806194	-79.173083
120	WQLM932	150-174	Commonwealth of Pennsylvania	60	39.829944	-78.543500
121	WQLN221	150-174	Commonwealth of Pennsylvania	56	39.806500	-79.173028
122	WQLP366	150-174	Commonwealth of Pennsylvania	60	39.850306	-78.734639
123	WQLS298	150-174	Commonwealth of Pennsylvania	64	40.039500	-78.782500
124	WQUX221	150-174	Commonwealth of Pennsylvania	36	39.806500	-79.173083
125	WQL325	25-50	COMMUNICATION SERVICE INC	121	39.275917	-80.293694
126	WPGM583	450-470	COMPROS, INC	121	40.599222	-79.052806
127	WPGN780	450-470	CONNELLSVILLE AREA SCHOOL DISTRICT	80	40.013694	-79.516694
128	WROM724	450-470	COUNTRY CLUB MALL REALTY, LLC	32	39.628417	-78.841250
129	KUB997	25-50, 450-470	CRESAPTOWN VOLUNTEER FIRE DEPT INC	16	39.595361	-78.831139
130	WNNO416	450-470	CRYSTAL SOUND SYSTEMS INC	80	39.894528	-79.626139
131	KCO632	150-174	CSX Transportation Inc	40	39.799611	-78.970639
132	KCO633	150-174	CSX Transportation Inc	24	39.457417	-79.223083
133	KCO633	150-174	CSX Transportation Inc	24	39.532722	-78.879417
134	KNNN252	150-174	CSX TRANSPORTATION INC	24	39.750639	-78.738639
135	KNNN252	150-174	CSX TRANSPORTATION INC	24	39.795639	-78.719750
136	KSK474	150-174	CSX Transportation Inc	40	39.805278	-79.328611
137	KVI486	150-174	CSX Transportation Inc	24	39.688139	-78.780028

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
138	KVI486	150-174	CSX Transportation Inc	24	39.630889	-78.764361
139	KVI486	150-174	CSX Transportation Inc	24	39.628972	-78.759167
140	KVI486	150-174	CSX Transportation Inc	24	39.627028	-78.741667
141	WNBL231	150-174	CSX TRANSPORTATION INC	40	39.433111	-79.270167
142	WNBL231	150-174	CSX TRANSPORTATION INC	40	39.507167	-79.135167
143	WNBZ936	150-174	CSX Transportation Inc	24	39.865556	-79.063889
144	WNBZ936	150-174	CSX Transportation Inc	24	39.814917	-78.895917
145	WNBZ936	150-174	CSX Transportation Inc	24	39.842861	-78.795917
146	WNNC205	150-174	CSX Transportation Inc	24	39.387389	-79.166417
147	WNZS727	450-470	CSX TRANSPORTATION INC	8	39.628972	-78.759194
148	WPXS770	450-470	CSX Transportation Inc	8	39.630861	-78.764389
149	WPXS770	450-470	CSX Transportation Inc	8	39.623417	-78.735306
150	WPYW315	450-470	CSX Transportation Inc	8	39.633806	-78.766306
151	WQKH593	150-174	CSX Transportation Inc	24	39.816639	-78.954972
152	WQSD866	150-174	CSX TRANSPORTATION INC	40	39.564361	-78.726556
153	WQSD866	150-174	CSX TRANSPORTATION INC	40	39.531750	-78.604667
154	WQSD866	150-174	CSX TRANSPORTATION INC	40	39.538611	-78.446778
155	WQSI495	150-174	CSX Transportation Inc	40	39.935250	-79.142750
156	WQSL548	150-174	CSX Transportation Inc	24	39.479889	-79.045306
157	WQWK379	150-174	CSX Transportation Inc	24	39.481111	-79.049194
158	WQXW578	450-470	CSX Transportation Inc	24	39.630944	-78.764639
159	WQYI997	150-174	CSX Transportation Inc	24	39.523278	-78.527417
160	WQYR627	150-174	CSX Transportation Inc	24	39.816944	-79.025000
161	WQYR627	150-174	CSX Transportation Inc	24	39.811306	-78.959833
162	WQYR627	150-174	CSX Transportation Inc	24	39.818000	-78.719500

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
163	WQYT437	150-174	CSX TRANSPORTATION INC	24	39.703000	-78.782778
164	WQYX306	150-174	CSX TRANSPORTATION INC	24	39.682306	-78.784750
165	WQZA759	150-174	CSX Transportation Inc	24	39.481167	-79.049167
166	WQCA955	25-50, 450-470	CUMBERLAND VALLEY TOWNSHIP VOL FIRE DEPT.	32	39.793167	-78.678694
167	WQA760	150-174	CUMBERLAND, CITY OF	16	39.648417	-78.765583
168	WQCP411	450-470	DISTRICT 16 AMBULANCE SERVICE	18	39.590778	-78.734889
169	WNJR423	25-50	EICHELBERGERS INC	121	39.948417	-79.039194
170	WNKW821	150-174	ELKINS MOUNTAIN SCHOOL	121	38.923722	-79.843389
171	WPDS263	800/900	FAYETTE, COUNTY OF	121	39.810917	-79.691833
172	WPDS263	800/900	FAYETTE, COUNTY OF	32	39.806750	-79.172806
173	WQSF386	800/900	FAYETTE, COUNTY OF	56	39.877861	-79.508361
174	WQSF386	800/900	FAYETTE, COUNTY OF	56	39.769722	-79.459333
175	WRTM925	450-470	FedEx Ground - Cumberland	32	39.598306	-78.738806
176	WQOW665	150-174	FELHC INC	45	39.519167	-79.301667
177	WQOW665	150-174	FELHC INC	45	39.581111	-78.898611
178	WQOW666	150-174	FELHC INC	45	39.830917	-78.543917
179	WQPG420	150-174	FELHC INC	55	39.309694	-78.716778
180	WQPG420	150-174	FELHC INC	45	39.303889	-78.653611
181	WQPG425	150-174	FELHC INC	45	39.689528	-78.299722
182	KA7455	150-174	FELHC, INC	40	39.581194	-78.898639
183	KA7455	450-470	FELHC, INC	80	39.186889	-78.281389
184	KA7455	150-174, 450-470	FELHC, INC	161	39.130667	-78.191389
185	WPTN344	450-470	FELHC, Inc.	93.2	39.418417	-79.400306
186	WPUA563	800/900	FELHC, INC.	113	40.496750	-78.131528
187	WPUB744	800/900	FELHC, INC.	113	40.145917	-77.652194

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
188	WPUB760	800/900	FELHC, INC.	113	40.354528	-78.838778
189	WPUB882	800/900	FELHC, INC.	113	40.127444	-78.170278
190	WPUB907	800/900	FELHC, INC.	113	39.824528	-78.968500
191	WPUB917	800/900	FELHC, INC.	113	40.567972	-78.441278
192	WPGP692	25-50	FI HOFF CONCRETE PRODUCTS INC	121	40.280639	-78.842806
193	WQBY878	450-470	FLINTSTONE VOLUNTEER FIRE COMPANY INC	32	39.688167	-78.529278
194	WNNT920	150-174	FRANK E WILSON LUMBER CO INC	121	38.925667	-79.849778
195	KAR780	150-174	FREDERICK COUNTY FIRE AND RESCUE DEPARTMENT	64	39.193278	-78.371417
196	WPMA734	800/900	FREDERICK COUNTY PUBLIC SCHOOLS	113	39.182056	-78.390000
197	WQTB272	150-174	Friends Aware	10	39.670500	-78.765194
198	WRAJ337	150-174	FRONTIER CONSTRUCTION COMPANY	79	40.098889	-79.361083
199	KC23117	450-470	FROSTBURG STATE UNIVERSITY	12.8	39.651194	-78.931694
200	WQHE659	150-174	FROSTBURG STATE UNIVERSITY	32	39.641667	-78.925000
201	KJD307	150-174	FROSTBURG, CITY OF	29	39.671750	-78.939750
202	WPYY580	150-174	FROSTBURG, CITY OF	40	39.674361	-78.962389
203	WNKX764	450-470	FULTON, COUNTY OF	80	40.238417	-78.657528
204	WQJY740	150-174	GANOE ENTERPRISES INC DBA CUSTOM COMPUTERS & COMMUNICATIONS	40	39.309694	-78.716778
205	WPRU936	800/900	GARRETT COUNTY OF	40	39.475083	-79.357528
206	WPRU936	800/900	GARRETT COUNTY OF	40	39.797028	-79.167806
207	WQOR765	450-470	GARRETT LIMESTONE CO.	32	39.881944	-79.092222
208	KGG760	150-174	GARRETT, COUNTY OF	40	39.412417	-79.361278
209	KGG760	150-174	GARRETT, COUNTY OF	40	39.688306	-79.092167
210	KYQ343	25-50, 450-470	GARRETT, COUNTY OF	50	39.513417	-79.298917
211	KYQ343	25-50	GARRETT, COUNTY OF	50	39.404528	-79.292250

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
212	KYQ343	25-50	GARRETT, COUNTY OF	50	39.694222	-79.250583
213	KYQ343	25-50	GARRETT, COUNTY OF	50	39.688139	-79.091972
214	KYQ343	25-50	GARRETT, COUNTY OF	50	39.676667	-78.960278
215	WPMK894	150-174	Garrett, County of	40	39.683972	-78.965583
216	WQUG671	150-174	GARRETT, COUNTY OF	40	39.652722	-79.439000
217	WQUG671	150-174	GARRETT, COUNTY OF	40	39.806500	-79.173028
218	WPGK510	450-470	GAUMER INDUSTRIES	121	39.929806	-77.663611
219	WRBP718	150-174	Georges Creek Railway	24	39.486889	-79.044167
220	WPNQ553	150-174	GML TRANSPORTATION INC DBA YELLOW CAB COMPANY	40	39.628139	-78.766944
221	BLP01060	150-174	GRAY TELEVISION LICENSEE, LLC	322	37.539306	-77.438028
222	BLP01084	150-174	GRAY TELEVISION LICENSEE, LLC	322	37.255972	-79.955028
223	BLP01212	450-470, 470-512	GRAY TELEVISION LICENSEE, LLC	321	37.255972	-79.955028
224	WPZZ417	450-470	Grey Wolfe Inc	80	39.208194	-78.109861
225	WQWJ404	450-470	HAMPSHIRE COUNTY COMMISSION	32	39.309694	-78.716778
226	WPTX514	150-174, 450-470	HAMPSHIRE, COUNTY OF	40	39.309833	-78.716778
227	WQQP237	150-174	HAMPSHIRE, COUNTY OF	40	39.160333	-78.826083
228	WPSE848	800/900	HARDY, COUNTY OF	72	38.983972	-78.908333
229	WQII833	150-174	HESS, ROGER	112	39.784111	-77.544889
230	WNXI392	450-470	HILLTOP TOWER LEASING INC	121	39.961194	-77.475278
231	WNXI986	450-470	HILLTOP TOWER LEASING INC	121	39.922306	-77.954722
232	WPGH624	450-470	HILLTOP TOWER LEASING INC	121	40.371194	-78.983917
233	WPGM584	450-470	HILLTOP TOWER LEASING INC	121	40.567556	-78.444750
234	WPEZ558	450-470	Hilltop Tower Leasing, Inc.	121	40.488694	-78.355278
235	WQJP648	450-470	Hunter Douglas Fabrication Company Northeast	10	39.592556	-78.752194
236	WYR458	25-50	HYDROCARBON ENERGIES INC	121	38.980667	-80.128694

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
237	KNIE375	25-50	HYNDMAN VOLUNTEER FIRE DEPARTMENT INC	32	39.820361	-78.721972
238	WQFA306	450-470	JCPenney Shared Services Center	32	39.632000	-78.835000
239	WPRF531	450-470	KEYSER, CITY OF	25	39.427028	-78.951417
240	WRQX479	450-470	Keystone Land Resources, Inc. d/b/a Keystone Transloading	120	40.008417	-79.929500
241	WNCS808	150-174	KING, GERALD	97	40.015917	-79.523083
242	WQFT904	25-50	KROM III, EDWARD V	121	38.934000	-78.029167
243	WQFT904	25-50	KROM III, EDWARD V	121	39.135667	-77.923333
244	KFW781	25-50	KUYKENDALL, LARRY D	97	38.983722	-78.908361
245	WNMG274	450-470	LAUREL HIGHLAND RIVER TOURS	80	39.877861	-79.508083
246	WNQU372	450-470	LAURITA ENERGY CORP	121	39.695917	-79.765056
247	WRDY682	800/900	Lauttamus Holding, Inc.	113	39.566389	-79.876111
248	KGJ642	25-50, 450-470	LAVALE VOLUNTEER FIRE DEPARTMENT INC	20	39.643417	-78.824194
249	KNFJ222	150-174, 450-470	LAVALE VOLUNTEER RESCUE SQUAD INC	16	39.644806	-78.822528
250	WPMZ299	150-174	LEE, GLEN M	40	39.437861	-78.974194
251	WPKM217	450-470	Lightner Electronics Inc.	121	40.488417	-78.353056
252	WPNX237	450-470	Lightner Electronics Inc.	121	40.487583	-78.351111
253	WNIU236	450-470	LLOYD HOFF HOLDING CORP.	121	39.275556	-80.295278
254	WNPJ304	450-470	LLOYD HOFF HOLDING CORP.	121	39.275556	-80.295278
255	WNPJ304	450-470	LLOYD HOFF HOLDING CORP.	121	38.937528	-79.710278
256	WNRR200	450-470	LLOYD HOFF HOLDING CORP.	121	39.695917	-79.765056
257	WNRS525	450-470	LLOYD HOFF HOLDING CORP.	121	39.444444	-79.607222
258	WPAJ626	450-470	LLOYD HOFF HOLDING CORP.	121	39.275556	-80.295000
259	WPEG524	450-470	LLOYD HOFF HOLDING CORP.	80	39.695833	-79.765000
260	WPEK367	450-470	LLOYD HOFF HOLDING CORP.	121	38.862333	-79.933944
261	WPEQ336	450-470	LLOYD HOFF HOLDING CORP.	121	39.444444	-79.607222

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
262	WPQH291	800/900	LLOYD HOFF HOLDING CORP.	113	39.695917	-79.765056
263	KTK612	25-50	LONACONING VOL FIRE CO	40	39.565917	-78.980306
264	WPGU207	150-174	LORD FAIRFAX EMS COUNCIL	121	39.183444	-78.166389
265	WQF417	450-470	M&D TECHNICAL SERVICES LLC	121	39.696472	-77.512500
266	KNNV447	150-174	MARYLAND STATE DEPARTMENT OF PUBLIC SAFETY & CORRECTIONAL SERVICES	8	39.608694	-78.817806
267	WPBM892	450-470	Maryland State Highway Administration	61	39.581194	-78.898083
268	WPBM895	450-470	Maryland State Highway Administration	61	39.690639	-78.406944
269	WPIU783	800/900	MARYLAND, STATE OF - BUREAU OF MINES	48	39.581750	-78.898361
270	WPJV866	450-470	MARYLAND, STATE OF - DEPARTMENT OF PUBLIC SAFETY & CORRECTIONAL SERVICES	2	39.608694	-78.817806
271	WPSS666	150-174	Matthews Communcations	40	40.013417	-79.093361
272	WQAY891	150-174	MATTHEWS COMMUNICATIONS	40	40.044972	-78.793639
273	WQBD730	150-174	MATTHEWS COMMUNICATIONS	40	40.044972	-78.793639
274	WPMH892	150-174	MATTHEWS, MARK	40	39.965639	-79.013639
275	WNJQ716	450-470	MATTHEWS, MARK J	80	39.759806	-79.191417
276	WPQH438	150-174	MATTHEWS, MARK J	40	39.794806	-79.168083
277	WQUV422	25-50, 150-174, 450-470	McDONALD'S RESTAURANTS OF MARYLAND, INC. #2027	1	39.636389	-78.841111
278	WQTT781	450-470	MCILWAIN SCHOOL BUS LINES, INC.	32	39.914778	-78.886944
279	KD51404	450-470	Mettiki Coal, LLC	80	39.266361	-79.430806
280	WNYT636	450-470	MEYERSDALE AREA SCHOOL DISTRICT	24	39.814806	-79.040861
281	WNRU789	150-174	MEYERSDALE MUNICIPAL AUTHORITY	40	39.814806	-79.025306
282	WPCS783	25-50	MIDLAND VOLUNTEER FIRE COMPANY	40	39.589250	-78.953083
283	WNQI770	150-174	Mineral County Emergency Services	64	39.382389	-79.078556
284	WPHK519	450-470	Mineral County Emergency Services	32	39.395833	-78.929167

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285	WQVL723	150-174	Mineral County Emergency Services	20	39.480333	-79.059722
286	WQZF938	450-470	Mineral County Emergency Services	32	39.538750	-78.738333
287	WRCT924	450-470	Mineral County Emergency Services	32	39.480333	-79.059722
288	KQK497	25-50	MORGAN, COUNTY OF	50	39.461667	-78.350000
289	WNRB670	800/900	MORGAN, COUNTY OF	48	39.445917	-78.343611
290	WPSD704	800/900	MORGAN, COUNTY OF	50	39.626667	-78.228056
291	WPTA421	800/900	MORGAN, COUNTY OF	50	39.626667	-78.228056
292	WPTD554	150-174	MORGAN, COUNTY OF	40	39.577000	-78.379306
293	WPTD554	25-50, 150-174	MORGAN, COUNTY OF	50	39.626667	-78.228333
294	WPDN412	450-470	MultiComm, Inc.	121	40.497306	-78.353056
295	WNIX722	150-174	NATIONAL SKI PATROL SYSTEM INC	40	39.558417	-79.349750
296	WNRX874	25-50	NEXUS DRILLING CORPORATION	121	39.007889	-80.153417
297	WNVH555	450-470	Northrop Grumman Systems Corporation	32	39.581472	-78.897806
298	WNVH555	450-470	Northrop Grumman Systems Corporation	8	39.554667	-78.832389
299	WQKQ716	150-174	OAKLAND VOLUNTEER FIRE DEPARTMENT INC.	40	39.409889	-79.406083
300	WRDY224	450-470	OHIO SEMITRONICS OF CA, INC	80	39.459444	-77.969167
301	WPDK638	800/900	PDV Spectrum Holding Company, LLC	113	39.490111	-77.498611
302	WNRC380	800/900	PECO ENERGY COMPANY	644	40.015944	-75.619111
303	KKA690	150-174	Penn Line Service, Inc.	80	40.107111	-79.580083
304	WPRR650	150-174	PENNA. TURNPIKE COMM	40	39.959806	-78.852528
305	WNYR682	450-470	Penna. Turnpike Comm.	120.7	40.313944	-79.680056
306	WNYR682	450-470	Penna. Turnpike Comm.	120.7	39.992861	-79.019750
307	WNYR682	450-470	Penna. Turnpike Comm.	120.7	40.089250	-77.844722
308	WQWE404	150-174	PENNSYLVANIA, COMMONWEALTH OF	36	39.829944	-78.543500
309	KFZ324	25-50	Peoples Natural Gas Company	129	40.771444	-79.413389

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
310	KR6141	150-174	Peoples Natural Gas Company LLC	121	40.500083	-78.999750
311	WQCS655	150-174, 450-470	PETERSON RADIO INC	482.8	38.754806	-83.536111
312	WQCI207	25-50	Pilgrim's Pride Corporation	121	38.982806	-78.908167
313	WQLA756	25-50	Pilgrim's Pride Corporation	121	38.982889	-78.908083
314	WQLA756	25-50	Pilgrim's Pride Corporation	121	38.650806	-78.664833
315	WQNB914	450-470	Pitt Ohio Express LLC	32	39.592056	-78.758139
316	WPQD237	450-470	POTOMAC HIGHLANDS AIRPORT AUTHORITY	3	39.618139	-78.759750
317	KNHU248	150-174	POTOMAC STATE COLLEGE	121	39.438972	-78.982806
318	KNEV403	150-174	PRESTON, COUNTY OF	64	39.475361	-79.672556
319	WQBB229	150-174	QUEEN CITY TAXI INC	40	39.638972	-78.761944
320	WNGP438	150-174	REAL ESTATE TRUST	80	40.181389	-79.151111
321	WNGP438	150-174	REAL ESTATE TRUST	97	40.181389	-79.151111
322	KD52109	450-470	RECREATION INDUSTRIES, INC.	32	39.548778	-79.356111
323	WNKL656	800/900	REGENCY CAB COMPANY	113	39.490111	-77.498611
324	WPAC762	150-174	ROSE, JOHN R	121	39.100111	-79.989528
325	WQCJ554	450-470	RUBBERMAID COMMERCIAL PRODUCTS	80	39.143056	-78.188889
326	WNNC225	150-174	SCALP LEVEL PAINT VOL FIRE DEPT	121	40.243972	-78.850028
327	WQRC873	450-470	Sears Holding Company	1	39.626639	-78.836000
328	WQTV917	450-470	Sheppard Pratt Health System	32	39.656528	-78.736083
329	WPGJ463	450-470	SHERMAN JR, JOHN M:SHOWALTER, MIKE D DBA EASTERN COMMUNICATIONS	80	38.984000	-78.908361
330	KNAM511	450-470	SMITH BUS COMPANY INC	121	40.448667	-79.157528
331	WNNK515	450-470	SOMERSET COMMUNITY HOSPITAL	48	40.006750	-79.079472
332	WQUB208	450-470	SOUTHAMPTON, TOWNSHIP OF	32	39.743944	-78.842250
333	WQDH781	450-470	State of Maryland - Department of Juvenile Services	8	39.590361	-79.021139

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
334	WQBB219	450-470	State of Maryland - DHMH -Thomas B Finan Center	10	39.654250	-78.735861
335	WQBB219	450-470	State of Maryland - DHMH -Thomas B Finan Center	13	39.654250	-78.735861
336	WQFI854	450-470	State of Maryland - District Court	30	39.566111	-78.979167
337	WPVB924	450-470	State of Maryland - DPSCS - North Branch Correctional Institute	2	39.603139	-78.819472
338	WNYV803	450-470	State of Maryland - Frostburg University	8	39.624250	-78.941972
339	WPGN363	450-470	State of Maryland - Frostburg University	6	39.624250	-78.941972
340	WQGJ235	25-50	STATE OF MARYLAND, DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONAL SERVICES	40	39.603278	-78.817306
341	KTI719	150-174	State of Maryland, DNR	40	39.716167	-78.883556
342	WPNW219	25-50	SUMMIT, TOWNSHIP OF	24	39.802028	-79.044472
343	WNMX434	450-470	T & T PUMPCO.,INC	113	39.566472	-79.875889
344	WPEA466	450-470	TACO BELL #9569	121	40.301444	-79.538917
345	KRA979	25-50	TRI STAR MINING INC	121	39.939528	-79.189472
346	WRDV819	800/900	TRIANGLE COMMUNICATIONS INC	113	40.145361	-77.653583
347	WPEC863	450-470	Triconnex LP	64	39.811028	-79.691778
348	WPGW283	450-470	Triconnex LP	121	39.811000	-79.691750
349	WPHK369	450-470	TRICONNEX LP	121	40.321667	-79.877500
350	WPHK369	450-470	TRICONNEX LP	121	39.811028	-79.691778
351	WPHQ906	450-470	Triconnex LP	121	40.137778	-79.957778
352	WPHQ906	450-470	Triconnex LP	121	40.638611	-79.146389
353	WPRH759	450-470	TUCKER COUNTY BOARD OF EDUCATION	121	39.106778	-79.603111
354	WPRI785	450-470	TWO WAY RADIO COMMUNICATIONS	32	39.674806	-78.778917
355	WPQH959	450-470	TWO WAY RADIO SERVICE	32	39.310639	-78.717222
356	WNDR708	450-470	TWO WAY RADIO SERVICE INC	112	39.581472	-78.897806
357	WPAN258	450-470	TWO WAY RADIO SERVICE INC	16	39.480639	-79.025028

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
358	WPDJ521	450-470	TWO WAY RADIO SERVICE INC	32	39.581194	-78.895583
359	WPDQ212	450-470	TWO WAY RADIO SERVICE INC	80	39.419833	-78.089167
360	WPET570	450-470	TWO WAY RADIO SERVICE INC	80	39.581472	-78.897806
361	WPEY303	450-470	TWO WAY RADIO SERVICE INC	80	39.581472	-78.897806
362	WPGB605	450-470	TWO WAY RADIO SERVICE INC	80	39.581472	-78.897806
363	WPGB739	450-470	TWO WAY RADIO SERVICE INC	80	39.581472	-78.897806
364	WPGG609	450-470	TWO WAY RADIO SERVICE INC	80	39.581472	-78.897806
365	WPHQ623	450-470	TWO WAY RADIO SERVICE INC	80	39.147611	-79.570889
366	WPTN295	450-470	TWO WAY RADIO SERVICE INC	32	39.636194	-78.609722
367	WQKP313	450-470	Two-Way Radio Service Inc.	32	39.707278	-78.627333
368	WPOX749	450-470	TWR COMMUNICATIONS	32	39.797028	-79.167806
369	WPOX749	450-470	TWR COMMUNICATIONS	32	39.482306	-79.027528
370	WPOX749	450-470	TWR COMMUNICATIONS	32	39.581472	-78.897806
371	WPWC727	450-470	TWR COMMUNICATIONS	32	39.581472	-78.897806
372	WPXQ471	450-470	TWR COMMUNICATIONS	32	39.676750	-78.960278
373	WRBT751	450-470	VALLEY HEALTH SYSTEMS	32	39.333194	-78.698528
374	WPHG257	450-470	VALLEY TWO WAY INC c/o Teltronic, Inc.	80	39.451222	-78.067778
375	WQRZ888	450-470	Vindex Energy LLC	32	39.614722	-78.929361
376	WQRZ888	450-470	Vindex Energy LLC	30	39.613667	-78.926944
377	WQJK361	150-174	VIRGINIA DEPARTMENT OF STATE POLICE	72	39.182556	-78.389361
378	KNNN759	450-470	VIRGINIA ELECTRIC AND POWER COMPANY	121	39.260667	-79.348389
379	WPSL222	800/900	Virginia International Terminals, Inc.	113	38.931389	-78.169444
380	WNPF539	800/900	VIRGINIA TWO WAY c/o Teltronic, Inc.	113	39.420667	-78.088889
381	WNRR589	450-470	Virginia Two Way c/o Teltronic, Inc.	97	39.420667	-78.088889
382	WNSQ659	450-470	Virginia Two Way c/o Teltronic, Inc.	113	38.955667	-78.022778

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
383	KYS639	25-50	VOAM Electric Cooperative, Inc.	80	39.995639	-79.048361
384	WQCP218	800/900	WARRENTON FAUQUIER JOINT COMMUNICATION CENTER	113	38.956389	-78.024167
385	WPFM510	800/900	WASHINGTON GAS LIGHT COMPANY	113	39.008083	-78.326556
386	WPFM510	800/900	WASHINGTON GAS LIGHT COMPANY	113	38.956778	-78.026944
387	WPMP767	800/900	WASHINGTON GAS LIGHT COMPANY	113	38.804111	-78.688556
388	WPMP767	800/900	WASHINGTON GAS LIGHT COMPANY	113	38.956778	-78.026944
389	WQLI431	800/900	WASHINGTON GAS LIGHT COMPANY	113	39.125472	-78.185000
390	WQLI431	800/900	WASHINGTON GAS LIGHT COMPANY	113	39.330806	-77.524333
391	WQOY742	800/900	WASHINGTON GAS LIGHT COMPANY	113	39.500667	-77.497500
392	WQIC699	150-174	WASHINGTON GAS LIGHT CORP.	40	39.198444	-78.754472
393	WQIC699	150-174	WASHINGTON GAS LIGHT CORP.	40	39.309694	-78.716778
394	KGB316	25-50	WAYNESBORO, BOROUGH OF	121	39.761472	-77.569444
395	WPZR407	150-174	WEST VIRGINIA RADIO CORPORATION OF THE ALLEGHENIES	80	39.463333	-77.986389
396	WQIQ313	450-470	West Virginia State Police	32	39.398889	-78.952778
397	WQIQ313	450-470	West Virginia State Police	32	39.325833	-78.615833
398	WPKC478	25-50	WEST VIRGINIA, STATE OF	260	38.713444	-80.679528
399	WPMJ916	150-174	WEST VIRGINIA, STATE OF	25	39.345944	-78.758083
400	WPYK859	150-174	WEST VIRGINIA, STATE OF	40	39.199278	-78.790583
401	WPJG213	72-76	WEST VIRGINIA, STATE OF DIVISION OF HIGHWAYS	235	39.001222	-80.252583
402	WQKQ204	150-174	WESTERN MARYLAND HEALTH SYSTEMS INC	10	39.655639	-78.785861
403	WQKQ204	150-174	WESTERN MARYLAND HEALTH SYSTEMS INC	10	39.647972	-78.730667
404	WQKJ588	450-470	Western Maryland Health Systems, Inc.	10	39.647750	-78.732944
405	WQKJ588	450-470	Western Maryland Health Systems, Inc.	10	39.647972	-78.730667
406	WPRK562	150-174	WESTERN MARYLAND SCENIC RAILROAD DEVELOPMENT CORP	32	39.716167	-78.883556

ID	Call Sign	Frequency Band (MHz)	Licensee	Mobile Area Radius (km)	Latitude (NAD83)	Longitude (NAD83)
407	WPDH225	800/900	WESTMORELAND, COUNTY OF	80	40.341750	-79.234472
408	KNIK428	150-174	WINDBER HOSPITAL	121	40.222306	-78.806139
409	WQLZ268	72-76, 150-174, 470-512	WJAC LICENSEE, LLC	160	40.295611	-78.936389
410	WPDS450	450-470	WOODS RESORT INC	113	39.564167	-77.986389
411	WQIY564	450-470	WV DIVISION OF EMERGENCY MANAGEMENT	32	39.382389	-79.078556
412	WQIY564	450-470	WV DIVISION OF EMERGENCY MANAGEMENT	32	39.309694	-78.716778
413	WQJG861	450-470	WV DIVISION OF EMERGENCY MANAGEMENT	32	39.382389	-79.078556
414	WQJG861	450-470	WV DIVISION OF EMERGENCY MANAGEMENT	32	39.309694	-78.716778
415	WRTL364	150-174	Zoological Society of Pittsburgh	24	39.894111	-78.806722

Table A: Mobile Licenses Intersecting Project Area

Wind Power GeoPlanner™

Mobile Phone Carrier Report

Dan's Mountain Wind Farm

Prepared on Behalf of
Dan's Mountain Wind
Force, LLC

March 2, 2023

COMSEARCH
A CommScope Company

Table of Contents

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.

2. Summary of Results

Methodology

Our mobile phone analysis was performed using Comsearch's proprietary carrier database, which is derived from a variety of sources including the Federal Communications Commission (FCC). Since mobile phone market boundaries differ from service to service, we disaggregated the carriers' licensed areas down to the county level. Then we compiled a list of all mobile phone carriers in the main counties that intersect the Dan's Mountain Wind Farm project area. The area of interest was defined by the client and encompasses five miles of the planned turbine locations. A depiction of the wind project area and counties appears below.

Figure 1: Counties that intersect the Area of Interest

Results
The Dans Mountain Wind Farm Project is located in Allegany County, MD, Garret County, MD, and Mineral County, WV. 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[1]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
700 MHz	T-Mobile	Lower A	Allegany	MD	BEA013	WQJQ698
700 MHz	T-Mobile	Lower A	Garrett	MD	BEA013	WQJQ698
700 MHz	T-Mobile	Lower A	Mineral	WV	BEA013	WQJQ698
700 MHz	US Cellular	Lower B	Allegany	MD	CMA269	WQLE711
700 MHz	US Cellular	Lower B	Mineral	WV	CMA269	WQLE711
700 MHz	US Cellular	Lower B	Garrett	MD	CMA467	WQLE751
700 MHz	AT&T	Lower C	Allegany	MD	CMA269	WPYZ882
700 MHz	AT&T	Lower C	Mineral	WV	CMA269	WPYZ882
700 MHz	AT&T	Lower C	Garrett	MD	CMA467	WPYZ908
700 MHz	AT&T	Lower D	Allegany	MD	EAG702	WPZA236
700 MHz	AT&T	Lower D	Garrett	MD	EAG702	WPZA236
700 MHz	AT&T	Lower D	Mineral	WV	EAG702	WPZA236
700 MHz	DISH Network	Lower E	Allegany	MD	BEA013	WQJY953
700 MHz	DISH Network	Lower E	Garrett	MD	BEA013	WQJY953
700 MHz	DISH Network	Lower E	Mineral	WV	BEA013	WQJY953
700 MHz	Verizon	Upper C	Allegany	MD	REA002	WQJQ690
700 MHz	Verizon	Upper C	Garrett	MD	REA002	WQJQ690
700 MHz	Verizon	Upper C	Mineral	WV	REA002	WQJQ690
AWS	AT&T	A	Allegany	MD	CMA269	WQGA814
AWS	AT&T	A	Mineral	WV	CMA269	WQGA814
AWS	AT&T	A	Garrett	MD	CMA467	WQGA825
AWS	Verizon	B	Allegany	MD	BEA013	WQGA909
AWS	Verizon	B	Garrett	MD	BEA013	WQGA909
AWS	Verizon	B	Mineral	WV	BEA013	WQGA909
AWS	Verizon	C	Allegany	MD	BEA013	WQPG204
AWS	Verizon	C	Garrett	MD	BEA013	WQPG204
AWS	Verizon	C	Mineral	WV	BEA013	WQPG204
AWS	Verizon	D	Allegany	MD	REA002	WQQZ831
AWS	Verizon	D	Garrett	MD	REA002	WQQZ831
AWS	Verizon	D	Mineral	WV	REA002	WQQZ831
AWS	T-Mobile	E	Allegany	MD	REA002	WQGB375
AWS	T-Mobile	E	Garrett	MD	REA002	WQGB375
AWS	T-Mobile	E	Mineral	WV	REA002	WQGB375

[1] 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

Service[1]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
AWS	T-Mobile	F	Allegany	MD	REA002	WQQZ847
AWS	T-Mobile	F	Garrett	MD	REA002	WQQZ847
AWS	T-Mobile	F	Mineral	WV	REA002	WQQZ847
Cellular	AT&T	A	Allegany	MD	CMA269	KNKA570
Cellular	AT&T	A	Mineral	WV	CMA269	KNKA570
Cellular	AT&T	A	Garrett	MD	CMA467	KNKN938
Cellular	US Cellular	B	Garrett	MD	CMA467	KNKN654
Cellular	US Cellular	B	Allegany	MD	CMA269	KNKA786
Cellular	US Cellular	B	Mineral	WV	CMA269	KNKA786
PCS	T-Mobile	A	Allegany	MD	MTA010	KNLF200
PCS	T-Mobile	A	Garrett	MD	MTA010	KNLF200
PCS	T-Mobile	A	Mineral	WV	MTA010	KNLF200
PCS	US Cellular	A	Allegany	MD	MTA010	WQIP559
PCS	US Cellular	A	Garrett	MD	MTA010	WQIP559
PCS	US Cellular	A	Mineral	WV	MTA010	WQIP559
PCS	AT&T	B	Allegany	MD	MTA010	KNLF220
PCS	AT&T	B	Garrett	MD	MTA010	KNLF220
PCS	AT&T	B	Mineral	WV	MTA010	KNLF220
PCS	AT&T	B	Allegany	MD	MTA010	WPOK289
PCS	AT&T	B	Garrett	MD	MTA010	WPOK289
PCS	AT&T	B	Mineral	WV	MTA010	WPOK289
PCS	Verizon	C	Allegany	MD	BTA100	WPOJ710
PCS	Verizon	C	Garrett	MD	BTA100	WPOJ710
PCS	Verizon	C	Mineral	WV	BTA100	WPOJ710
PCS	Verizon	C	Allegany	MD	BTA100	WQKS703
PCS	Verizon	C	Garrett	MD	BTA100	WQKS703
PCS	Verizon	C	Mineral	WV	BTA100	WQKS703
PCS	T-Mobile	C	Allegany	MD	BTA100	WQYH202
PCS	T-Mobile	C	Garrett	MD	BTA100	WQYH202
PCS	T-Mobile	C	Mineral	WV	BTA100	WQYH202
PCS	T-Mobile	D	Allegany	MD	BTA100	KNLG674
PCS	T-Mobile	D	Garrett	MD	BTA100	KNLG674
PCS	T-Mobile	D	Mineral	WV	BTA100	KNLG674
PCS	T-Mobile	E	Allegany	MD	BTA100	KNLH323
PCS	T-Mobile	E	Garrett	MD	BTA100	KNLH323
PCS	T-Mobile	E	Mineral	WV	BTA100	KNLH323
PCS	T-Mobile	F	Allegany	MD	BTA100	KNLH389
PCS	T-Mobile	F	Garrett	MD	BTA100	KNLH389

Service[1]	Mobile Phone Carrier	Channel Block	County	ST	Market ID	Callsign
PCS	T-Mobile	F	Mineral	WV	BTA100	WQCL694
PCS	T-Mobile	G	Allegany	MD	BEA013	WQKS987
PCS	T-Mobile	G	Garrett	MD	BEA013	WQKS987
PCS	T-Mobile	G	Mineral	WV	BEA013	WQKS987
WCS	AT&T	A	Allegany	MD	MEA005	KNLB315
WCS	AT&T	A	Garrett	MD	MEA005	KNLB315
WCS	AT&T	A	Mineral	WV	MEA005	KNLB315
WCS	AT&T	B	Allegany	MD	MEA005	KNLB276
WCS	AT&T	B	Garrett	MD	MEA005	KNLB276
WCS	AT&T	B	Mineral	WV	MEA005	KNLB276
WCS	AT&T	C	Allegany	MD	REA002	KNLB238
WCS	AT&T	C	Garrett	MD	REA002	KNLB238
WCS	AT&T	C	Mineral	WV	REA002	KNLB238
WCS	AT&T	D	Allegany	MD	REA002	KNLB239
WCS	AT&T	D	Garrett	MD	REA002	KNLB239
WCS	AT&T	D	Mineral	WV	REA002	KNLB239

Table 1: Mobile Phone Carriers in the Area of Interest

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 five cellular sites within five miles of the proposed turbines. 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.

Plot ID	Callsign	Licensee	Structure Height to Tip (m)	ASR Number	Latitude (NAD83)	Longitude (NAD83)	Distance to the Nearest Turbine (meters)
1	KNKA786	US Cellular	76.8	1036978	39.584444	-78.895833	420
2	KNKA570	AT&T	Unknown		39.583333	-78.897389	336
3	KNKA786	US Cellular	55.2		39.638694	-78.911972	3675
4	KNKA786	US Cellular	Unknown	1225803	39.628472	-78.841306	3055
5	KNKA570	AT&T	Unknown	1258082	39.557056	-78.981111	7506

Table 2: FCC-Licensed Mobile Phone Sites

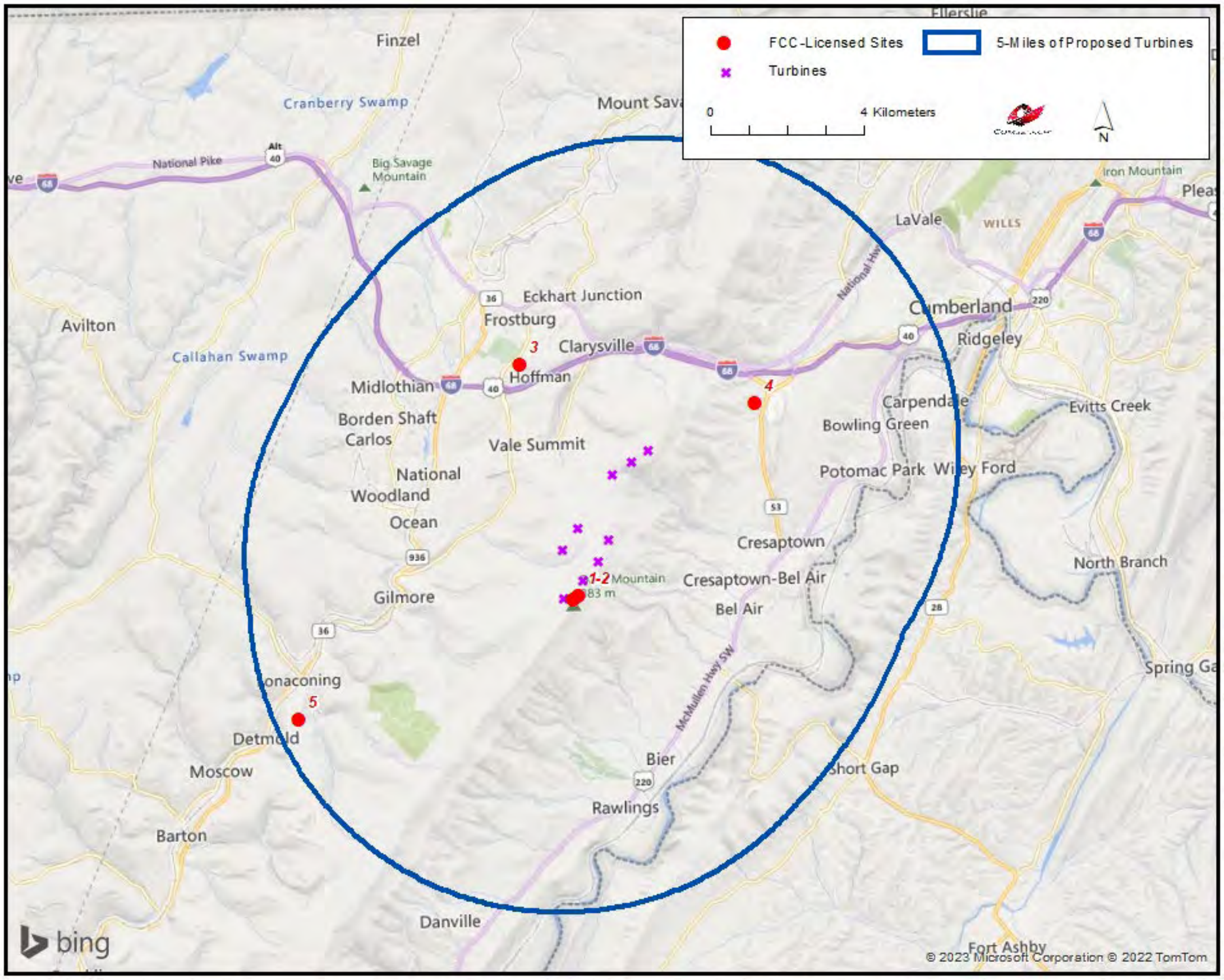

Figure 2: FCC-Licensed Mobile Phone Sites within Five Miles of the Proposed Turbines

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

Frequency of Emission (MHz)	Field Strength (microVolts/meter)
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 ($1X10^{-12}$ Watts) and the typical sensitivity of base stations is -93 dBm ($5X10^{-13}$ 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.

$$\mathbf{A = G^*\lambda^2 / 4^*\pi}$$

Where,
G = Antenna Gain, number
λ = Wavelength, 0.353 meters
π = 3.14

This gives us an effective area for the mobile unit antenna of $9.9X10^{-4}$ meter^2 and the effective area for the base station antenna of 0.496 meter^2. 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:

$$P_D = S/A$$

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, $P_D = 1.01X10^{-9}$ Watts/meter^2 and E = 617 microVolts/meter. And, for the base station unit, P_D= $1.008X10^{-12}$ Watts/meter^2 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 MicroVolts/meter)*(3 meters) / 19.4 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 Dan's Mountain Wind Farm 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. The closest proposed turbine to a licensed cellular tower site is 420 meters away. Considering the turbine diameter of 158 meters and the recommended separation distance of 77.3 meters, the nearest turbine is more than 4 times the recommended setback distance..

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:

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Web site:	www.comsearch.com

Wind Power GeoPlanner™

Off-Air TV Analysis

Dan's Mountain Wind Farm

Prepared on Behalf of
Dan's Mountain Wind
Force, LLC

March 3, 2023

COMSEARCH
A CommScope Company

Table of Contents

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 Dan’s Mountain Wind Farm wind project in Allegany County, Maryland. 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[1] 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, on the next page, and a plot depicting their locations is provided in Figure 2. There are a total of 97 database records for stations within approximately 150 kilometers of the proposed turbines. Of these stations, only 75 stations are currently licensed and operating, 33 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.

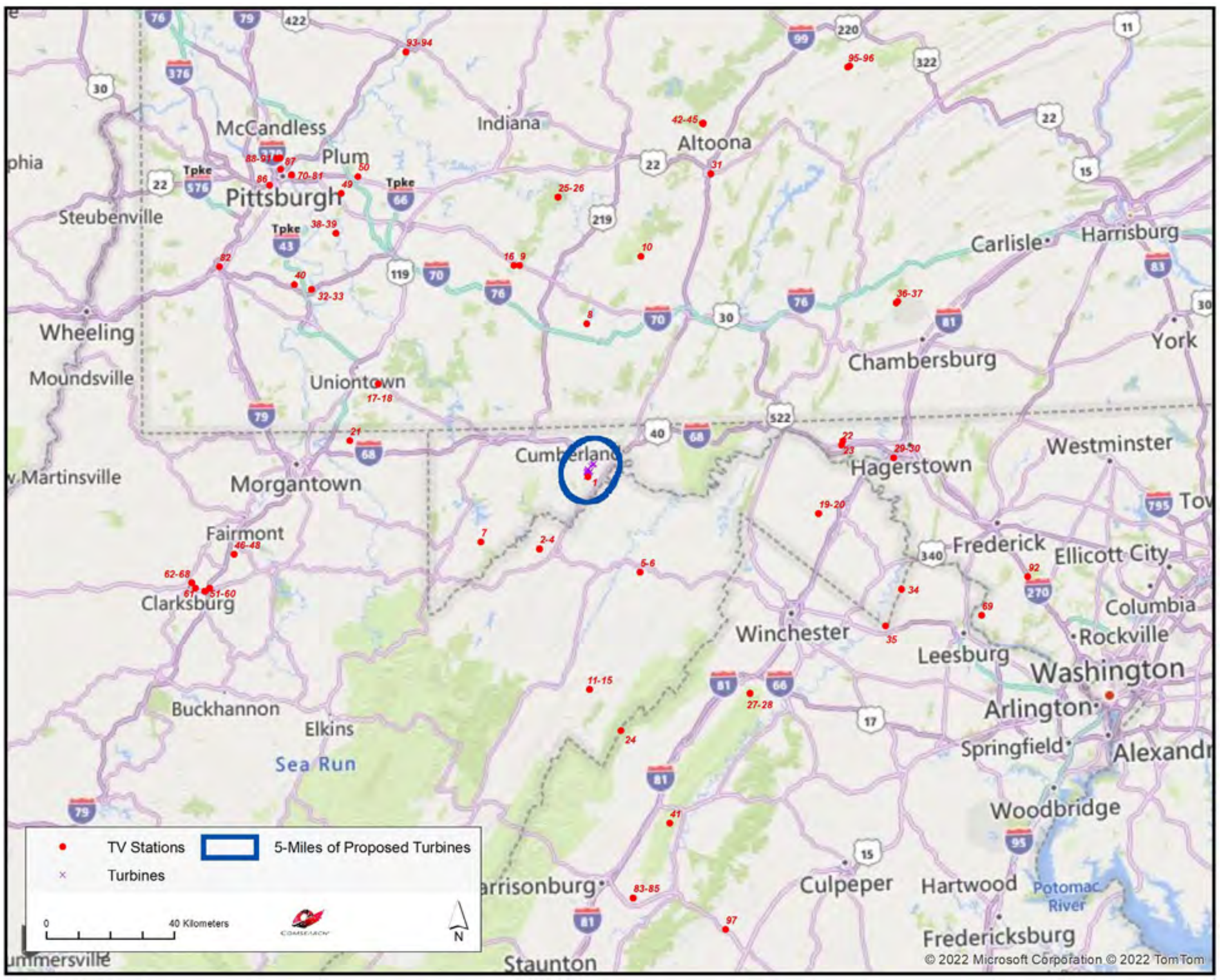

Figure 2: Plot of Off-Air TV Stations within 150 Kilometers of Proposed Turbines

[1] 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.

ID	Call Sign	Status	Service[2]	Channel	Transmit ERP[3] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Closest Turbine (km)
1	W43BP	LIC	LPX	43	1.3	39.581472	-78.897778	0.42
2	W41DK-D	STA	LPD	16	7.0	39.382028	-79.079194	27.18
3	W16DT-D	CP	LPD	16	15.0	39.382028	-79.079194	27.18
4	W41DK-D	LIC	LPT	41	7.0	39.382028	-79.079194	27.18
5	W21DZ-D	CP	LPT	21	15.0	39.309694	-78.716778	34.37
6	W23DR-D	LIC	LPT	23	15.0	39.309694	-78.716778	34.37
7	WGPT	LIC	DTV	26	200.0	39.404528	-79.291889	39.09
8	W33EM-D	LIC	LPT	33	2.0	40.012972	-78.889083	43.85
9	WPCW	LIC	DRT	30	15.0	40.180917	-79.129278	66.18
10	WJAC-TV	CP	DRT	28	7.0	40.198611	-78.683056	66.49
11	W22CV-D	LIC	LPT	22	0.095	38.982583	-78.908333	66.80
12	W24ES-D	LIC	LPT	24	0.1	38.982583	-78.908333	66.80
13	W27EI-D	LIC	LPT	27	0.1	38.982583	-78.908333	66.80
14	W29DH-D	LIC	LPT	29	0.1	38.982583	-78.908333	66.80
15	W33EJ-D	LIC	LPT	33	0.1	38.982583	-78.908333	66.80
16	WWCP-TV	LIC	DTV	8	9.3	40.181028	-79.151500	66.84
17	WWKH-CD	LIC	DCA	22	4.92	39.854583	-79.655806	70.82
18	WPXI	LIC	DRT	24	2.0	39.854583	-79.655806	70.82
19	W27EE-D	CP	LPD	27	15.0	39.460056	-78.062417	71.98
20	W08EE-D	LIC	LPT	8	0.3	39.460083	-78.062222	72.00
21	WNPB-TV	LIC	DTV	34	660.0	39.695833	-79.762222	74.76
22	WWPB	LIC	DTV	29	700.0	39.651111	-77.970556	77.69
23	WDVM-TV	LIC	DTV	23	800.0	39.662500	-77.964722	78.25

[2] 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

[3] ERP = Transmit Effective Radiated Power

ID	Call Sign	Status	Service[2]	Channel	Transmit ERP[3] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Closest Turbine (km)
24	WHSV-TV	CP	LPD	25	15.0	38.864833	-78.799778	80.35
25	WTOO-CD	LIC	DCA	22	15.0	40.371056	-78.983917	84.12
26	WJAC-TV	LIC	DTV	35	1000.0	40.371389	-78.981944	84.14
27	WHSV-TV	LIC	DRT	24	15.0	38.960333	-78.331000	84.97
28	WVPY	LIC	DTV	21	100.0	38.960083	-78.330833	85.00
29	W25FE-D	CP	LPD	25	2.5	39.610556	-77.781667	93.85
30	W42CK	LIC	LPA	42	6.37	39.610556	-77.781667	93.85
31	WTOO-CD	CP	DCA	22	9.0	40.425361	-78.417056	97.77
32	WMVH-CD	CP	DCA	32	15.0	40.123333	-79.895556	103.33
33	WMVH-CD	LIC	DCA	32	4.65	40.123333	-79.895556	103.33
34	WWPX-TV	LIC	DTV	13	4.2	39.239167	-77.771111	103.92
35	WDVM-TV	CP	DTV	23	1000.0	39.137917	-77.832667	104.23
36	WCZS-LD	LIC	LPD	30	15.0	40.045278	-77.753056	107.08
37	W20EU-D	LIC	LPT	20	15.0	40.050083	-77.747472	107.75
38	WTAE-TV	LIC	DTV	27	850.0	40.280278	-79.802778	107.87
39	WTAE-TV	CP	DTV	27	1000.0	40.280278	-79.802778	107.87
40	WWAT-CD	LIC	DCA	29	15.0	40.137778	-79.957778	108.63
41	WHSV-TV	LIC	DRT	28	15.0	38.600750	-78.632611	111.64
42	WTAJ-TV	LIC	DTV	24	788.0	40.566944	-78.441389	111.64
43	WATM-TV	LIC	DTV	31	790.0	40.568333	-78.443611	111.72
44	WKBS-TV	LIC	DTV	6	3.1	40.567694	-78.440333	111.75
45	WJAC-TV	LIC	DRT	33	7.0	40.569222	-78.440556	111.90
46	W21EB-D	CP	LPD	21	5.0	39.379806	-80.188694	113.05
47	W28EX-D	CP	LPD	28	10.0	39.379806	-80.188694	113.05
48	W29FK-D	CP	LPD	29	10.0	39.379806	-80.188694	113.05
49	WPCB-TV	LIC	DTV	28	530.0	40.392778	-79.781389	115.55
50	WBYD-CD	LIC	DCA	19	15.0	40.439722	-79.719444	116.17
51	W20DY-D	LIC	LPD	20	0.4	39.284722	-80.278056	123.09
52	WVUX-LD	AMD	LPD	10	0.25	39.276250	-80.293639	124.65
53	WVUX-LD	CP	LPD	10	1.0	39.275917	-80.293694	124.66
54	WVUX-LD	LIC	LPD	13	2.7	39.275917	-80.293694	124.66
55	WUSV-LD	LIC	LPD	16	0.27	39.275556	-80.295278	124.80
56	WUSV-LD	CP	LPD	16	15.0	39.275556	-80.295278	124.80
57	W21EB-D	LIC	LPD	21	0.1	39.275556	-80.295278	124.80
58	W24ER-D	LIC	LPD	24	4.75	39.275556	-80.295278	124.80
59	W28EX-D	LIC	LPD	28	0.1	39.275556	-80.295278	124.80
60	W29FK-D	LIC	LPD	29	0.1	39.275556	-80.295278	124.80
61	WBOY-TV	LIC	DTV	12	12.25	39.285000	-80.329444	127.35
62	WVFX	LIC	DTV	13	32.0	39.300556	-80.343333	128.05
63	W22CY-D	LIC	LPD	22	3.5	39.300556	-80.343333	128.05
64	W25FS-D	LIC	LPD	25	1.0	39.300556	-80.343333	128.05
65	W28FC-D	LIC	LPD	28	1.0	39.300556	-80.343333	128.05

ID	Call Sign	Status	Service[2]	Channel	Transmit ERP[3] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Closest Turbine (km)
66	W32FY-D	LIC	LPD	32	0.2	39.300556	-80.343333	128.05
67	WDTV	LIC	DTV	33	935.0	39.300556	-80.343333	128.05
68	W35DI-D	LIC	LPD	35	0.2	39.300556	-80.343333	128.05
69	WETA-TV	CP	DRT	31	15.0	39.157500	-77.485000	130.20
70	WPDN-LD	LIC	LPD	24	10.0	40.446111	-79.963889	130.50
71	WIIC-LP	LIC	LPA	29	5.92	40.446111	-79.963889	130.50
72	WIIC-LD	LIC	LPD	31	15.0	40.446111	-79.963889	130.50
73	WBYD-CD	CP	LPD	39	15.0	40.446111	-79.963889	130.50
74	WQED	LIC	DTV	4	10.0	40.446167	-79.963944	130.51
75	WIIC-LD	APP	LPD	10	1.0	40.446167	-79.963944	130.51
76	WBPA-LD	LIC	LPD	12	3.0	40.446167	-79.963944	130.51
77	WINP-TV	LIC	DTV	16	775.0	40.446167	-79.963944	130.51
78	WTAE-TV	LIC	DRT	22	15.0	40.446167	-79.963944	130.51
79	WOSC-CD	LIC	DCA	26	30.0	40.446167	-79.963944	130.51
80	WWAT-CD	CP	DCA	29	15.0	40.446167	-79.963944	130.51
81	WPTG-CD	LIC	DCA	30	30.0	40.446167	-79.963944	130.51
82	WWLM-CD	LIC	DCA	36	15.0	40.190000	-80.231944	131.57
83	WSVW-LD	LIC	LPT	30	12.0	38.393000	-78.769972	132.74
84	WHSV-TV	LIC	DRT	34	15.0	38.393000	-78.769972	132.74
85	WSVF-CD	LIC	DCA	36	15.0	38.393000	-78.769972	132.74
86	WBPA-LP	LIC	LPA	30	1.1	40.418778	-80.045528	133.47
87	WPXI	LIC	DTV	23	500.0	40.463250	-80.004306	134.28
88	WPGH-TV	LIC	DTV	20	800.0	40.495278	-80.004444	136.79
89	WPNT	LIC	DTV	21	721.0	40.495278	-80.004444	136.79
90	WPCW	LIC	DTV	11	30.0	40.493889	-80.018889	137.55
91	KDKA-TV	LIC	DTV	25	1000.0	40.493889	-80.018889	137.55
92	WFPT	LIC	DTV	28	71.3	39.260556	-77.312111	140.28
93	WKHU-CD	LIC	DCA	32	4.9	40.788472	-79.534583	141.57
94	WKHU-CD	CP	DCA	32	15.0	40.788472	-79.534583	141.57
95	WPSU-TV	LIC	DTS	15	48.0	40.713056	-77.900000	147.23
96	W26EQ-D	LIC	LPD	26	15.0	40.716667	-77.892667	147.91
97	W13DV-D	LIC	LPD	13	0.2	38.297444	-78.442194	148.31

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 Dan's Mountain Wind Farm, it was determined that eight of the full-power digital stations, identified below in Table 2, along with three 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 Closest Turbine (km)
1	W43BP	LIC	LPX	43	1.3	39.581472	-78.897778	0.42
2	WPCW	LIC	DRT	30	15.0	40.180917	-79.129278	27.18
4	W41DK-D	LIC	LPT	41	7.0	39.382028	-79.079194	27.18
6	W23DR-D	LIC	LPT	23	15.0	39.309694	-78.716778	34.37
7	WGPT	LIC	DTV	26	200.0	39.404528	-79.291889	39.09
16	WWCP-TV	LIC	DTV	8	9.3	40.181028	-79.151500	66.84
21	WNPB-TV	LIC	DTV	34	660.0	39.695833	-79.762222	74.76
22	WWPB	LIC	DTV	29	700.0	39.651111	-77.970556	77.69
23	WDVM-TV	LIC	DTV	23	800.0	39.662500	-77.964722	78.25
26	WJAC-TV	LIC	DTV	35	1000.0	40.371389	-78.981944	84.14
28	WVPY	LIC	DTV	21	100.0	38.960083	-78.330833	85.00

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 stations 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

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Wind Power GeoPlanner™

AM and FM Radio Report

Dan's Mountain Wind Farm

Prepared on Behalf of
Dan's Mountain Wind
Force, LLC

March 2, 2023

COMSEARCH®
A CommScope Company

Table of Contents

1. Introduction

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Dan's Mountain Wind Farm in Allegany County, Maryland.

2. Summary of Results

AM Radio Analysis

Comsearch found ten database records[1] for AM stations within approximately 30 kilometers of the project, as shown in Table 1 and Figure 1. The closest station is WCBC, which is licensed out of Cumberland, Maryland, located 10.25 km from the nearest proposed turbine location to the northeast of the project area of interest (AOI).

ID	Call Sign	Status[2]	Frequency (kHz)	Transmit ERP[3] (kW)	Operation Time	Latitude (NAD 83)	Longitude (NAD 83)	Recommended Separation Distance (km)	Distance to the Nearest Proposed Turbine (km)
1	WCBC	LIC	1270	5.0	Daytime	39.674531	-78.779742	2.36	10.25
2	WCBC	LIC	1270	1.0	Nighttime	39.674531	-78.779742	2.36	10.25
3	WFRB	LIC	560	5.0	Daytime	39.683531	-78.965025	0.54	10.42
4	WFRB	LIC	560	0.055	Nighttime	39.683531	-78.965025	0.54	10.42
5	WTBO	LIC	1450	1.0	Daytime	39.646144	-78.751961	0.21	10.95
6	WTBO	LIC	1450	1.0	Nighttime	39.646144	-78.751961	0.21	10.95
7	WCMD	LIC	1230	1.0	Daytime	39.643978	-78.741961	0.24	11.72
8	WCMD	LIC	1230	1.0	Nighttime	39.643978	-78.741961	0.24	11.72
9	WKLP	LIC	1390	1.0	Daytime	39.436761	-78.955581	0.22	17.03
10	WKLP	LIC	1390	0.074	Nighttime	39.436761	-78.955581	0.22	17.03

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

[1] 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.

[2] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

[3] ERP = Transmit Effective Radiated Power.

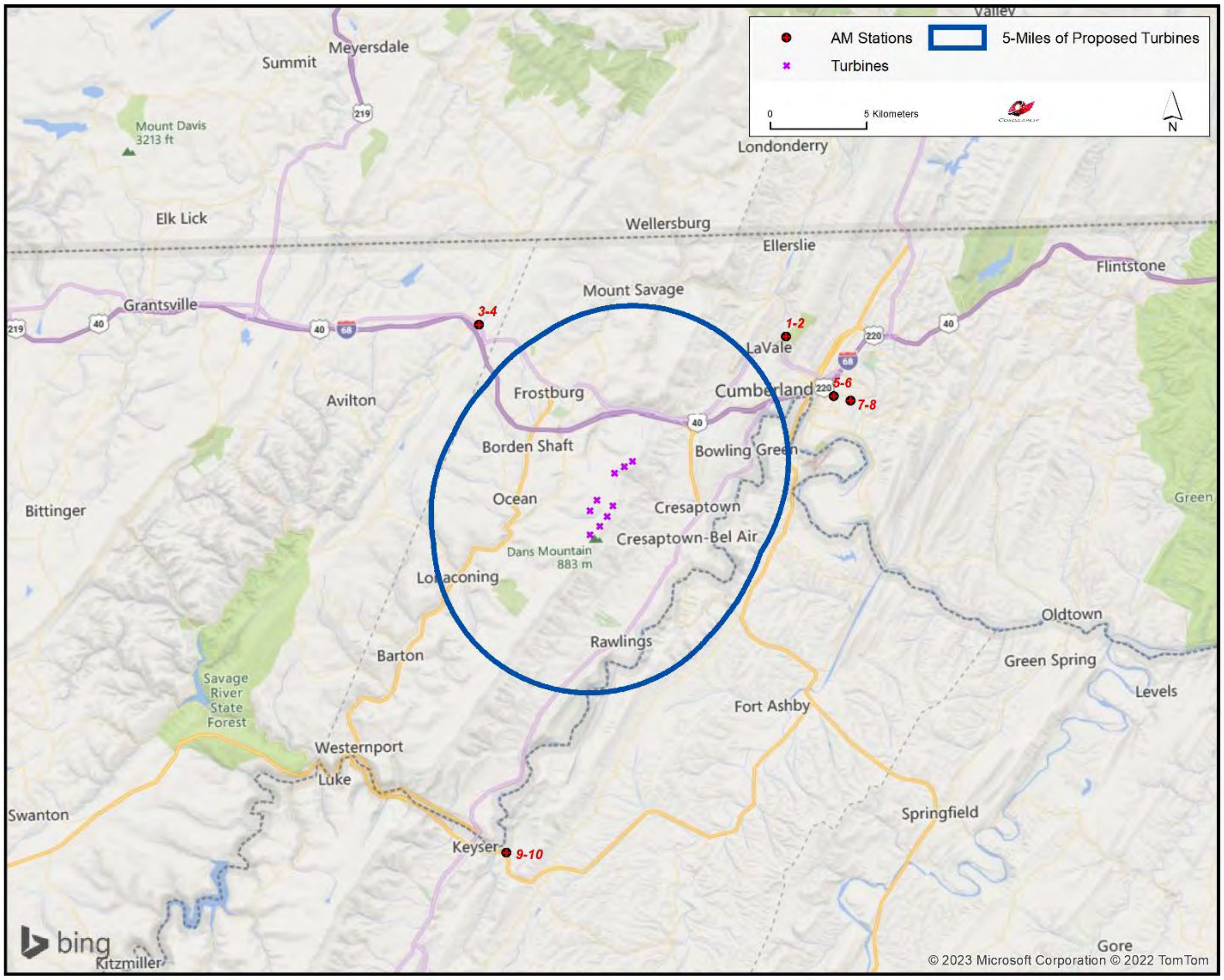

Figure 1: AM Radio Stations within 30 Kilometers of Project Area

FM Radio Analysis

Comsearch determined that there were twenty-five database records for FM stations within a 30-kilometer radius of the Dan's Mountain Wind Farm, as shown in Table 2 and Figure 2. Twenty-four of the stations are currently licensed and operating; eight of which are translator stations, two are booster stations and one is a low power station, all of which operate with limited range. The closest FM stations are W289BR, which is currently licensed out of Cumberland, Maryland, and W294CF, which is currently licensed out of Frostburg, Maryland, both located 0.370 km from the nearest proposed turbine location.

ID	Call Sign	Service[4]	Status[5]	Frequency (MHz)	Transmit ERP[6] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Nearest Turbine (km)
1	W289BR	FX	LIC	105.7	0.1	39.581194	-78.899444	0.370
2	W294CF	FX	LIC	106.7	0.25	39.581194	-78.899444	0.370
3	WRQE	FM	LIC	106.1	5.4	39.581139	-78.899444	0.376
4	W278BL	FX	LIC	103.5	0.01	39.580917	-78.899750	0.390
5	WLVV	FM	LIC	88.3	0.49	39.580083	-78.900833	0.464
6	WFWM	FM	LIC	91.9	1.3	39.581750	-78.897778	0.402
7	WLIC	FM	LIC	97.1	0.14	39.601750	-78.886944	0.456
8	WDZN-FM1	FB	LIC	99.5		39.645333	-78.804444	6.712
9	WCBC-FM	FM	LIC	107.1	0.48	39.525083	-78.861667	7.395
10	WQZK-FM1	FB	LIC	94.1		39.634528	-78.778083	8.458
11	W260BP	FX	LIC	99.9	0.075	39.634528	-78.778083	8.458
12	W300BU	FX	LIC	107.9	0.005	39.522944	-78.973333	9.210
13	WDZN	FM	LIC	99.5	1.05	39.674944	-78.961750	9.521
14	W276DQ	FX	LIC	103.1	0.155	39.674611	-78.778944	10.308
15	WFRB-FM	FM	LIC	105.3	13.5	39.683528	-78.965028	10.415
16	W250CM	FX	LIC	97.9	0.25	39.646194	-78.751972	10.953
17	-	FM	CP	89.9	0.8	39.600389	-78.743222	11.429
18	W271AT	FX	LIC	102.1	0.027	39.643917	-78.741917	11.719
19	WDYK	FM	LIC	100.5	6.0	39.713861	-78.715444	17.283
20	WKYW-LP	FL	LIC	102.9	0.1	39.437583	-78.980000	17.640
21	WQZK-FM	FM	LIC	94.1	13.0	39.418694	-78.953917	18.934
22	WAIJ	FM	LIC	90.3	10.0	39.703972	-79.091694	20.331
23	WVMD	FM	LIC	100.1	0.9	39.422306	-78.790000	20.365
24	WHYU-FM	FM	LIC	89.1	1.3	39.783333	-79.101944	26.526
25	WWPN	FM	LIC	101.1	0.32	39.382861	-79.078361	27.062

Table 2: FM Radio Stations within 30 km

[4] FM = FM broadcast station; FL = FM low power station, FX = FM translator station; FS = FM auxiliary (backup) station; FB = FM booster station.

[5] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

[6] ERP = Transmit Effective Radiated Power.

ID	Call Sign	Status[7]	Frequency (MHz)	Antenna Make	Antenna Model	Antenna Size (m)	Recommended Minimum Separation Distance[8] (km)
1	W289BR	LIC	105.7	SWR	FMECR/1-PLUS	5.67	0.023
2	W294CF	LIC	106.7	SHI	6815	5.62	0.023
3	WRQE	LIC	106.1	SHI	6810-2R-SS	5.65	0.023
4	W278BL	LIC	103.5	NIC	BKG77	11.59	0.093
5	WLVV	LIC	88.3	ERI	LP-2E-DA-HW	6.79	0.027
6	WFWM	LIC	91.9	SHI	6812B-2R-CF	6.52	0.026
7	WLIC	LIC	97.1	ERI	100A-1	3.09	0.006

Table 3: FM Radio Stations within 2 km of the Project Area with Separation Distances

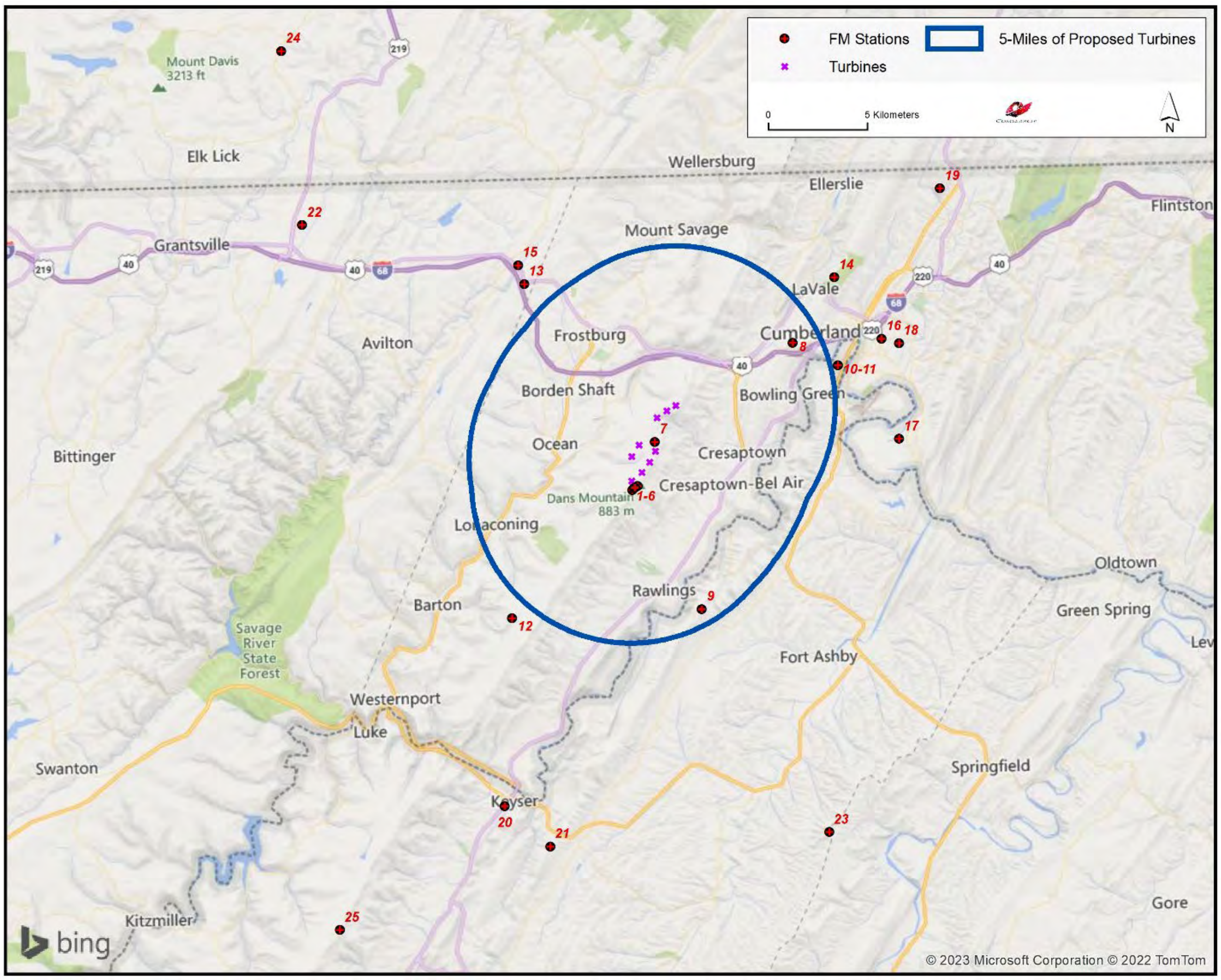

Figure 2: FM Radio Stations within 30 km

[7] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted.

[8] Recommended minimum separation distance is based on the far field distance of the antenna or 1.5 km if no antenna information is available and includes separation from both the turbine towers and blades.

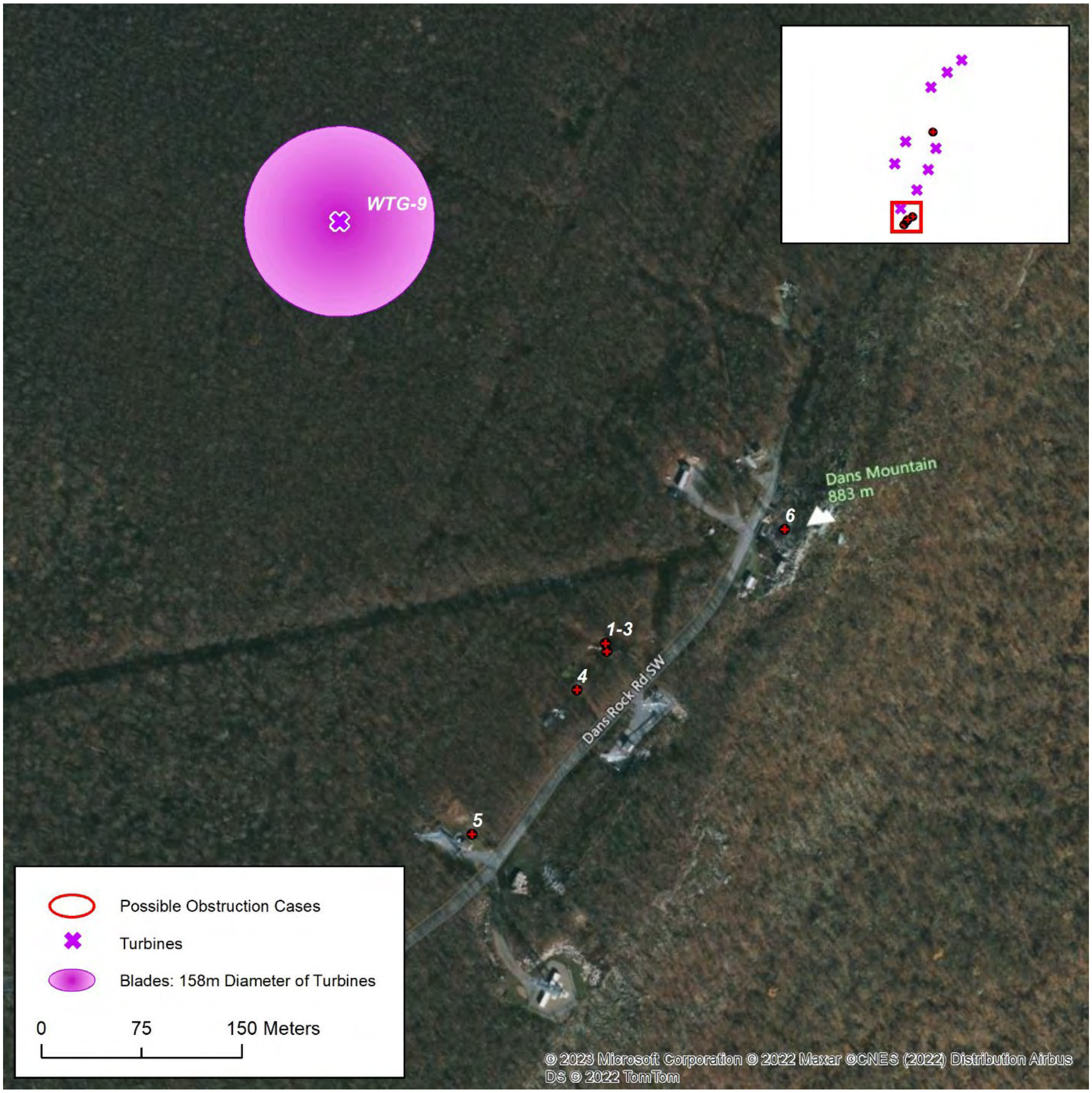

Figure 3: Detailed View of FM Radio Station #'s 1 - 6

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 (WCBC) is located 10.25 km from the nearest proposed turbine location. 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. There are seven FM stations within 2 km of a turbine location, stations W289BR and W294CF are the nearest FM stations at 0.370 km away, with the other five stations located between 0.376 km and 0.456 km from a turbine location. Based on the licensed antenna information; W289BR, W294CF and WRQE all require a minimum separation distance of 0.023 km, W278BL requires a minimum separation distance of 0.093 km, WLVV requires a minimum separation distance of 0.027 km, WFWM requires a minimum separation distance of 0.026 km and WLIC requires a minimum separation distance of 0.006 km from the stations and any turbine tower and blade. Based on the distance calculations, all of these stations meet the required separation distance and therefore there is adequate separation to avoid radiation pattern distortion. All other FM stations are located 6.712 km or further from the proposed turbine locations and would not be impacted by the wind project.

4. Recommendations

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

5. Contact

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Wind Power GeoPlanner™

Doppler Weather Radar Study

Dan's Mountain Wind Farm

Prepared on Behalf of
Dan's Mountain Wind
Force, LLC

March 3, 2023

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Table of Contents

1. Introduction

The purpose of this document is to describe the research, calculations, and analysis performed to assess the impact of the proposed Dan's Mountain Wind Farm on the operation of Doppler Weather Radar Systems owned and operated by television stations and commercial interests within the vicinity of the project. This study was performed for Dan's Mountain Wind Force, LLC.

2. Project Area

The location of the Dan's Mountain Wind Farm project in Allegany County, Maryland is shown in Figure 1. The proposed turbines will have a hub height 117 meters and a rotor diameter of 158 meters, giving the structures an overall maximum height of 196 meters above ground level. At the time of this study, there are nine turbines proposed for the Dan's Mountain Wind Farm 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 Dan's Mountain Wind Farm Project in the State of Maryland

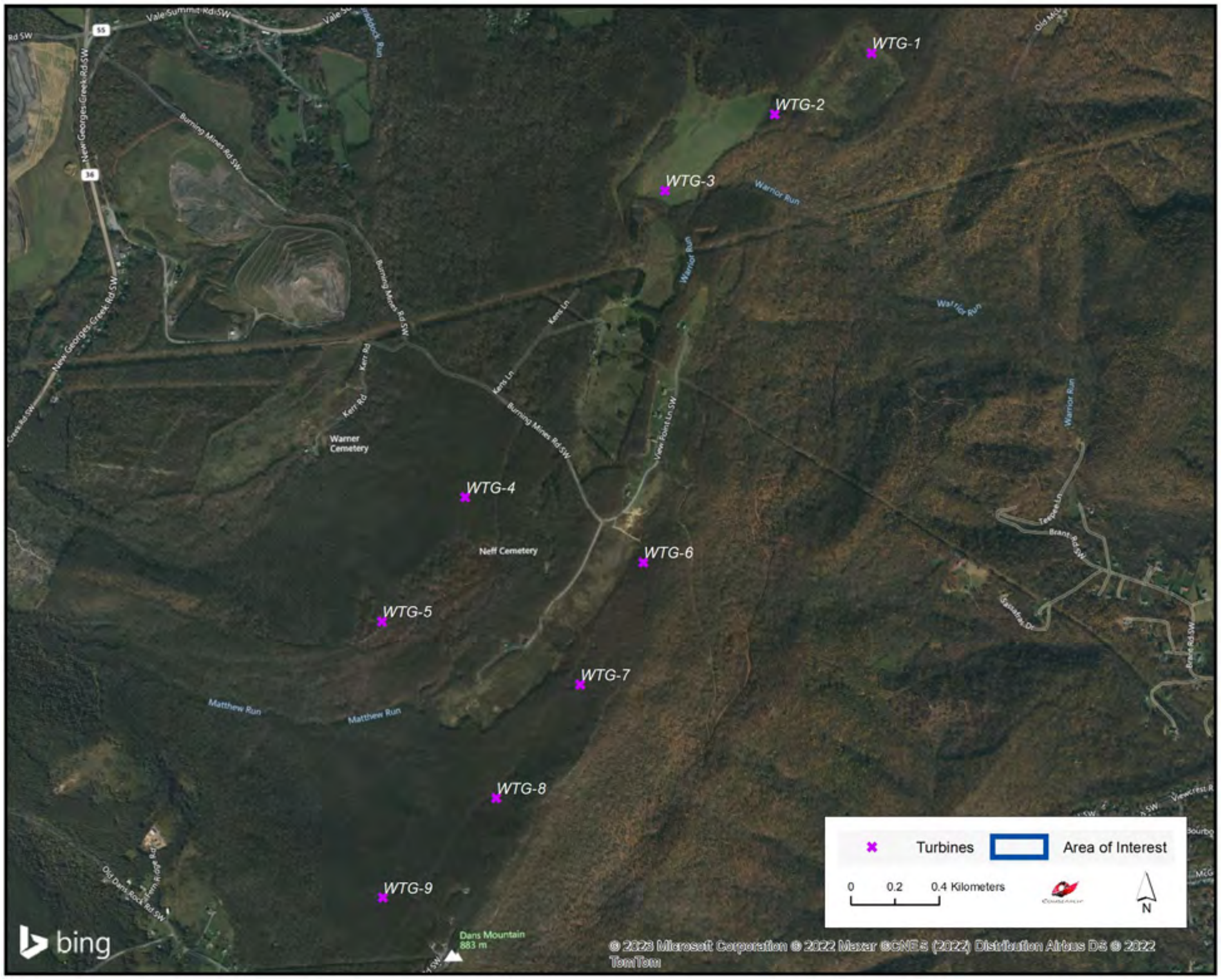

Figure 2: Location of Turbines within Dan's Mountain Wind Farm Project

Turbine ID	Latitude (NAD83)	Longitude (NAD83)	Ground Elevation (m)	Maximum Blade Height Above Mean Sea Level (m)
WTG-1	39.61817296	-78.87429544	772.44	968.44
WTG-2	39.61577522	-78.87949196	759.64	955.64
WTG-3	39.61276384	-78.88536913	757.19	953.19
WTG-4	39.60046295	-78.89627746	817.31	1013.31
WTG-5	39.59547461	-78.90082457	802.17	998.17
WTG-6	39.59764127	-78.88696929	816.48	1012.48
WTG-7	39.59271795	-78.89044907	826.14	1022.14
WTG-8	39.58817681	-78.89501780	809.61	1005.61
WTG-9	39.58425836	-78.90114937	833.97	1029.97

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	WPKX987	5450.0-5600.0	402.0	39.0	1000000	125.02
2	WPKW203	5400.0-5650.0	399.8	46.0	350000	137.47
3	WPUK613	5400.0-5600.0	85.1	35.3	350000	178.70
4	WQBU383	5500.0-5600.0	68.6	36.0	350000	183.37
5	WPPE429	5554.7	162.0	42.0	250000	185.93
6	WPRV205	5575.0	48.7	35.7	350000	196.06
7	WPKW696	5550.0-5600.0	311.0	36.0	280500	198.75
8	WPSR220	5350.0-5460.0	508.0	31.0	200	219.01

Table 2: Technical Data for Commercial Interest and Television Station Doppler Radar Systems within 250 Kilometers of the Dan's Mountain Wind Farm

ID	Call Sign	Owner- Operator	Location	Latitude (NAD83)	Longitude (NAD83)
1	WPKX987	WPXI, LLC	BETHEL PARK, PA	40.29341667	-80.05116667
2	WPKW203	CBS Broadcasting Inc.	PITTSBURGH, PA	40.49366667	-80.01783333
3	WPUK613	WUSA-TV, Inc.	COLLEGE PARK, MD	39.00127778	-76.96166667
4	WQBU383	FOX TELEVISION STATIONS, LLC	BELTSVILLE, MD	39.05686111	-76.87511111
5	WPPE429	Scripps Broadcasting Holdings LLC	CATONSVILLE, MD	39.28761111	-76.75775000
6	WPRV205	ACC Licensee, LLC	HILLMEADE, MD	38.94416667	-76.77527778
7	WPKW696	Hearst Properties Inc.	HELLAM, PA	40.03452778	-76.61775000

[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.

ID	Call Sign	Owner- Operator	Location	Latitude (NAD83)	Longitude (NAD83)
8	WPSR220	WYTV Television, LLC	YOUNGSTOWN, OH	41.06172222	-80.63508333

Table 3: Location and Ownership of Commercial Interest and Television Station Doppler Radar Systems within 250 Kilometers of the Dan's Mountain Wind Farm

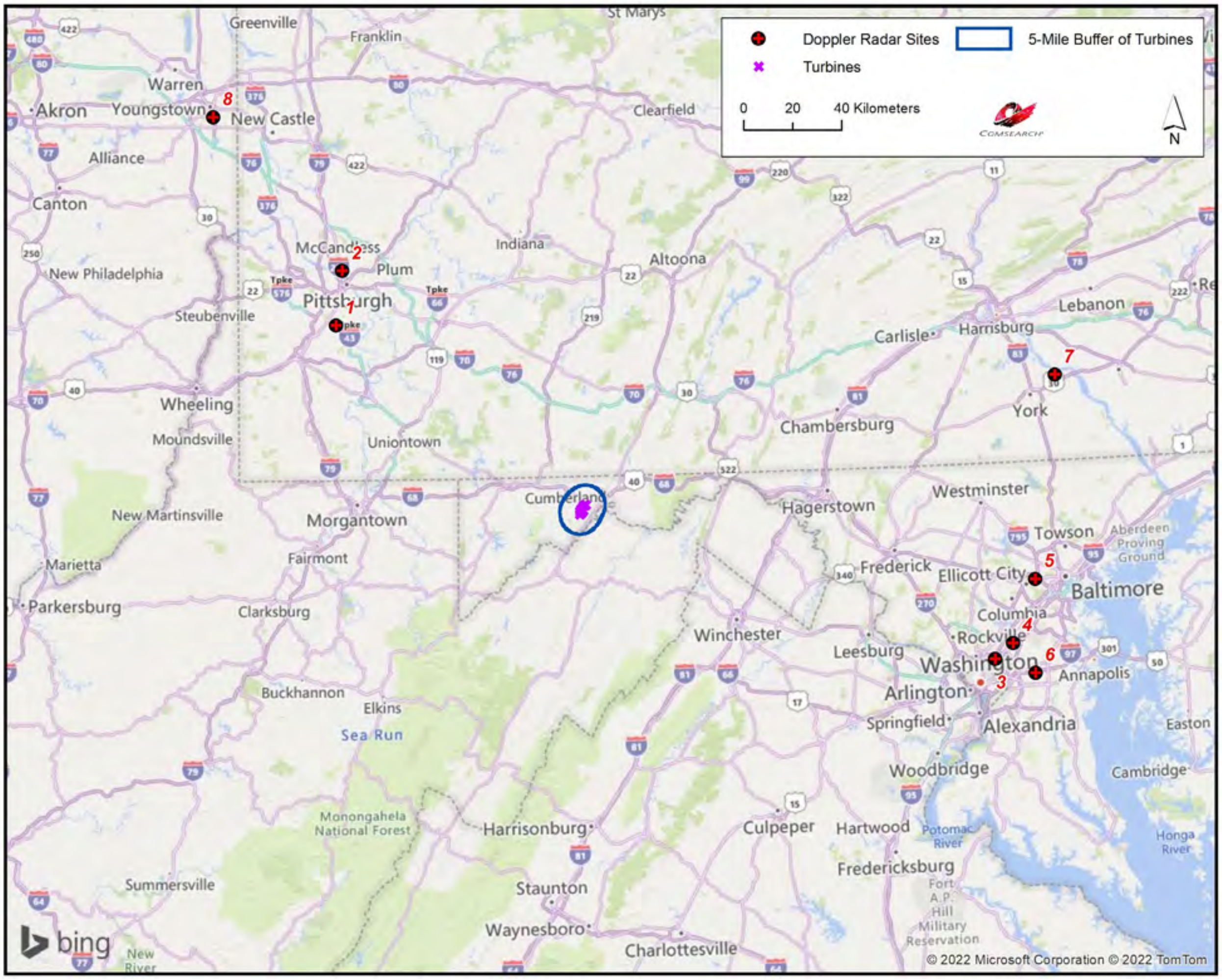

Figure 3: Location of Doppler Radar Systems within 250 Kilometers of the Dan's Mountain Wind Farm

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 Dan's Mountain Wind Farm 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 Dan's Mountain Wind Farm 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. Conclusions

Based on the analysis described in this report, none of the eight Doppler radar systems in the vicinity of the Dan's Mountain Wind Farm wind energy project could be impacted by the project's planned wind turbines.

6. Contact

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

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Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Appendix

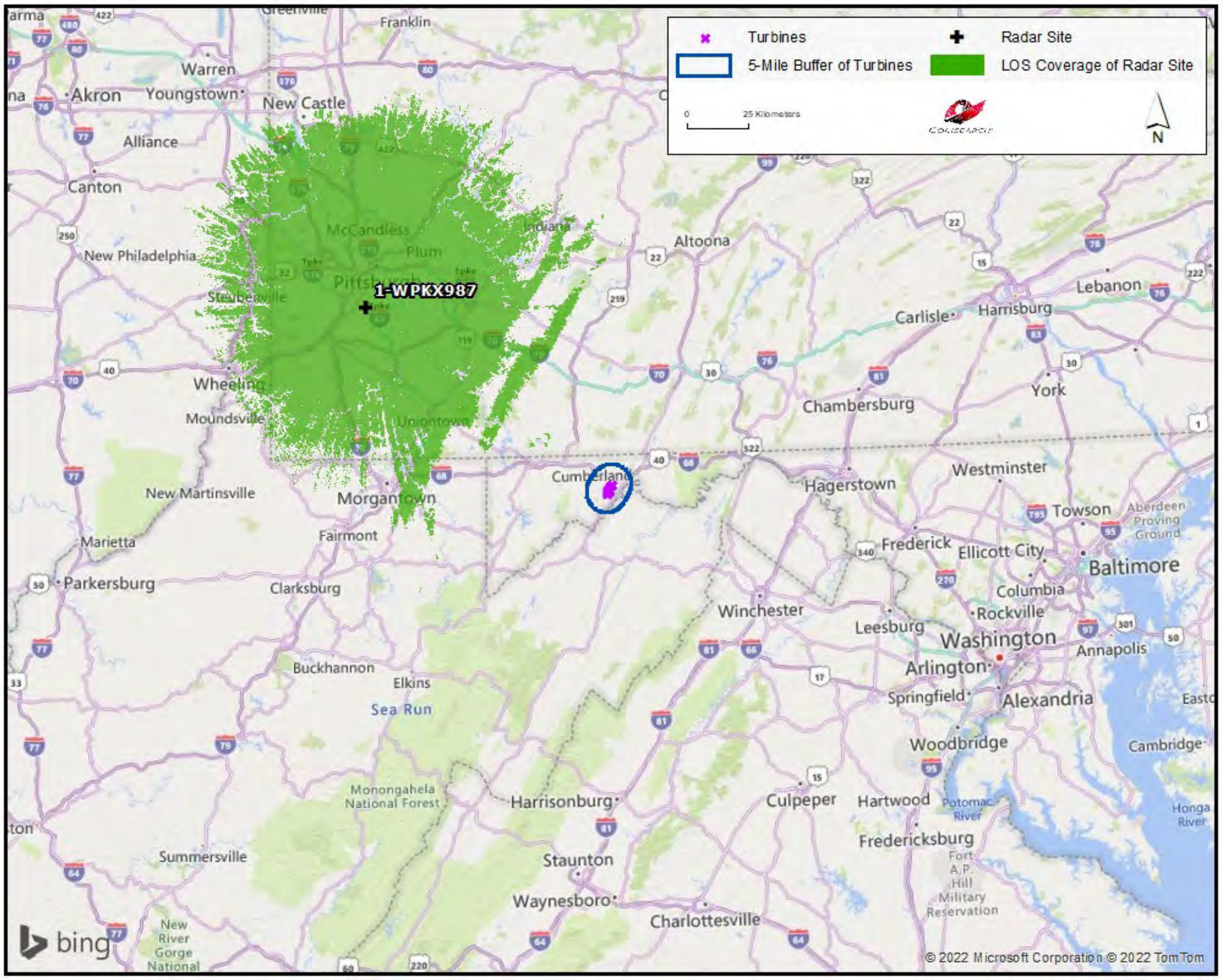

Figure A-1: Line-of-Sight Coverage of WPKX987 with Respect to Dan's Mountain Wind Farm

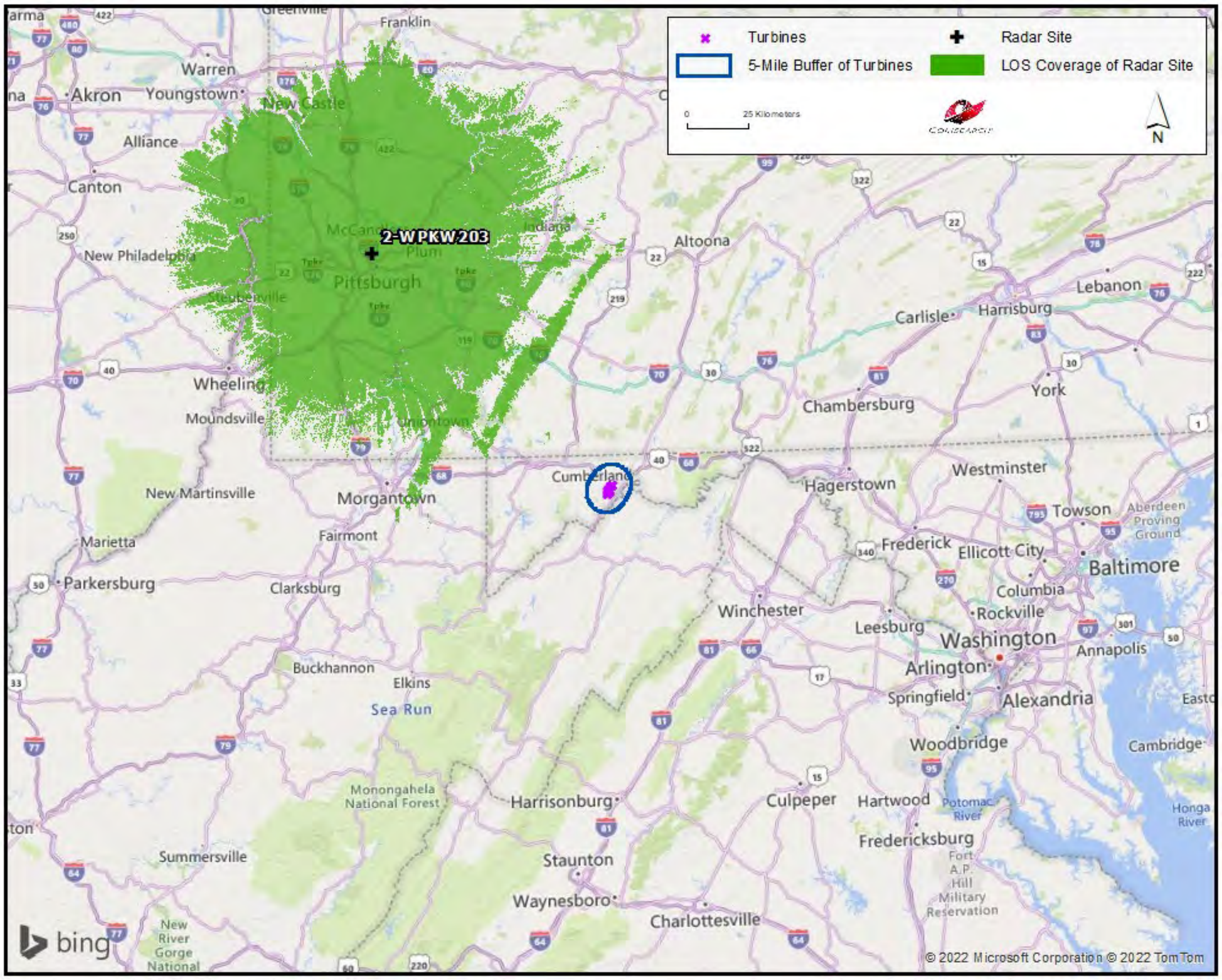

Figure A-2: Line-of-Sight Coverage of WPKW203 with Respect to Dan's Mountain Wind Farm

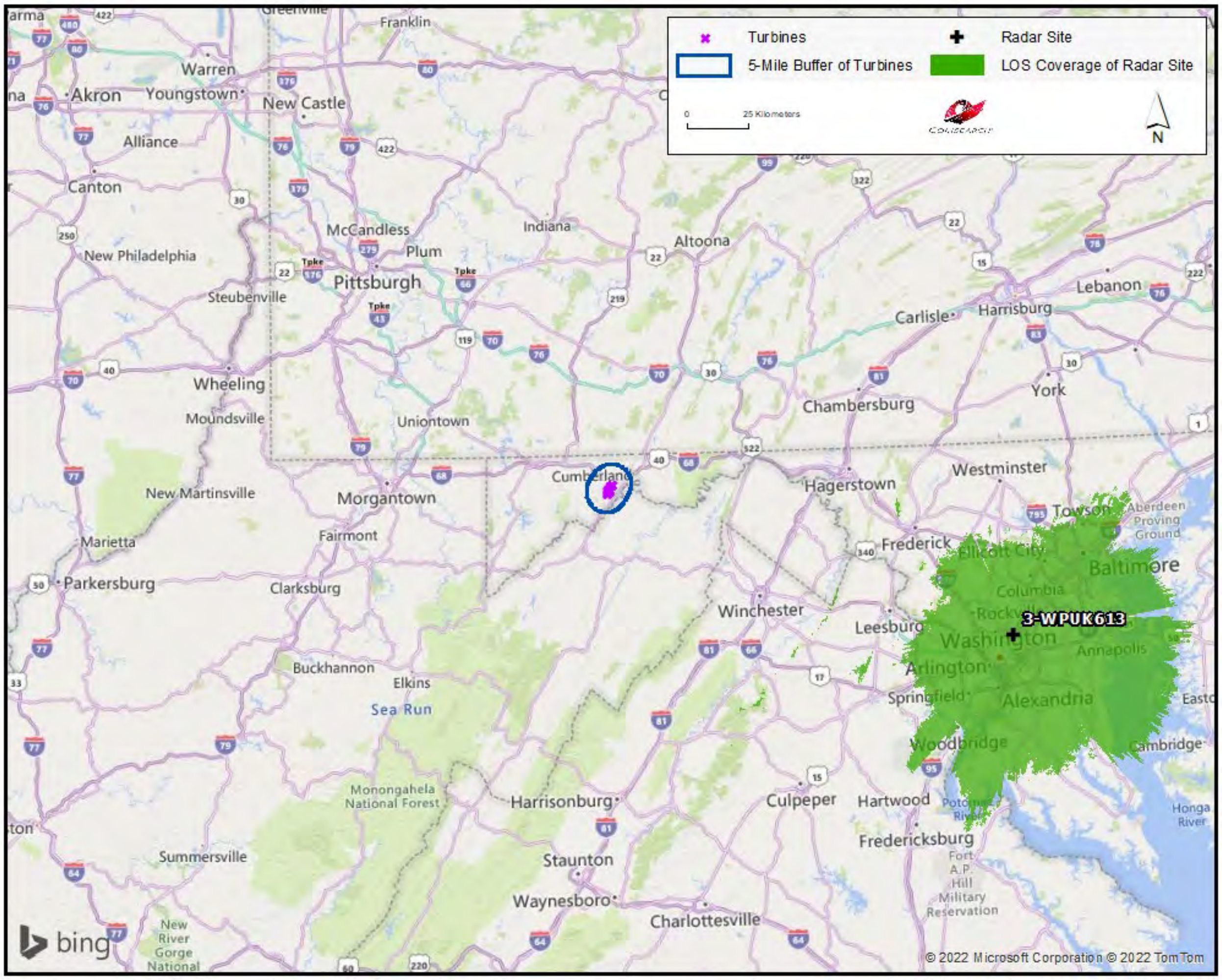

Figure A-3: Line-of-Sight Coverage of WPUK613 with Respect to Dan's Mountain Wind Farm

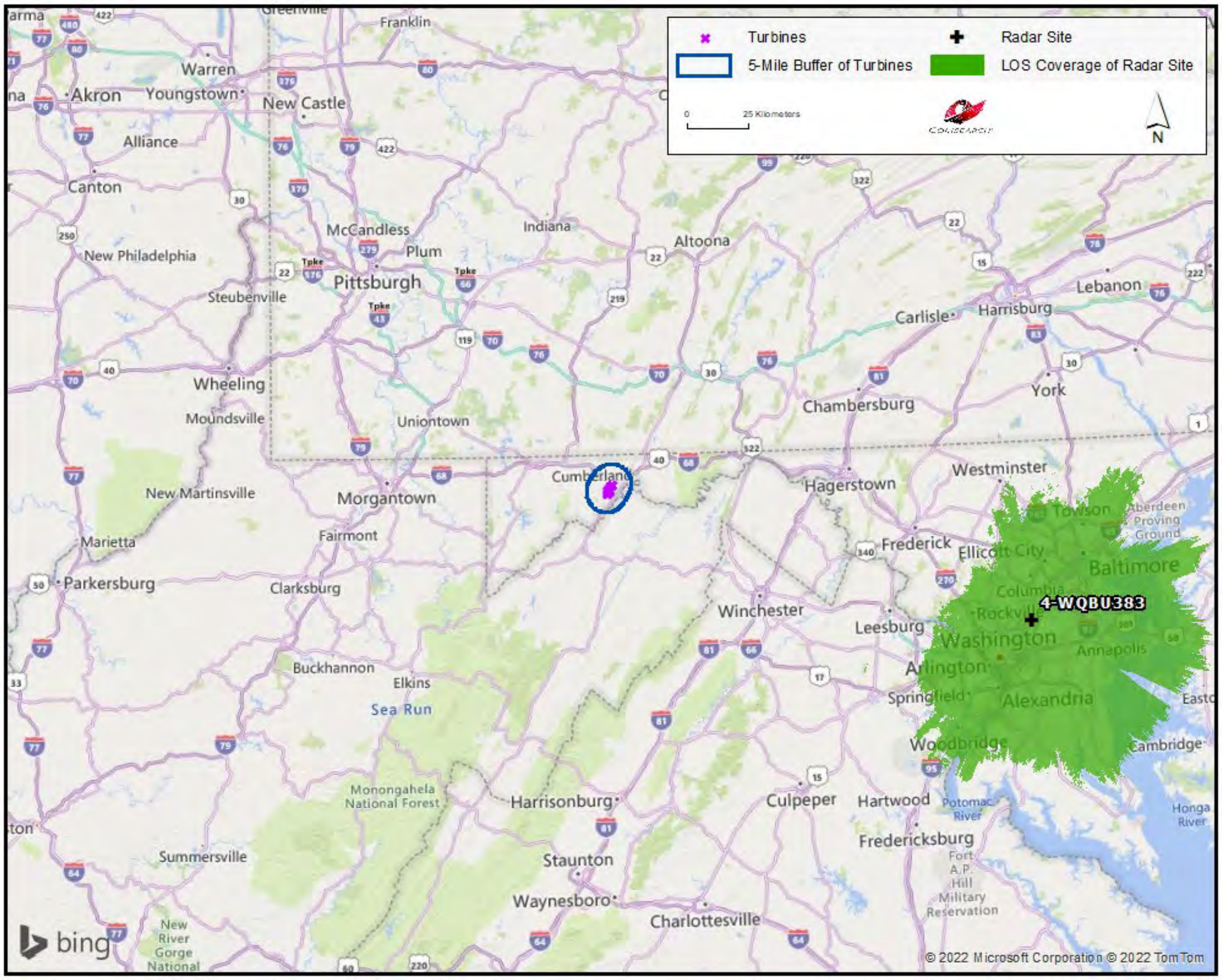

Figure A-4: Line-of-Sight Coverage of WQBU383 with Respect to Dan's Mountain Wind Farm

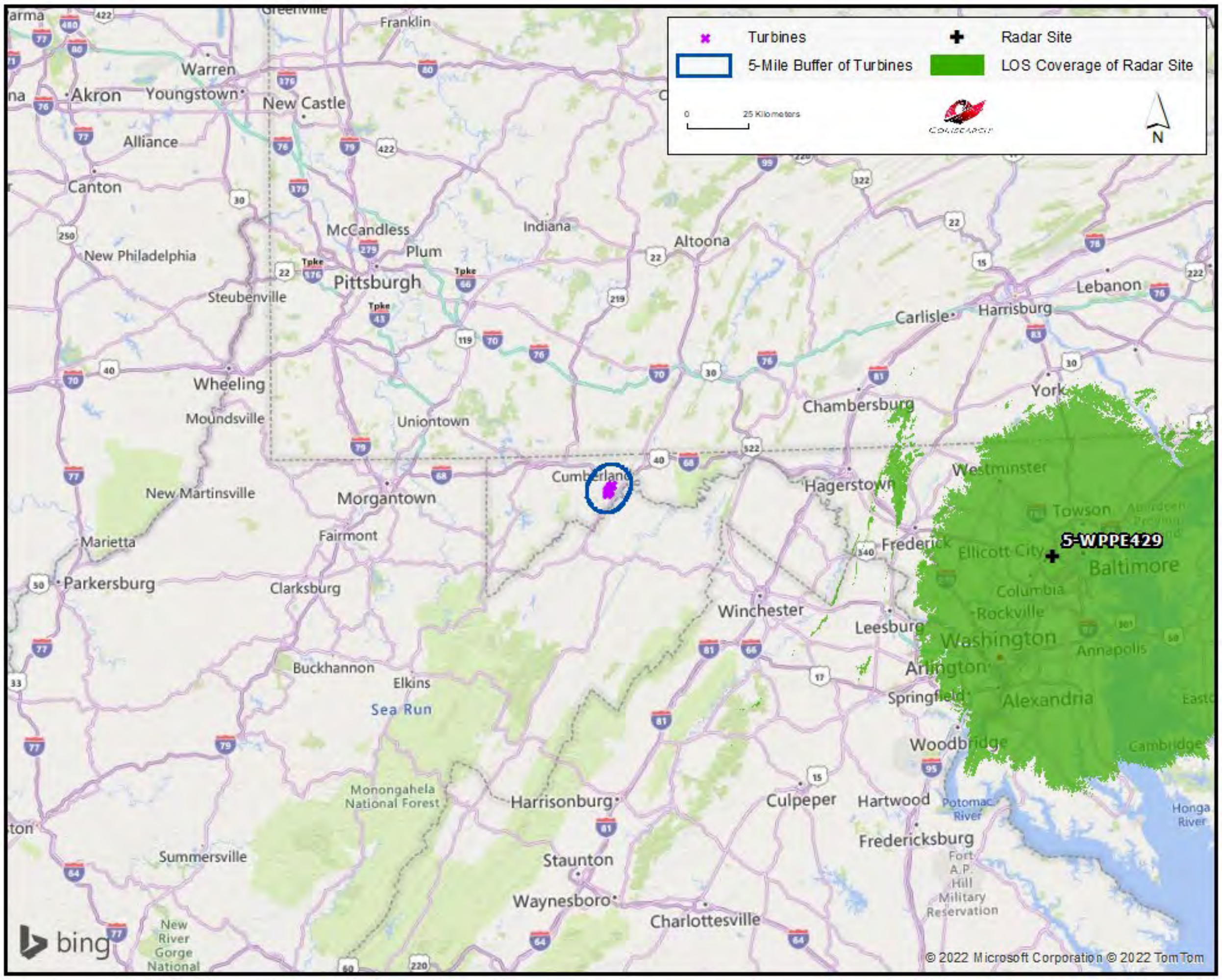

Figure A-5: Line-of-Sight Coverage of WPPE429 with Respect to Dan's Mountain Wind Farm

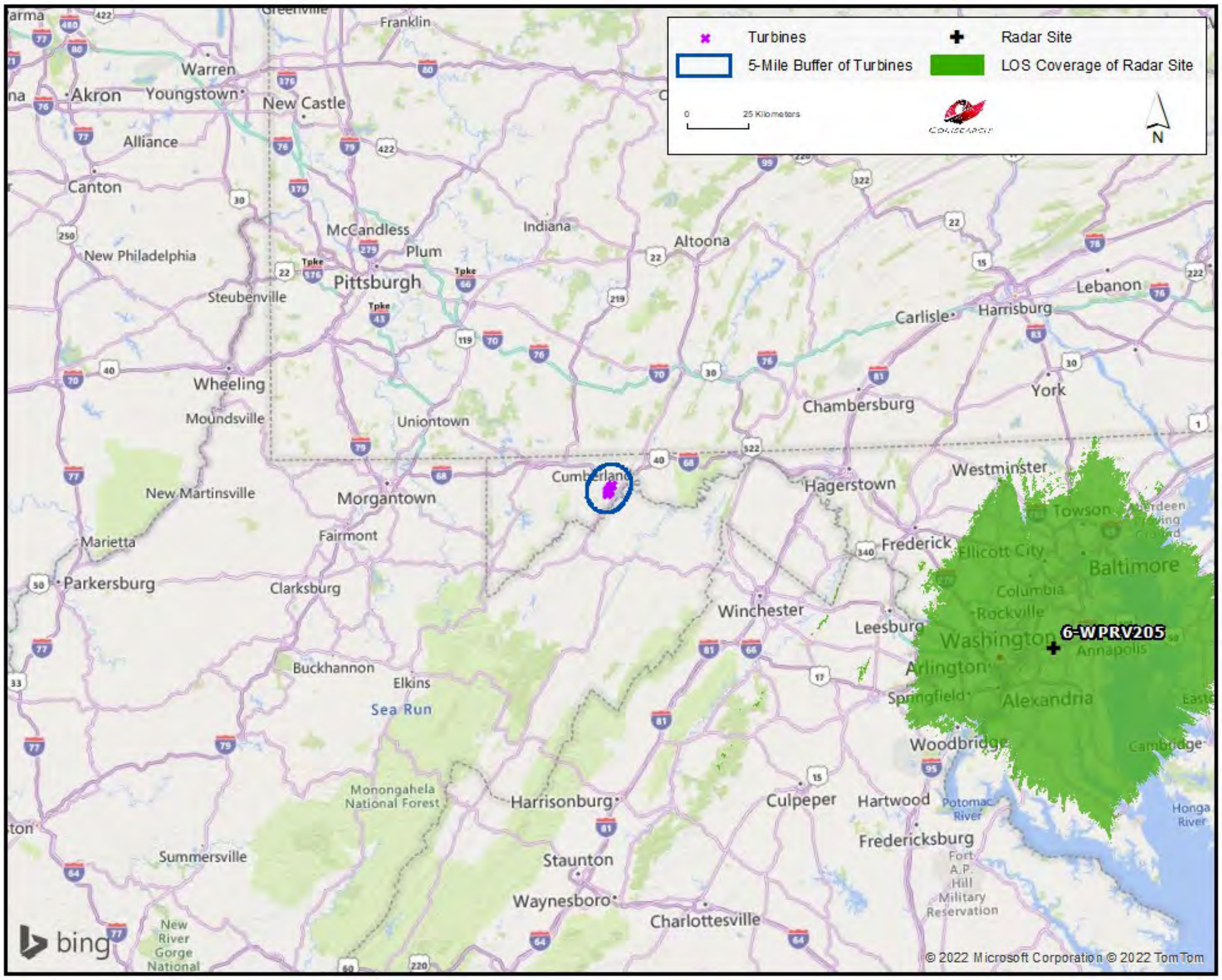

Figure A-6: Line-of-Sight Coverage of WPRV205 with Respect to Dan's Mountain Wind Farm

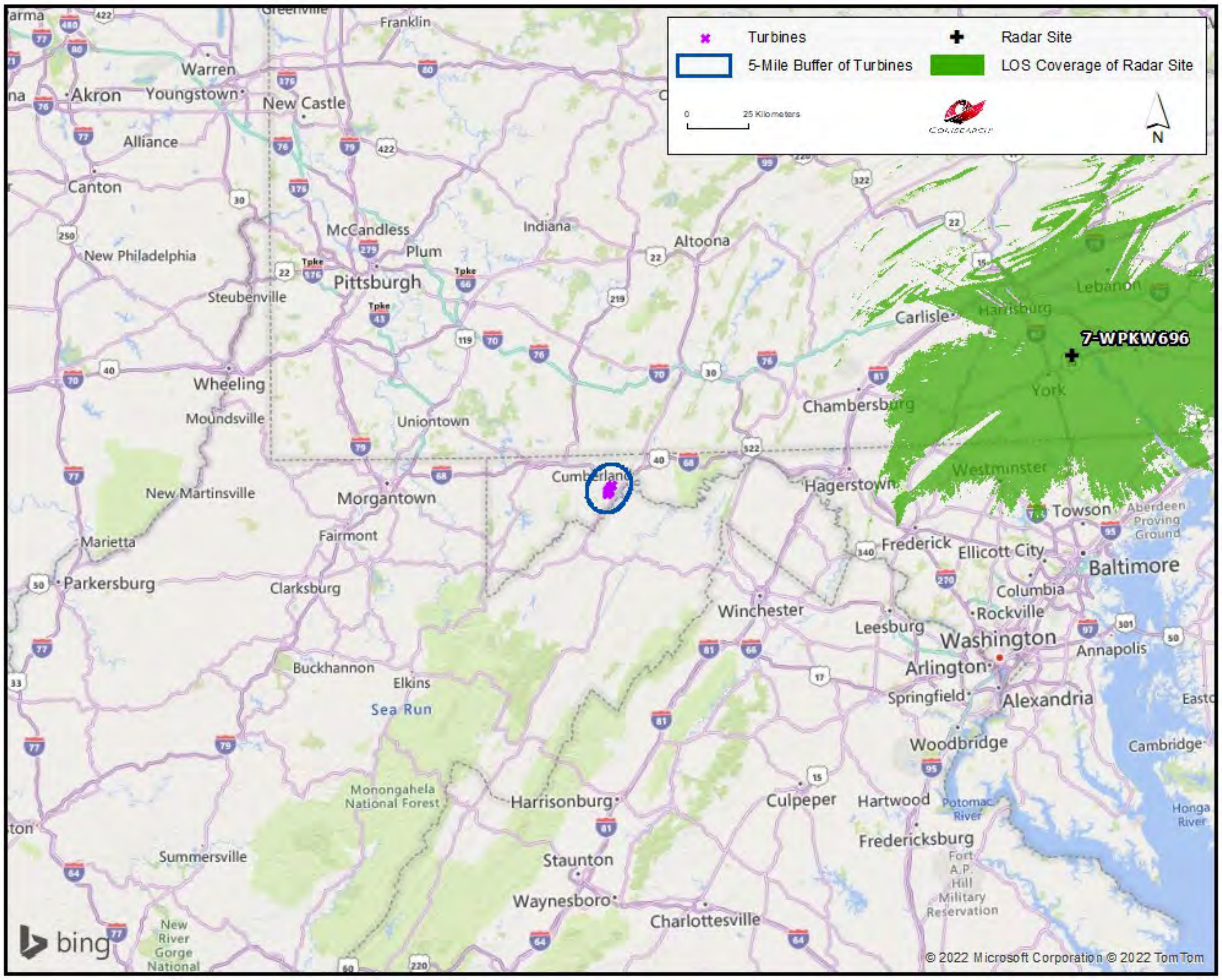

Figure A-7: Line-of-Sight Coverage of WPKW696 with Respect to Dan's Mountain Wind Farm

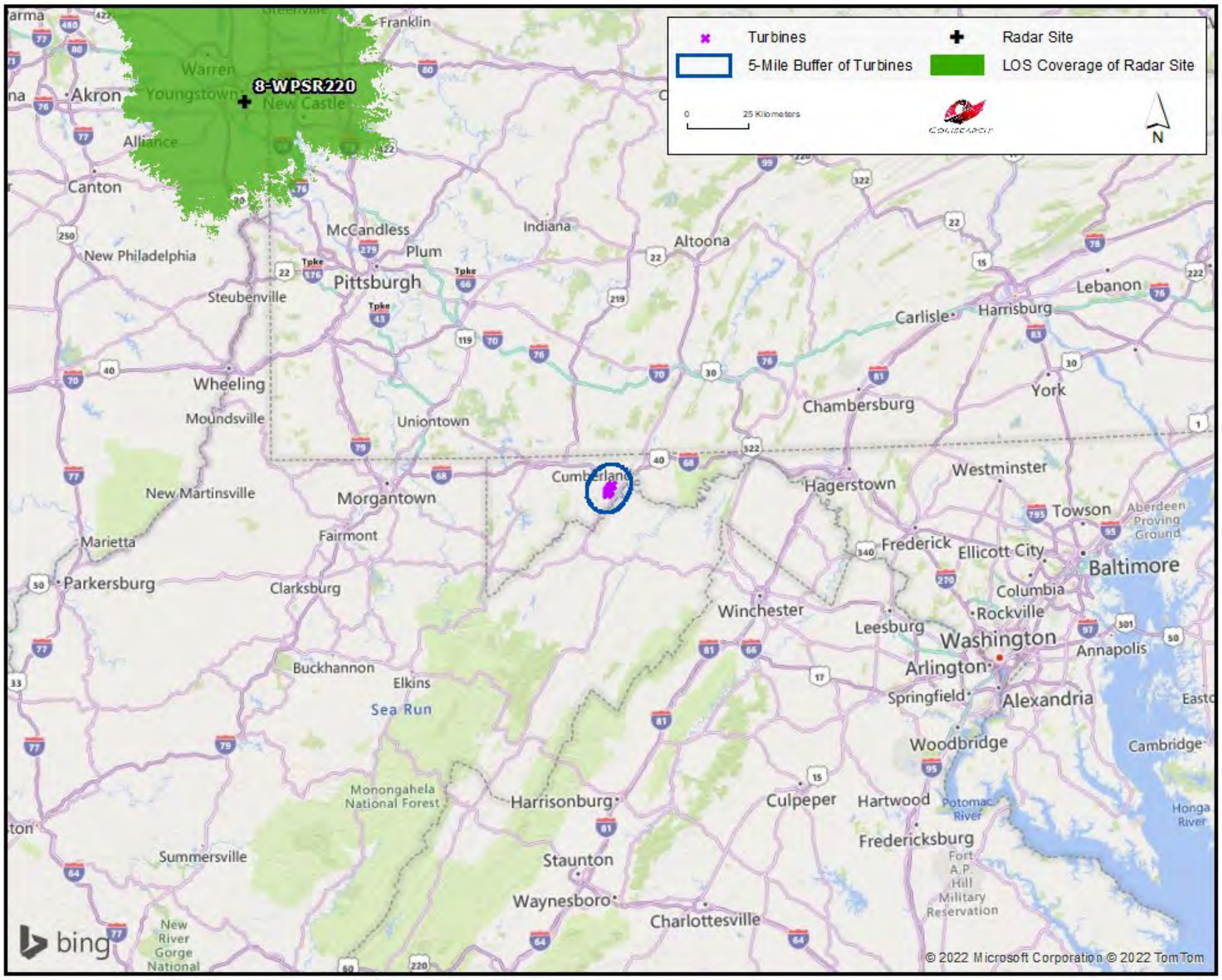

Figure A-8: Line-of-Sight Coverage of WPSR220 with Respect to Dan's Mountain Wind Farm

Wind Power GeoPlanner™

Communication Tower Study

Dan’s Mountain Wind Farm

Prepared on Behalf of
Dan’s Mountain Wind Force, LLC

March 3, 2023

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

This Communication Tower Study was performed for the Dan's Mountain Wind Farm in Allegany County, Maryland to identify the tower structures as well as FCC-licensed communication antennas that exist within five miles of the proposed turbines. 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 42 tower structures and 143 FCC-licensed communication antennas were identified within five miles of the Dan's Mountain Wind Farm using the data sources described in our methodology above. Twenty-five of the structures found were registered with the FCC. The structures identified contain 48 of the 143 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]. Some communication towers and antennas were found to have inaccurate coordinates and above ground heights in the FCC licenses. They have been corrected using aerial imagery and the surveyed information provided by the client.

Besides the 143 licensed communication antennas identified above, 21 unlicensed microwave antennas were identified within five miles of the proposed turbines based on the information provided by the client. Their locations can be found in Table 3.

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[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.

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

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
Tower001	1269618	Global Tower, LLC. through American Towers, LLC	59.4	39.546583	-78.942389	5.48
Tower002	1258082	VB-S1 Assets, LLC	79.3	39.557056	-78.981111	7.51
Tower003	1301346	Maryland State Highway Administration	100.0	39.578917	-78.900250	0.60
Tower004	N/A	Unknown	Unknown	39.579661	-78.900438	0.51
Tower005	N/A	Unknown	Unknown	39.580092	-78.901093	0.46
Tower006	1036042	Potomac Edison	69.5	39.580422	-78.899451	0.45
Tower007	N/A	Unknown	Unknown	39.580778	-78.899093	0.42
Tower008	1036217	VB-S1 Assets, LLC	54.8	39.580787	-78.899885	0.40
Tower009	N/A	Unknown	Unknown	39.581155	-78.899456	0.37
Tower010	N/A	SBA COMMUNICATIONS	30.5	39.581376	-78.898174	0.41
Tower011	N/A	Unknown	Unknown	39.581521	-78.897825	0.42
Tower012	N/A	AMERICAN TOWER CORP	Unknown	39.581597	-78.897706	0.42
Tower013	N/A	Unknown	Unknown	39.581703	-78.897778	0.41
Tower014	N/A	Unknown	Unknown	39.581791	-78.898424	0.36
Tower015	N/A	SBA COMMUNICATIONS	30.5	39.581838	-78.897882	0.39
Tower016	N/A	Unknown	Unknown	39.582145	-78.898731	0.31
Tower017	N/A	SBA COMMUNICATIONS	32.0	39.582257	-78.897879	0.36
Tower018	N/A	Unknown	Unknown	39.582352	-78.898551	0.31
Tower019	1036996	Broadcast Communications, Inc.	54.8	39.583326	-78.897393	0.34
Tower020	1036978	United States Cellular Corporation	73.8	39.584343	-78.896619	0.39
Tower021	1290790	SBA Towers X, LLC	55.2	39.585194	-78.915806	1.26
Tower022	N/A	US CELLULAR	Unknown	39.588974	-78.836193	4.47
Tower023	1248101	Allegany County of Maryland	26.2	39.593833	-78.800889	6.86
Tower024	N/A	Unknown	Unknown	39.601500	-78.887100	0.43
Tower025	1290791	SBA Towers X, LLC	58.0	39.626639	-78.925694	3.79

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
Tower026	1225803	United States Cellular Corporation	73.5	39.628472	-78.841222	3.06
Tower027	1011508	Global Tower, LLC. through American Towers, LLC	85.3	39.638611	-78.910833	3.61
Tower028	1284272	UNITED STATES CELLULAR CORPORATION	54.8	39.638639	-78.912000	3.67
Tower029	1229362	SpectraSite Communications, LLC. through American Towers, LLC.	91.7	39.639028	-78.850861	3.07
Tower030	1212706	Maryland State Police	36.0	39.639639	-78.830083	4.48
Tower031	1299618	Tarpon Towers II, LLC	60.7	39.639667	-78.820528	5.20
Tower032	1309599	Department of Maryland State Police	100.6	39.640194	-78.830556	4.48
Tower033	1262031	UNITED STATES CELLULAR CORPORATION	36.5	39.640194	-78.789083	7.71
Tower034	1306992	American Towers LLC	51.8	39.640278	-78.789083	7.72
Tower035	1210142	LAVALE SANITARY COMMISSION	12.2	39.640917	-78.823056	5.07
Tower036	1208270	Columbia Gas of Maryland	24.4	39.644528	-78.805278	6.61
Tower037	1036215	Northeast Tower Rental	24.6	39.646111	-78.803889	6.79
Tower038	1290787	SBA Towers X, LLC	58.0	39.648389	-78.882444	3.43
Tower039	N/A	Unknown	Unknown	39.649083	-78.940917	6.25
Tower040	N/A	Unknown	36.6	39.649086	-78.940911	6.25
Tower041	1259435	UNITED STATES CELLULAR CORPORATION	33.5	39.649972	-78.939389	6.21
Tower042	1310708	American Towers LLC	59.4	39.650722	-78.808833	6.68

Table 1: Summary of Tower Structures

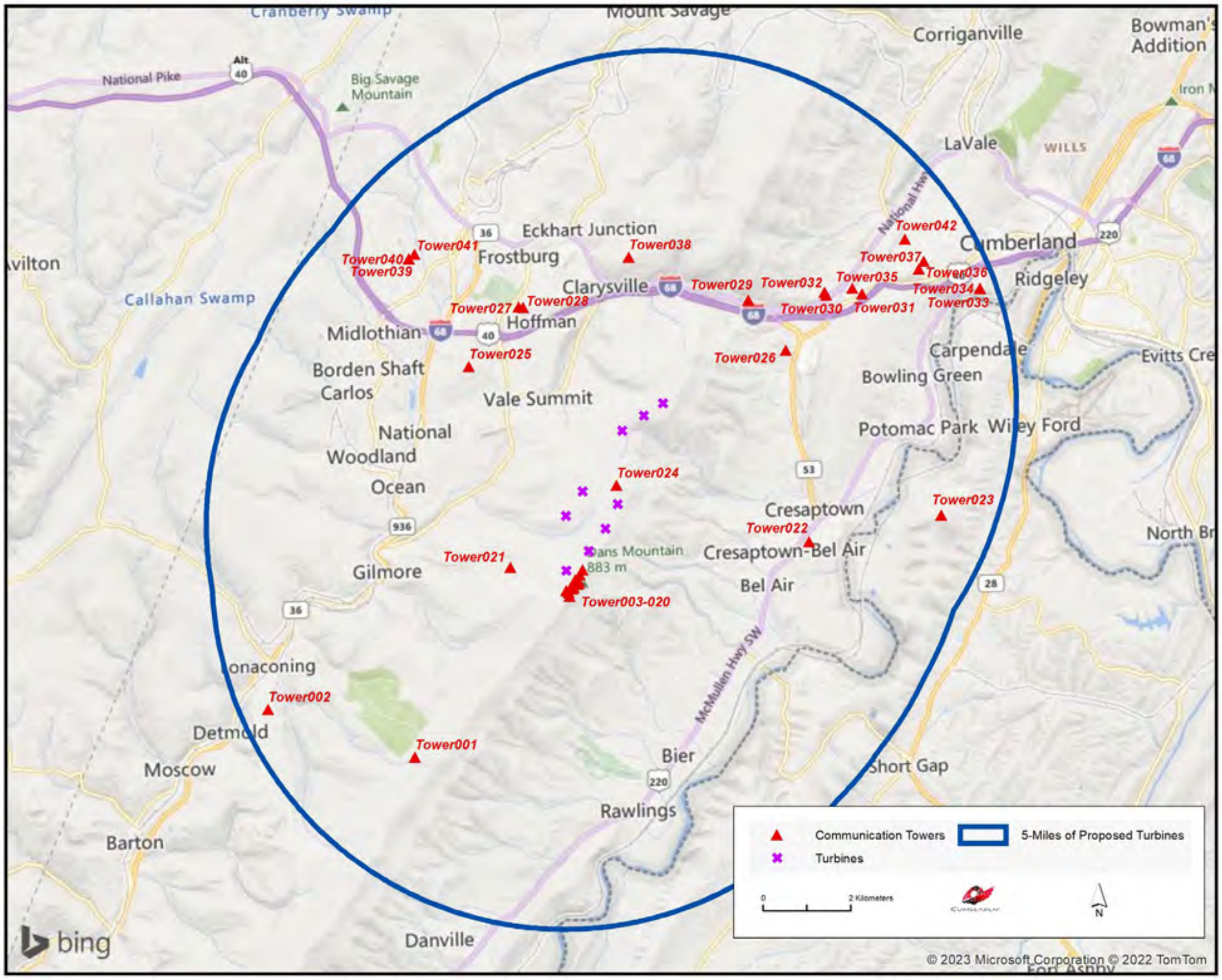

Figure 1: Towers within five miles of Proposed Turbines

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
1		RXONLY	Microwave	Cumberland Broadcasting Company	6.1	39.523972	-78.861972	7.49
2		WCBC-FM	FM	PROSPERITAS BROADCASTING SYSTEM, LP	21.3	39.525083	-78.861667	7.39
3		KCO633	Land Mobile	CSX Transportation Inc	15.0/21.3	39.532722	-78.879417	6.02
4		WQCA884	Land Mobile	American Woodmark Corporation	12.2	39.554806	-78.863639	4.58
5	Tower002	WRDT898	Microwave	Allegany County Government	22.9	39.557056	-78.981111	7.51
6	Tower002	WRCN429	Microwave	Mountain View Communications, LLC	74.7/76.2	39.557056	-78.981111	7.51
7	Tower002	KNKA570	Cellular	New Cingular Wireless PCS, LLC	Unknown	39.557056	-78.981111	7.51
8	Tower002	WRMN200	Microwave	T-Mobile License LLC	71.63	39.557056	-78.981111	7.51
9		KNHT494	Land Mobile	Maryland, State of - DNR	12.0	39.557306	-78.947528	4.98
10		KNHT493	Land Mobile	Maryland, State of - DNR	12.0	39.557306	-78.947528	4.98
11		WQZI397	Microwave	Conxx, Inc.	6.1	39.564222	-78.840194	5.35
12		KTK612	Land Mobile	LONACONING VOL FIRE CO	24.0	39.565917	-78.980306	7.10
13		WQHV525	Land Mobile	Allegany County Board of Education	18.3	39.567778	-78.979722	6.99
14		WQQD629	Land Mobile	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	10.7	39.567778	-78.979722	6.99
15		WQHV525	Land Mobile	Allegany County Board of Education	49.0	39.575278	-78.907500	1.14
16		WQIR601	Land Mobile	ALLEGANY COUNTY OF	49.0	39.575278	-78.907500	1.14
17		WQFD361	Land Mobile	ALLEGANY COUNTY OF	49.0	39.575278	-78.907500	1.14
18		WNJM820	Land Mobile	ALLEGANY, COUNTY OF	37.0	39.575361	-78.907528	1.13
19		KTG669	Land Mobile	ALLEGANY, COUNTY OF	49.0	39.575361	-78.907528	1.13
20		WNNN469	Land Mobile	T & T PUMPCO.,INC	46.0	39.575917	-78.897806	0.97
21		WQEW534	Land Mobile	MARYLAND, STATE OF	19.8/20.7	39.576194	-78.898083	0.93
22		KDG881	Land Mobile	ALLEGANY, COUNTY OF	43.0	39.576194	-78.897528	0.95
23		KGA910	Land Mobile	MARYLAND, STATE OF	36.0	39.576194	-78.897528	0.95
24		WAM29	Land Mobile	Maryland, State of - DNR	12.0/20.0	39.576194	-78.897528	0.95
25		KBU667	Land Mobile	Maryland, State of - DNR	12.0	39.576194	-78.897528	0.95
26	Tower003	WRDT897	Microwave	Allegany County Government	28.1/30.5	39.578917	-78.900250	0.60
27	Tower003	WRCN287	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	74.7	39.578917	-78.900250	0.60

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
28	Tower003	WRCJ556	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	40.2	39.578917	-78.900250	0.60
29	Tower003	WRCN287	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	70.1	39.578917	-78.900250	0.60
30	Tower003	WRCJ556	Land Mobile	ALLEGANY, COUNTY OF 911 JOINT COMMUNICATIONS DIVISION	34.7	39.578917	-78.900250	0.60
31	Tower003	WRJB242	Land Mobile	STATE OF MARYLAND - DEPT OF INFORMATION TECHNOLOGY	33.5	39.578917	-78.900250	0.60
32	Tower003	WQZR472	Microwave	State of Maryland, MIEMSS	76.2-91.4	39.578917	-78.900250	0.60
33		WNTJ750	Microwave	State of Maryland, MIEMSS	23.65/28.06	39.579652	-78.900444	0.52
34		WLVV	FM	EDUCATIONAL MEDIA FOUNDATION	Unknown	39.580083	-78.900833	0.46
35		KAB226	Land Mobile	State of Maryland, MIEMSS	52.0	39.580083	-78.900583	0.47
36	Tower005	WRCL314	Microwave	T-Mobile License LLC	57.62/57.99	39.580092	-78.901093	0.46
37	Tower006	WNEN347	Microwave	FELHC, Inc.	24.46-49.89	39.580422	-78.899451	0.45
38	Tower006	WNTI291	Microwave	FELHC, Inc.	15.2	39.580422	-78.899451	0.45
39	Tower007	WRFM318	Microwave	FELHC, Inc.	37.2	39.580778	-78.899093	0.42
40	Tower007	WNEN347	Microwave	FELHC, Inc.	24.5	39.580778	-78.899093	0.42
41	Tower008	WQCW375	Microwave	Allegany County Government	25.03/28.96	39.580787	-78.899885	0.40
42	Tower008	WQVX430	Microwave	Allegany County Government	29.35/31.84	39.580787	-78.899885	0.40
43	Tower008	WQZI396	Microwave	Conxx, Inc.	26.1	39.580787	-78.899885	0.40
44	Tower008	W278BL	FM	CEDAR RIDGE CHILDREN'S HOME & SCHOOL, INC	38.0	39.580787	-78.899885	0.40
45	Tower006	WQOW665	Land Mobile	FELHC INC	64.6	39.580422	-78.899451	0.45
46		WRQE	FM	FM RADIO LICENSES, LLC	51.0	39.581139	-78.899444	0.38
47	Tower009	WQXT395	Microwave	FM Radio License, LLC	33.12	39.581155	-78.899456	0.37
48	Tower009	RXONLY	Microwave	FM Radio License, LLC	28.75-31.58	39.581155	-78.899456	0.37
49		W289BR	FM	FM RADIO LICENSES, LLC	37.0	39.581194	-78.899444	0.37
50		W294CF	FM	FM RADIO LICENSES, LLC	44.0	39.581194	-78.899444	0.37
51		KGG931	Land Mobile	Maryland State Highway Administration	37.0	39.581194	-78.898083	0.43

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
52	Tower010	WQQI930	Microwave	Two Way Radio Inc.	30.6	39.581376	-78.898174	0.41
53		W43BP	TV	DIGITAL NETWORKS-NORTHEAST, LLC	13.0	39.581472	-78.897778	0.42
54		WPMF429	Land Mobile	ALLEGANY, COUNTY OF	30.0	39.581472	-78.897806	0.42
55		WPRS598	Land Mobile	ALLEGANY, COUNTY OF	30.0	39.581472	-78.897806	0.42
56		WNVH555	Land Mobile	Northrop Grumman Systems Corporation	6.0	39.581472	-78.897806	0.42
57		WPGB605	Land Mobile	TWO WAY RADIO SERVICE INC	46.0	39.581472	-78.897806	0.42
58		WPGG609	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
59		WPET570	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
60		WPEY303	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
61		WNJY543	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
62		WPIE995	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
63		WNDR708	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.897806	0.42
64		WPGB739	Land Mobile	TWO WAY RADIO SERVICE INC	46.0	39.581472	-78.897806	0.42
65		WPWC727	Land Mobile	TWR COMMUNICATIONS	38.0	39.581472	-78.897806	0.42
66		WPOX749	Land Mobile	TWR COMMUNICATIONS	38.0	39.581472	-78.897806	0.42
67		WPEG518	Land Mobile	TWO WAY RADIO SERVICE INC	30.0	39.581472	-78.892250	0.78
68	Tower011	WQJT598	Microwave	West Virginia Radio Corporation	15.24	39.581521	-78.897825	0.42
69	Tower011	RXONLY	Microwave	WITF, Inc.	6.1	39.581521	-78.897825	0.42
70	Tower011	RXONLY	Microwave	WITF, Inc.	22.9	39.581521	-78.897825	0.42
71		WNCM956	Land Mobile	CARL BELT INC	30.0	39.581750	-78.910028	0.81
72		KPM488	Land Mobile	FROSTBURG STATE UNIVERSITY	15.0	39.581750	-78.897806	0.40
73		WFWM	FM	FROSTBURG STATE UNIVERSITY	35.0	39.581750	-78.897778	0.40
74		KTE668	Land Mobile	State of Maryland, DNR	27.0	39.581750	-78.897528	0.42
75		RXONLY	Microwave	He's Alive Inc.	30.5	39.582306	-78.897806	0.36
76		KGC602	Paging	AMS Spectrum Holdings, LLC	32.0	39.582306	-78.897500	0.38
77	Tower018	RXONLY	Microwave	Frostburg State University	15.4	39.582352	-78.898551	0.31
78	Tower019	WQQL435	Microwave	Thought Transmissions, LLC	27.55/34.87	39.583326	-78.897393	0.34
79		KNKA570	Cellular	New Cingular Wireless PCS, LLC	Unknown	39.583333	-78.897389	0.34
80	Tower020	WMR416	Microwave	USCOC of Cumberland, Inc.	39.36-62.48	39.584343	-78.896619	0.39

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
81	Tower020	KNKA786	Cellular	USCOC OF CUMBERLAND, LLC	76.8	39.584343	-78.896619	0.39
82		WQUU265	Microwave	USCOC of Cumberland, Inc.	30.48	39.588972	-78.836278	4.46
83		WPCS783	Land Mobile	MIDLAND VOLUNTEER FIRE COMPANY	14.0	39.589250	-78.953083	4.50
84		WQCI629	Land Mobile	ALLEGANY, COUNTY OF	15.0	39.593139	-78.801139	6.87
85		WNQI770	Land Mobile	Mineral County Emergency Services	24.0	39.593139	-78.801139	6.87
86	Tower023	WQHV525	Land Mobile	Allegany County Board of Education	18.3	39.593833	-78.800889	6.86
87	Tower023	WQCW374	Microwave	Allegany County Government	18.29-23.77	39.593833	-78.800889	6.86
88	Tower023	KDG881	Land Mobile	ALLEGANY, COUNTY OF	18.3	39.593833	-78.800889	6.86
89	Tower023	WQQD629	Land Mobile	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	18.3	39.593833	-78.800889	6.86
90	Tower023	WQXU874	Microwave	Conxx, Inc.	26.2	39.593833	-78.800889	6.86
91	Tower023	WQOT448	Land Mobile	Mineral County Emergency Services	24.0	39.593833	-78.800889	6.86
92		KUB997	Land Mobile	CRESAPTOWN VOLUNTEER FIRE DEPT INC	21.0	39.595361	-78.831139	4.49
93		WQPV747	Land Mobile	ALLEGANY, COUNTY OF	12.0	39.598944	-78.823194	4.88
94		WPDV708	Land Mobile	ALLEGANY, COUNTY OF	46.0	39.598972	-78.916139	1.37
95		KVD573	Land Mobile	Allegany County 911 Joint Communications Division	45.0	39.601472	-78.887806	0.43
96		WLIC	FM	CALVARY CHAPEL CUMBERLAND, INC.	44.0	39.601750	-78.886944	0.46
97		WQGJ235	Land Mobile	STATE OF MARYLAND, DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONAL SERVICES	35.0	39.603278	-78.817306	5.17
98		KNNV447	Land Mobile	MARYLAND STATE DEPARTMENT OF PUBLIC SAFETY & CORRECTIONAL SERVICES	15.0	39.608694	-78.817806	4.96
99		WQRZ888	Land Mobile	Vindex Energy LLC	10.0	39.614722	-78.929361	3.25
100		WNYV803	Land Mobile	State of Maryland - Frostburg University	18.0	39.624250	-78.941972	4.73
101		WQFI398	Land Mobile	BOWLING GREEN VOLUNTEER FIRE DEPT	14.0	39.625083	-78.805583	5.95
102		WROM724	Land Mobile	COUNTRY CLUB MALL REALTY, LLC	28.0	39.628417	-78.841250	3.06
103	Tower026	KNKA786	Cellular	USCOC OF CUMBERLAND, LLC	Unknown	39.628472	-78.841222	3.06

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
104	Tower026	WQQA260	Microwave	USCOC of Cumberland, Inc.	42.67	39.628472	-78.841222	3.06
105		WPIH295	Land Mobile	CSX Transportation Inc	2.0	39.629806	-78.802528	6.30
106		WPFM943	Land Mobile	Maryland State Highway Administration	32.0	39.633694	-78.832528	3.98
107	Tower027	WQTR920	Microwave	New Cingular Wireless PCS - Maryland	44.2/59.44	39.638611	-78.910833	3.61
108	Tower027	WRCN600	Microwave	T-Mobile License LLC	68.58/87.48	39.638611	-78.910806	3.61
109	Tower028	WQQC524	Microwave	USCOC of Cumberland, Inc.	27.43-42.67	39.638639	-78.912000	3.67
110		KNKA786	Cellular	USCOC OF CUMBERLAND, LLC	55.2	39.638694	-78.911972	3.68
111	Tower030	KGA910	Land Mobile	MARYLAND, STATE OF	40.0	39.639639	-78.830083	4.48
112	Tower031	WQYB986	Microwave	USCOC of Cumberland, Inc.	54.86	39.639667	-78.820444	5.20
113	Tower033	WQPM993	Microwave	USCOC of Cumberland, Inc.	33.53/34.75	39.640194	-78.789083	7.71
114		WQHE659	Land Mobile	FROSTBURG STATE UNIVERSITY	40.7	39.641667	-78.925000	4.68
115		KGJ642	Land Mobile	LAVALE VOLUNTEER FIRE DEPARTMENT INC	21.0	39.643417	-78.824194	5.13
116	Tower036	WPQD657	Land Mobile	COLUMBIA GAS OF MARYLAND	27.4	39.644528	-78.805278	6.61
117		KNFJ222	Land Mobile	LAVALE VOLUNTEER RESCUE SQUAD INC	15.0	39.644806	-78.822528	5.34
118		WPRV884	Microwave	Frostburg State University	5.1	39.645083	-78.938750	5.82
119		KGJ642	Land Mobile	LAVALE VOLUNTEER FIRE DEPARTMENT INC	25.0	39.645194	-78.805083	6.66
120		KNFJ222	Land Mobile	LAVALE VOLUNTEER RESCUE SQUAD INC	25.0	39.645194	-78.805083	6.66
121		WDZN-FM1	FM	WEST VIRGINIA RADIO CORPORATION OF THE ALLEGHENIES	20.0	39.645333	-78.804444	6.71
122		WQVX737	Microwave	Allegany County Government	9.14-24.7	39.645333	-78.805000	6.67
123		WQCW387	Microwave	Allegany County Government	27.13	39.645389	-78.804972	6.67
124		KGA886	Land Mobile	ALLEGANY COUNTY OF	40.0	39.645917	-78.805306	6.68
125		WQCI629	Land Mobile	ALLEGANY, COUNTY OF	15.0	39.645917	-78.805306	6.68
126		WPPV765	Land Mobile	ALLEGANY, COUNTY OF-911 JOINT COMMUNICATIONS DIVISION	40.0	39.645917	-78.805306	6.68
127		KJD307	Land Mobile	FROSTBURG, CITY OF	20.0	39.649806	-78.923083	5.23
128		KJL891	Land Mobile	MARYLAND, STATE OF	12.0	39.649806	-78.923083	5.23
129	Tower041	WQXY359	Microwave	T-Mobile License LLC	33.53	39.649972	-78.939389	6.21
130	Tower041	WQQC526	Microwave	USCOC of Cumberland, Inc.	24.38	39.649972	-78.939389	6.21

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
131		KGD459	Land Mobile	FROSTBURG FIRE DEPARTMENT NO 1 INC	24.0	39.650083	-78.923361	5.27
132		WQYT905	Microwave	New Cingular Wireless PCS - Maryland	21.34	39.652111	-78.936639	6.20
133		WLG299	Microwave	Frostburg State University	16.7	39.652250	-78.932194	5.95
134		RXONLY	Microwave	Frostburg State University	15.2	39.652250	-78.932194	5.95
135		WQQC751	Microwave	USCOC of Cumberland, Inc.	7.77	39.652528	-78.930528	5.88
136		WQNC803	Land Mobile	Allegany, County of	17.0	39.653444	-78.931167	5.99
137		KVN610	Land Mobile	MARYLAND, STATE OF	18.0	39.657583	-78.942528	6.99
138		WPDA208	Land Mobile	MARYLAND, STATE OF - FROSTBURG STATE UNIVERSITY	18.0	39.657583	-78.941972	6.96
139		WQQC525	Microwave	USCOC of Cumberland, Inc.	15.24	39.658306	-78.929444	6.32
140		KNEC959	Land Mobile	TROUTMAN, ROY E	15.0	39.658417	-78.929472	6.33
141		WPTL759	Land Mobile	Allegany County of	15.0	39.659722	-78.931667	6.56
142		KGJ642	Land Mobile	LAVALE VOLUNTEER FIRE DEPARTMENT INC	15.0/23.0	39.660361	-78.805583	7.53
143		KJD307	Land Mobile	FROSTBURG, CITY OF	20.0	39.671750	-78.939750	8.04

Table 2: Summary of Communication Antennas

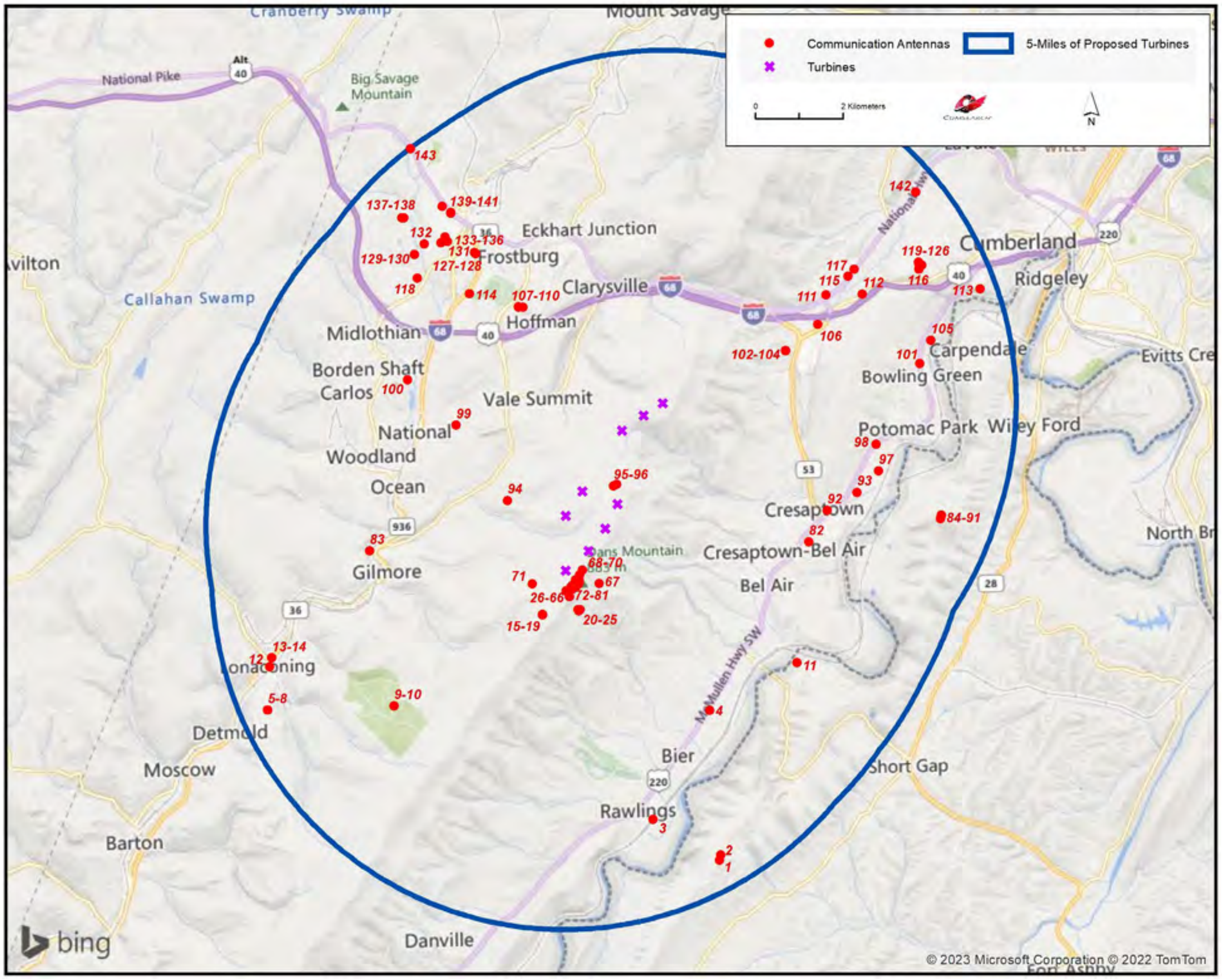

Figure 2: Communication Antennas within five miles of Proposed Turbines

Tower ID	Latitude (NAD83)	Longitude (NAD83)	Distance the Nearest Turbine (km)
1	39.524900	-78.861800	7.41
2	39.534700	-78.877900	5.85
3	39.557000	-78.981100	7.51
4	39.579652	-78.900444	0.52
5	39.580787	-78.899885	0.40
6	39.580787	-78.899885	0.40
7	39.580787	-78.899885	0.40
8	39.580787	-78.899885	0.40
9	39.581376	-78.898174	0.41
10	39.581376	-78.898174	0.41
11	39.581376	-78.898174	0.41
12	39.581376	-78.898174	0.41
13	39.581376	-78.898174	0.41
14	39.581703	-78.897778	0.41
15	39.581703	-78.897778	0.41
16	39.581703	-78.897778	0.41
17	39.582300	-78.968300	5.77
18	39.601500	-78.887100	0.43
19	39.601500	-78.887100	0.43
20	39.633600	-78.832200	4.00
21	39.668300	-78.812900	7.66

Table 3: Summary of Unlicensed Microwave Antennas

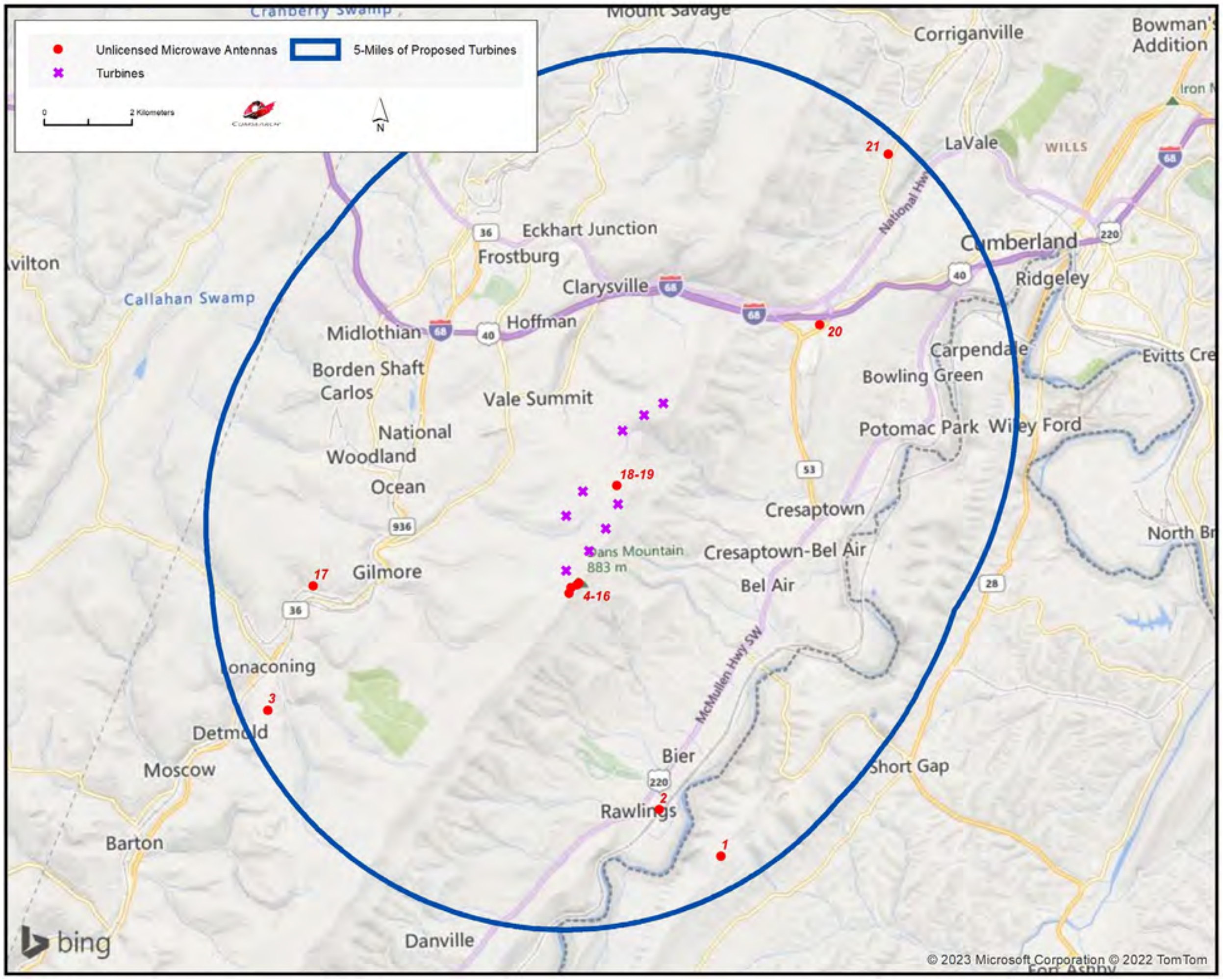

Figure 3: Unlicensed Microwave Antennas within Five Miles of Proposed Turbines

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 ensure 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 42 tower structures, 143 FCC-licensed antennas, and 21 unlicensed microwave antennas within five miles of the project area. They are used for microwave, cellular, FM, TV, paging, and land mobile services in the area.

5. Contact Us

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Comsearch Geoplanner Survey Summary

ID	TOWER	rcn_number	service	band #	band	band_name	status 1	status 2	site_1	site_2	call_1	call_2	lat_1	lon_1	lat_2	lon_2	gnd_elev_1	gnd_elev_2	tacl_1 ft	tacl_1 MSL	tacl_2 ft	tacl_2 MSL
1	1	05032916	of	6	6.7 GHz	Upper 6 GHz	LP	LP	ALLEG 911	DANS ROCK	WBX365	WNTJ750	39.64869444	-78.74972222	39.58008333	-78.90055556	925.04514	2837.14632	50.00244	975.04758	100.00488	2937.1512
2	4	15102601	tv	1	950 MHz	950 MHz	LP	LP	WRQE STUDIO	WKGO FM TWR	WHB707	RXONLY	39.64602778	-78.75180556	39.58113889	-78.89947222	870.1212	2840.0336	26.248	896.3692	0	2840.0336
3	4	91083025	tv	1	950 MHz	950 MHz	LP	LP	MEADOW MTN	DANS ROCK	WLD321	RXONLY	39.70397222	-79.09169444	39.58230556	-78.89780556	2720.14586	2838.065	100.00488	2820.15074	0	2838.065
4	9B	00120101	tv	1	950 MHz	950 MHz	LP	LP	FRAMPTON HAL	DANS ROCK	WLG299	RXONLY	39.65225	-78.93219444	39.58175	-78.89780556	1971.2248	2880.718	54.7927	2026.0175	0	2880.718
5	6B		tv	1	950 MHz	950 MHz	LP	LP	WHITE AVE	WPVM	WLJ664	RXONLY	39.64341667	-78.74277778	39.58147222	-78.89780556	835.0145	2869.5626	41.9968	877.0113	0	2869.5626
6	12	16052663	cc	6	6.1 GHz	Lower 6 GHz	LY	LY	DANS MTN	SHORT GAP	WMR416	WQKA700	39.58433333	-78.89661111	39.51930556	-78.79475	2803.45045	972.94774	75.00366	2878.45411	154.99444	1127.94218
7	12	16052663	cc	6	6.1 GHz	Lower 6 GHz	LY	LY	FLINTSTONE	DANS MTN	WMT232	WMR416	39.70727778	-78.62666667	39.58433333	-78.89661111	1824.69534	2803.45045	120.01898	1944.71432	50.00244	2853.45289
8	5	10080533	of	6	6.7 GHz	Upper 6 GHz	LP	LP	DANS ROCK	MEADOW MTN	WNEN347	WNEN348	39.58119444	-78.89861111	39.51925	-79.30169444	2841.0179	3008.15204	170.02142	3011.03932	204.99688	3213.14892
9	5		of	6	6.7 GHz	Upper 6 GHz	LP	LP	DANS ROCK	CUMBERLND P	WNEN347	WNEN360P	39.58119444	-78.89861111	39.62202778	-78.71169444	2841.0179	1755.07252	85.01071	2926.02861	16.01128	1771.0838
10	5	08081426	of	6	6.7 GHz	Upper 6 GHz	LP	LP	DANS ROCK	AUGUSTA	WNEN347	WNEX908	39.58119444	-78.89861111	39.30397222	-78.65361111	2841.0179	1240.218	100.00488	2941.02278	205.010004	1445.228004
11	5	19052939	of	6	6.7 GHz	Upper 6 GHz	LB	LB	DANS ROCK	BLACK OAK PR	WNEN347	WQNA362P	39.58119444	-78.89861111	39.50075	-78.92441667	2841.0179	1521.0716	80.0564	2921.0743	29.98834	1551.05994
12	5	10080532	cc	6	6.1 GHz	Lower 6 GHz	LP	LP	SIDELING	DANS ROCK	WNEN355	WNEN347	39.68952778	-78.29972222	39.58119444	-78.89861111	1635.08635	2841.0179	135.006588	1770.092938	165.008052	3006.025952
13	5	08093020	of	6	6.7 GHz	Upper 6 GHz	LP	LP	CUMBERLAND P	DANS ROCK	WNEN360P	WNEN347	39.62202778	-78.71166667	39.58119444	-78.89861111	1755.0069	2841.0179	14.99417	1770.00107	120.01898	2961.03688
14	5	110526AF	cc	1	940-960 MHz	940-960 MHz	LP	LP	DANS ROCK	HELMICK ROC	WNTI291	WNTI290	39.58111111	-78.89861111	38.98286111	-78.90805556	2841.0179	3265.2512	49.8712	2890.8891	49.8712	3315.1224
15	5	90110223	of	1	940-960 MHz	940-960 MHz	LP	LP	DANS ROCK	HELMICK ROC	WNTI291	WNTI290	39.58111111	-78.89861111	38.98286111	-78.90805556	2841.0179	3265.2512	50.00244	2891.02034	50.00244	3315.25364
16	1	05032916	of	6	6.7 GHz	Upper 6 GHz	LP	LP	DANS ROCK	SAVAGE MT	WNTJ750	WNTM695	39.58008333	-78.90055556	39.67397222	-78.9625	2837.14632	2847.15337	79.99078	2917.1371	50.00244	2897.15581
17	Tower Unknown	03082112	tv	1	950 MHz	950 MHz	LP	LP	WROG COMP	WROG STL	WPYJ824	RXONLY	39.64361111	-78.73444444	39.58277778	-78.89722222	870.1212	2840.0336	35.1067	905.2279	0	2840.0336
18	3	05042228	cc	18	18 GHz	18 GHz	LP	LP	DANS ROCK	KNOBBLY S	WQCW375	WQCW374	39.57966667	-78.90044444	39.59383333	-78.80088889	2835.14491	1840.08323	89.99783	2925.14274	64.99661	1905.07984
19	3	05042228	cc	18	18 GHz	18 GHz	LP	LP	DANS ROCK	KNOBBLY N	WQCW375	WQCW383	39.57966667	-78.90044444	39.63447222	-78.77805556	2835.14491	1090.04663	95.01776	2930.16267	64.99661	1155.04324
20	6B	08111138	cc	11	11 GHz	11 GHz	LP	LP	WHITE AVENUE	DANSROCK	WQJT762	WQJT598	39.64388889	-78.74222222	39.58138889	-78.89805556	1120.06778	2875.1403	39.99539	1160.06317	50.00244	2925.14274
21	6B	08111138	cc	11	11 GHz	11 GHz	LP	LP	SAVAGE MTN	DANSROCK	WQJT763	WQJT598	39.67444444	-78.96194444	39.58138889	-78.89805556	2924.15844	2875.1403	70.01654	2994.17498	50.00244	2925.14274
22	6B	08111138	cc	11	11 GHz	11 GHz	LP	LP	WQZK	DANSROCK	WQJT764	WQJT598	39.41888889	-78.95361111	39.58138889	-78.89805556	2047.11433	2875.1403	85.01071	2132.12504	50.00244	2925.14274
23	12	16032336	cc	11	11 GHz	11 GHz	LY	LY	ALLEGHENY GR	DANS MTN	WQQA260	WMR416	39.62847222	-78.84122222	39.58433333	-78.89661111	1212.06702	2803.45045	140.00027	1352.06729	204.99688	3008.44733
24	12	21012905	cc	11	11 GHz	11 GHz	LY	LY	FROSTBURG	DANS MTN	WQQC524	WMR416	39.63863889	-78.912	39.58433333	-78.89661111	2219.9246	2803.45045	140.00027	2359.92487	125.56387	2929.01432
25	6A	12082066	cc	11	11 GHz	11 GHz	LN	LN	DANS ROCK	WILLS MT	WQQI930	WQQM666	39.58136111	-78.89819444	39.67461111	-78.77897222	2844.627	1607.69	100.0705	2944.6975	29.8571	1637.5471
26	11	12092549	of	6	6.7 GHz	Upper 6 GHz	LY	LY	ASR1036996	W41AO	WQQL435	WQQL347	39.58313889	-78.89697222	39.45166667	-78.34641667	2828.222	2503.43581	85.99501	2914.21701	93.01635	2596.45216
27	11	12092548	cc	11	11 GHz	11 GHz	LY	LY	ATC305272	ASR1036996	WQQL437	WQQL435	39.68155556	-79.26205556	39.58313889	-78.89697222	2987.0224	2828.222	328.00157	3315.02397	85.99501	2914.21701
28	12	16052663	cc	11	11 GHz	11 GHz	LY	LY	BOWLINGGREEN	DANS MTN	WQUU265	WMR416	39.58897222	-78.83627778	39.58433333	-78.89661111	874.0584	2803.45045	100.00488	974.06328	150.00732	2953.45777
29	3	14051565	cc	18	18 GHz	18 GHz	LN	LN	DANS ROCK	KNOBBLYNORTH	WQVX430	WQVX433	39.58069444	-78.89994444	39.63447222	-78.77802778	2838.13062	1089.9482	100.00488	2938.1355	60.00949	1149.95769
30	3	15111027	cc	11	11 GHz	11 GHz	LN	LN	DANS ROCK	MT SAVAGE	WQVX430	WQXB565	39.58069444	-78.89994444	39.71616667	-78.88355556	2838.13062	2027.9861	92.09767	2930.22829	72.47729	2100.46339
31	14A	19040403	cc	11	11 GHz	11 GHz	LN	LN	HAYSTACK S	STATE DANS	WQVX737	WRDT897	39.64533333	-78.805	39.57891667	-78.90025	1430.1879	2821.66	81.0407	1511.2286	100.0705	2921.7305
32	4	16040125	tv	1	950 MHz	950 MHz	LN	LN	CUMBERLAND	DANS ROCK	WQXR845	RXONLY	39.64602778	-78.75180556	39.58113889	-78.89947222	870.1212	3015.239	20.0141	890.1353	0	3015.239
33	4	16040126	tv	1	950 MHz	950 MHz	LN	LN	CUMBERLAND	DANS ROCK	WQXR847	RXONLY	39.64602778	-78.75180556	39.58113889	-78.89947222	870.1212	3015.239	20.0141	890.1353	0	3015.239
34	4	16041927	tv	1	950 MHz	950 MHz	LN	LN	DANS ROCK	WFRB TX SITE	WQXT395	RXONLY	39.58113889	-78.89947222	39.68455556	-78.96502778	3015.239	2740.2912	107.9449	3123.1839	0	2740.2912
35	3	17050127	cc	11	11 GHz	11 GHz	LN	LN	ATK FIBER SH	DANS MTN	WQZI397	WQZI396	39.56422222	-78.84019444	39.58077778	-78.89991667	668.04441	2838.13062	20.0141	688.05851	85.01071	2923.14133
36	14A	17080326	cc	6	6.1 GHz	Lower 6 GHz	LN	LN	DANS ROCK	WARRIOR MTN	WQZR472	WNTY925	39.57891667	-78.90025	39.62119444	-78.62055556	2821.66	2185.146	299.8834	3121.5434	84.9779	2270.1239
37	14A	17050414	cc	6	6.1 GHz	Lower 6 GHz	LY	LY	DANS ROCK	ALLEGANYPSAP	WQZR472	WQBZ627	39.57891667	-78.90025	39.64869444	-78.74972222	2821.66	924.9139	250.0122	3071.6722	125.9904	1050.9043
38	14A	17080326	cc	6	6.1 GHz	Lower 6 GHz	LN	LN	DANS ROCK	ALLEGANYPSAP	WQZR472	WQBZ627	39.57891667	-78.90025	39.64869444	-78.74972222	2821.66	924.9139	250.0122	3071.6722	125.9904	1050.9043
39	14A	17050414	cc	6	6.1 GHz	Lower 6 GHz	LY	LY	DANS ROCK	WARRIOR MTN	WQZR472	WQZR489	39.57891667	-78.90025	39.61969444	-78.61819444	2821.66	2103.121	299.8834	3121.5434	250.0122	2353.1332
40	14A	21061653	cc	6	6.1 GHz	Lower 6 GHz	LY	LY	DANS ROCK	WESTERN MARY	WQZR472	WRJD755	39.57891667	-78.90025	39.64761111	-78.73313889	2821.66	682.67767	250.0122	3071.6722	144.00309	826.68076
41	2A	18032601	cc	6	6.1 GHz	Lower 6 GHz	LN	LN	69293A	69292B	WRCK206	WRCL314	39.41625	-78.9554444444	39.58	-78.90097222	1908.8858	2816.80412	311.3669	2220.2527	190.00271	3006.80683
42	2A	18032601	cc	11	11 GHz	11 GHz	QN	XN	69292B	69275A	WRCL314	WRCL315	39.58	-78.90097222	39.64908333	-78.94	2816.80412	2037.79629	190.00271	3006.80683	100.00488	2137.80117
43	5A	20030337	cc	6	6.1 GHz	Lower 6 GHz	LN	LN	DANS ROCK 2	PARR RUN	WRFM318	WRFM317	39.58072222	-78.89908333	39.40338889	-79.02061111	2840.95228	977.738	121.00328	2961.95556	145.0202	1122.7582

* Could not locate tower location for ID 17

Data Continued

ID	TOWER	company_1	contact_1	street_1	city_1	st_1	zip_1	zip ex 1	phone_ac_1	phone_1	phone ex 1	fax_ac_1	company_2	contact_2	street_2	city_2	phone ex 2	fax_2	email_2	Shape_Leng	CentFreq
1	1	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.165705097	6.7
2	4	FM Radio License	Jeffrey Tr	129 Blaine	Brownsville	PA	15423		814	9419800	0	814	FM Radio Licens	Jeffrey Trunzo	129 Blaine Road	Brownsville	0	4932754	jtrunzo@foreve	0.161294799	0.95
3	4	He's Alive Inc.	Monte Pa	PO Box 54	Grantsville	MD	21536	0540	301	8953292	0	0	He's Alive Inc.	Monte Palmer	PO Box 540	Grantsville	0	0	hesalive@minc	0.228901023	0.95
4	9B	Frostburg State U	Justin Ell	301 West	Baltimore	MD	21201	2308	410	6931874	0	410	Frostburg State	Justin Ellingwood	301 West Presto	Baltimore	0	3335163	justin.ellingwoo	0.078440077	0.95
5	6B	WITF Inc.	Ron Hetr	4801 Lindl	Harrisburg	PA	17111	2444	717	7043000	0	0	WITF Inc.	Ron Hetrick	4801 Lindle Roa	Harrisburg	0	0	ron_hetrick@w	0.166945279	0.95
6	12	USCOC of Cumb	Diane Su	5117 W. T	Madison	WI	53718		608	4414546	0	608	US Cellular Ope	Diane Supinski	5117 W. Terrace	Madison	0	4414130	diane.supinski(	0.120848243	6.175
7	12	USCOC of Cumb	Diane Su	5117 W. T	Madison	WI	53718		608	4414546	0	608	USCOC of Cuml	Diane Supinski	5117 W. Terrace	Madison	0	4414130	diane.supinksi(	0.296623228	6.175
8	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.407815261	6.7
9	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.191324859	6.7
10	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.369969134	6.7
11	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.08448216	6.7
12	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.608608259	6.175
13	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.191351996	6.7
14	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.598324544	0.95
15	5	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.598324544	0.95
16	1	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.112482166	6.7
17	Tower Unknown	WITF Inc.	Ron Hetr	4801 Lindl	Harrisburg	PA	17111	2444	717	7043000	0	0	WITF Inc.	Ron Hetrick	4801 Lindle Roa	Harrisburg	0	0	ron_hetrick@w	0.173773702	0.95
18	3	Allegany County (	Beth Tho	108 Wash	CUMBERLAND	MD	21502		301	7772438	0	301	Allegany County	Beth Thomas	108 Washington	CUMBERLAND	0	7592019	bthomas@alleg	0.100558455	18.7
19	3	Allegany County (	Beth Tho	108 Wash	CUMBERLAND	MD	21502		301	7772438	0	301	Allegany County	Beth Thomas	108 Washington	CUMBERLAND	0	7592019	bthomas@alleg	0.134099548	18.7
20	6B	West Virginia Rad	Randy Ke	1251 Earl	Morgantown	WV	26505		304	2960029	0	304	West Virginia Ra	Randy Kerbawy	1251 Earl L Core	Morgantown	0	2963876	randy.kerbawy(	0.167899607	11.2
21	6B	West Virginia Rad	Randy Ke	1251 Earl	Morgantown	WV	26505		304	2960029	0	304	West Virginia Ra	Randy Kerbawy	1251 Earl L Core	Morgantown	0	2963876	randy.kerbawy(	0.112876598	11.2
22	6B	West Virginia Rad	Randy Ke	1251 Earl	Morgantown	WV	26505		304	2960029	0	304	West Virginia Ra	Randy Kerbawy	1251 Earl L Core	Morgantown	0	2963876	randy.kerbawy(	0.1717343	11.2
23	12	USCOC of Cumb	Diane Su	5117 W. T	Madison	WI	53718		608	4414546	0	608	USCOC of Cuml	Diane Supinski	5117 W. Terrace	Madison	0	4414130	diane.supinksi(	0.070824929	11.2
24	12	USCOC of Cumb	Diane Su	5117 W. T	Madison	WI	53718		608	4414546	0	608	USCOC of Cuml	Diane Supinski	5117 W. Terrace	Madison	0	4414130	diane.supinksi(	0.056443878	11.2
25	6A	Two Way Radio I	Harry E. W	PO Box 29	Cumberland	MD	21502		301	7772692	0	301	Two Way Radio	Harry E. Wolford	PO Box 299 - 54	Cumberland	0	7777845	wink.wolford@t	0.151358848	11.2
26	11	Thought Transmis	Brian Sul	P.O. Box 8	Wilmington	DE	19803		302	6587581	0	0	Fundamental Br	Brian Sullivan	P.O. Box 8077	Wilmington	0	0	cwfrequencyno	0.566035656	6.7
27	11	Thought Transmis	Brian Sul	P.O. Box 8	Wilmington	DE	19803		302	6587581	0	0	Thought Transm	Brian Sullivan	P.O. Box 8077	Wilmington	0	0	cwfrequencyno	0.378115963	11.2
28	12	USCOC of Cumb	Diane Su	5117 W. T	Madison	WI	53718		608	4414546	0	608	USCOC of Cuml	Diane Supinski	5117 W. Terrace	Madison	0	4414130	diane.supinksi(	0.060511407	11.2
29	3	Allegany County (	Beth Tho	108 Wash	CUMBERLAND	MD	21502		301	7772438	0	301	Allegany County	Beth Thomas	108 Washington	CUMBERLAND	0	7592019	bthomas@alleg	0.133250602	18.7
30	3	Allegany County (	Beth Tho	108 Wash	CUMBERLAND	MD	21502		301	7772438	0	301	Allegany County	Beth Thomas	108 Washington	CUMBERLAND	0	7592019	bthomas@alleg	0.136459953	11.2
31	14A	Allegany County (	Beth Tho	108 Wash	CUMBERLAND	MD	21502		301	7772438	0	301	Allegany County	Beth Thomas	108 Washington	CUMBERLAND	0	7592019	bthomas@alleg	0.11611949	11.2
32	4	FM Radio License	Jeffrey Tr	129 Blaine	Brownsville	PA	15423		814	9419800	0	814	FM Radio Licens	Jeffrey Trunzo	129 Blaine Road	Brownsville	0	4932754	jtrunzo@foreve	0.161294799	0.95
33	4	FM Radio License	Jeffrey Tr	129 Blaine	Brownsville	PA	15423		814	9419800	0	814	FM Radio Licens	Jeffrey Trunzo	129 Blaine Road	Brownsville	0	4932754	jtrunzo@foreve	0.161294799	0.95
34	4	FM Radio License	Jeffrey Tr	129 Blaine	Brownsville	PA	15423		814	9419800	0	814	FM Radio Licens	Jeffrey Trunzo	129 Blaine Road	Brownsville	0	4932754	jtrunzo@foreve	0.12244402	0.95
35	3	Conxx, Inc.	David Ka	434 North	Cumberland	MD	21501		240	5802767	0	888	Conxx, Inc.	David Kartchner	434 North Centre	Cumberland	0	9926699	dave.kartchner	0.061974433	11.2
36	14A	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.282871689	6.175
37	14A	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.165914285	6.175
38	14A	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.165914285	6.175
39	14A	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.284988006	6.175
40	14A	State of Maryland	Rich Berg	653 West	Baltimore	MD	21201		410	7063688	0	0	State of Marylan	Rich Berg	653 West Pratt S	Baltimore	0	0	rberg@miemss	0.180679412	6.175
41	2A	T-Mobile License	Shannon	12920 SE	Bellevue	WA	98006		425	3835178	0	425	T-Mobile License	Shannon Reilly Krau	12920 SE 38th S	Bellevue	0	3834840	shannon.reilly@	0.172572551	6.175
42	2A	T-Mobile License	Shannon	12920 SE	Bellevue	WA	98006		425	3835178	0	425	T-Mobile License	Shannon Reilly Krau	12920 SE 38th S	Bellevue	0	3834840	shannon.reilly@	0.07980016	11.2
43	5A	FELHC, Inc.	FCC Lice	PO Box 44	Akron	OH	44308		330	4362226	0	330	FELHC, Inc.	FCC License Admir	PO Box 44308 -	Akron	0	7617203	fcc_license_ad	0.214979329	6.175

Appendix B. CME Beam Path Study

Dan's Mountain Wind Farm

Allegany County, Maryland

CME
ENGINEERING

MICROWAVE BEAM PATH STUDY

Prepared for

Dan's Mountain Wind Force, LLC

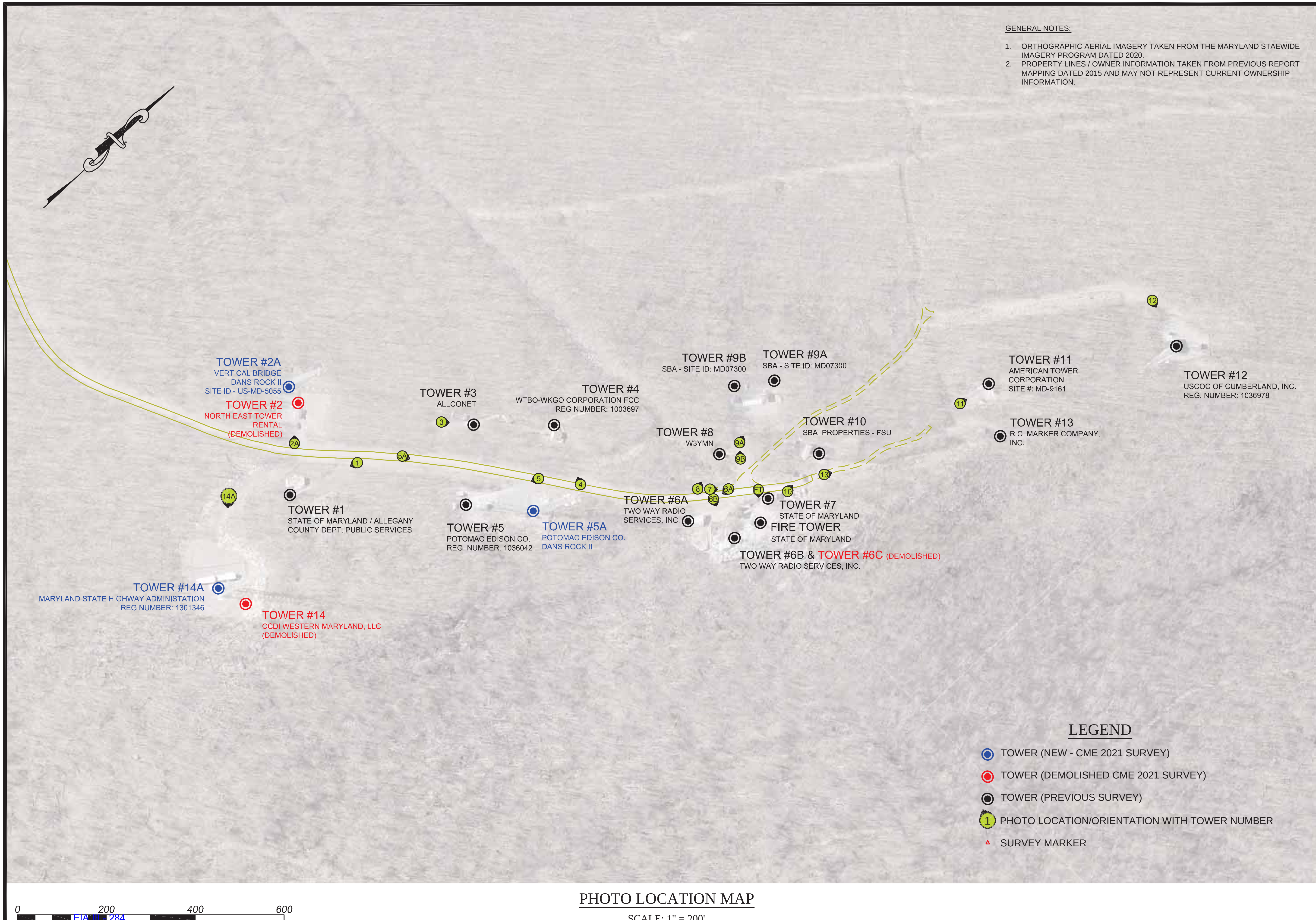
645 Pittsburgh St., #356

Greensburg, PA 15601-2781

Date: November 11, 2021

CME Project # 0456-S091

CME Engineering LLC
165 East Union Street, Suite 100
Somerset, Pennsylvania 15501
Phone (814) 443-3344 Fax (814) 444-0365



GENERAL NOTES:

1. ORTHOGRAPHIC AERIAL IMAGERY TAKEN FROM THE MARYLAND STAEWIDE IMAGERY PROGRAM DATED 2020.
2. PROPERTY LINES / OWNER INFORMATION TAKEN FROM PREVIOUS REPORT MAPPING DATED 2015 AND MAY NOT REPRESENT CURRENT OWNERSHIP INFORMATION.

LEGEND

- TOWER (NEW - CME 2021 SURVEY)
- TOWER (DEMOLISHED CME 2021 SURVEY)
- TOWER (PREVIOUS SURVEY)
- 1 PHOTO LOCATION/ORIENTATION WITH TOWER NUMBER
- SURVEY MARKER

PHOTO LOCATION MAP

SCALE: 1" = 200'

EIA III - 284

CME ENGINEERING

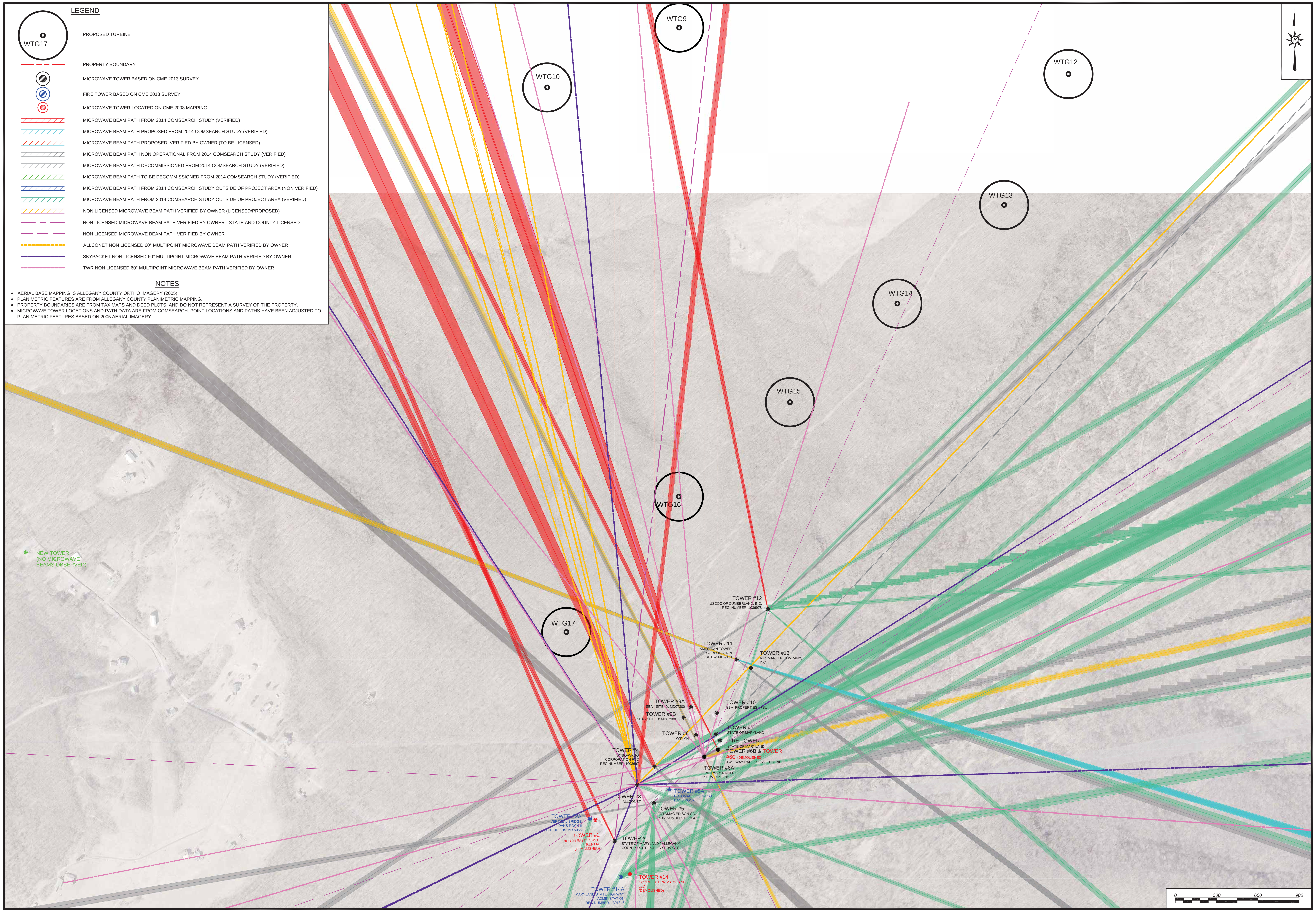
CME ENGINEERING LP
165 East Union Street
Suite 100
Somerset, PA 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

PHOTO LOCATION MAP

Mirowave Path Study
Dan's Mountain Wind Project
0456-S091
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, Pennsylvania 15601-2781
Situate in
Allegany County, Maryland

REVISION | DATE | NO.

DATE:	11-12-2021
PROJECT NO:	0456-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mountain - Microwave Verification - Base.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI
SCALE:	1" = 200'



C M E ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Microwave Study
Overview Map Beam Paths
Dan's Mountain Wind Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781

Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

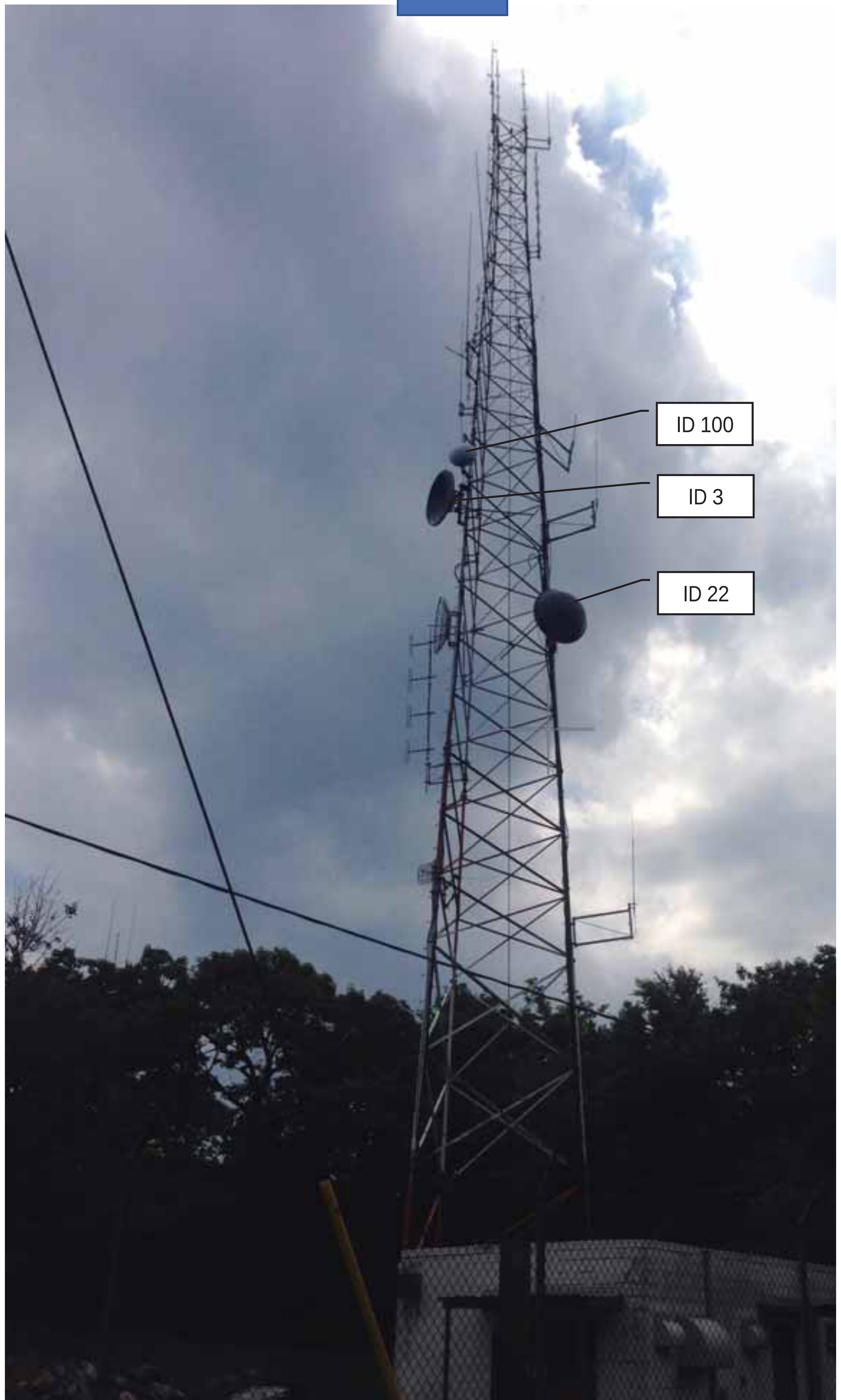
DATE:	11-15-2021
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

COPYRIGHT:

SHEET TITLE

EXHIBIT 2

2014



TOWER #1

Owner: State of Maryland / Allegany County
Allegany County Department of Public Safety

Contact: Rich Berg State of Maryland, MIEMSS
653 West Pratt St., Baltimore, Maryland 21201
Work: 410-706-3668
Cell: 410-365-5344
Email: rberg@miemss.org

Licensed Microwave Beam Paths:

- Comsearch ID #3 (2021-1) State of Maryland MIEMSS to Allegany County 911 Center located in Cumberland, MD (ACTIVE - OUT OF PROJECT AREA)
- Comsearch ID #22 (2021-16) State of Maryland MIEMSS to Big Savage Mountain located west of Frostburg, MD. **(Active in project area)**
- ~~Comsearch ID #23 (18) State of Maryland MIEMSS to Warrior Mountain located in Cumberland, MD. (Inactive - OUT OF PROJECT AREA)~~

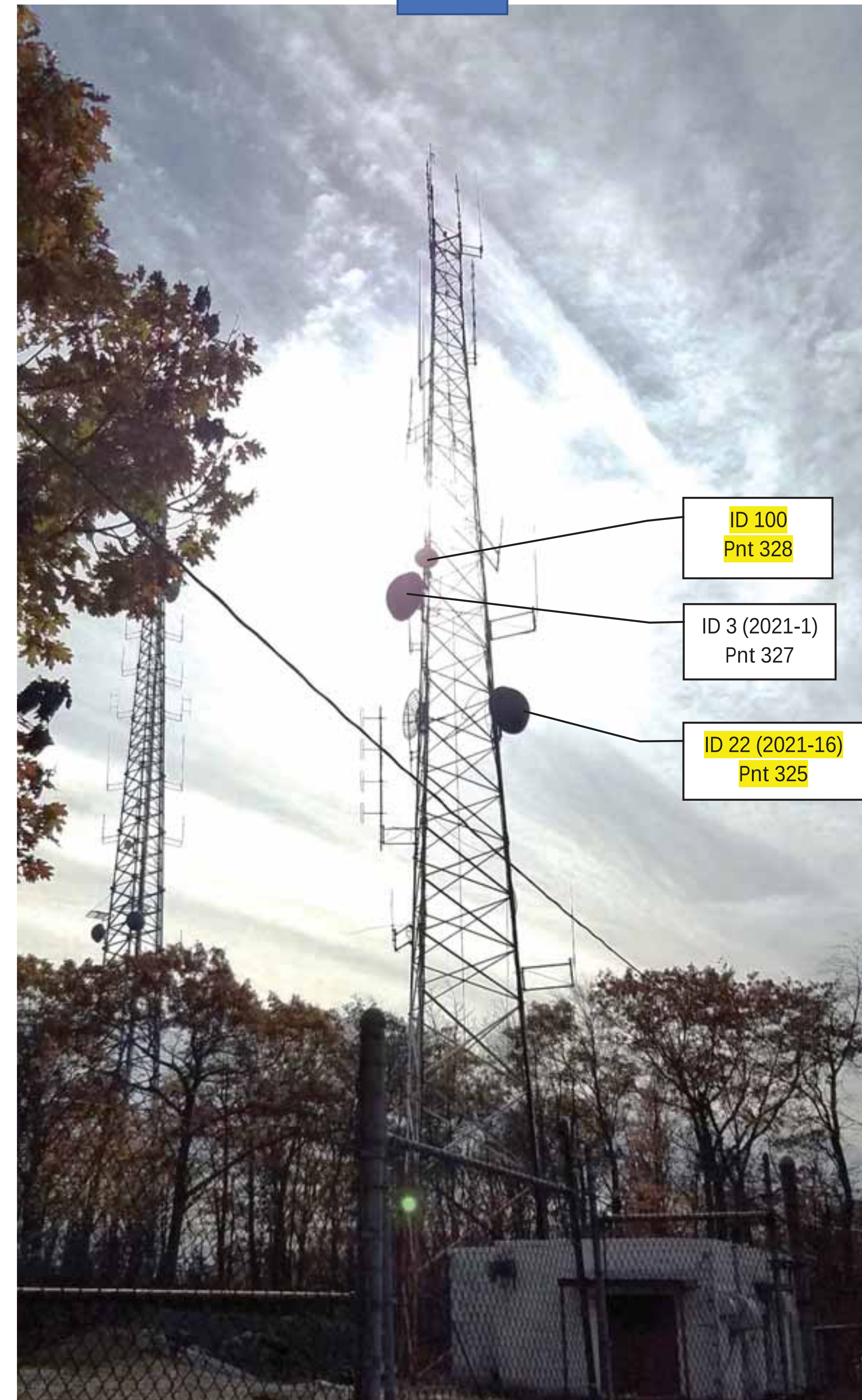
Unlicensed Microwave Beam Paths:

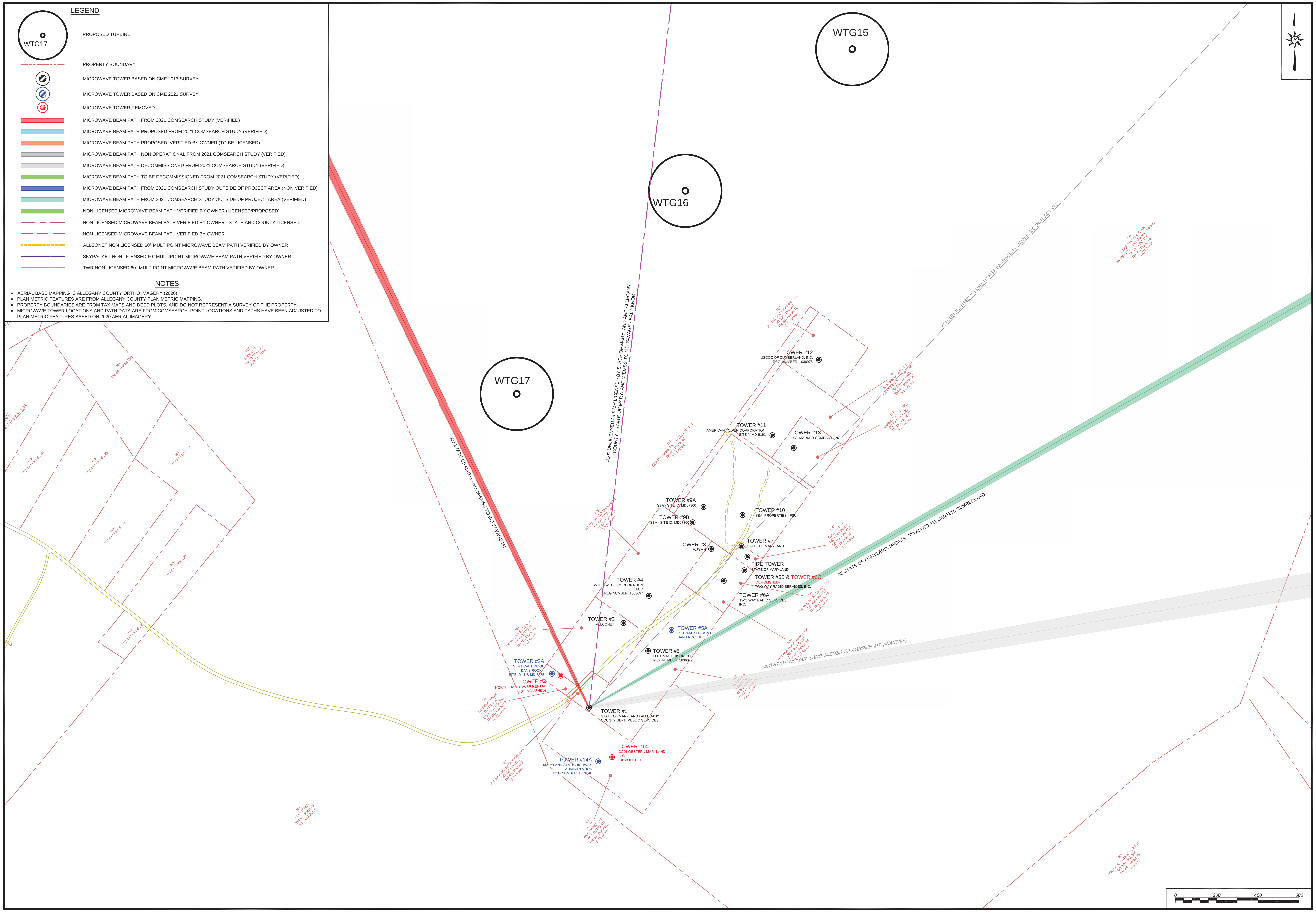
- Comsearch ID #100 Point-to-Point State of Maryland MIEMSS to Bald Knob located in Mount Savage, MD. **(Active in project area)**
- ~~Comsearch ID #115 Point-to-Point State of Maryland MIEMSS to Maryland State Police Barracks located in LaVale, MD. (Inactive - OUT OF PROJECT AREA)~~

Comment:

- Information compiled from CME on site investigation and email verification provided by Rich Berg Dated 11-11-2021
- Two Beams are within project area, no Beams on Tower 1 are Affected

2021





LEGEND

WTG17	PROPOSED TURBINE
	PROPERTY BOUNDARY
	MICROWAVE TOWER BASED ON CME 2013 SURVEY
	MICROWAVE TOWER BASED ON CME 2021 SURVEY
	MICROWAVE TOWER REMOVED
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)
	MICROWAVE BEAM PATH NON OPERATIONAL FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER
	ALLCONET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
	SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
	TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

- AERIAL BASE MAPPING IS ALLEGANY COUNTY ORTHO IMAGERY (2020).
- PLANIMETRIC FEATURES ARE FROM ALLEGANY COUNTY PLANIMETRIC MAPPING.
- PROPERTY BOUNDARIES ARE FROM TAX MAPS AND DEED PLOTS, AND DO NOT REPRESENT A SURVEY OF THE PROPERTY.
- MICROWAVE TOWER LOCATIONS AND PATH DATA ARE FROM COMSEARCH. POINT LOCATIONS AND PATHS HAVE BEEN ADJUSTED TO PLANIMETRIC FEATURES BASED ON 2020 AERIAL IMAGERY.

CME ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T1: Microwave Beam Path Study - Tower #1
Allegany Co. Dept. Public Safety - Dan's Mountain Project

for

Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781

Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

COPYRIGHT:

SHEET TITLE

TOWER #1 EXHIBIT

2014

~~TOWER #2~~

~~Owner: North East Tower Rental, LLC~~
~~Contact: Van Michael~~
~~Owner~~
~~4271 Muncy Exchange Road,~~
~~Turbotville, PA 17772~~
~~Work: 570-412-6295~~
~~Email: vanmichael@sisna.com~~

TOWER #2A (NEW) →

Owner: VB-S1 Assets, LLC
Site ID: Dans Rock II US-MD-5055
Contact: Floyd Jenkins
750 Park of Commerce Dr., Suite 200
Boca Raton, FL 33487
Phone: 301-667-0069
Email: Fjenkins@verticalbridge.com

Licensed Microwave Beam Paths:

- 2021 Comsearch ID #41 T-Mobile License LLC (OUT OF PROJECT AREA)
- 2021 Comsearch ID #42 T-Mobile License LLC **(In Project Area – Not Affected)**

Comment:

- Information compiled from CME on site investigation and Comsearch Query – Tower Owner Contacted and Awaiting Response for further verification.
- New beam path 42 passes west of WTG17 but is not impacted

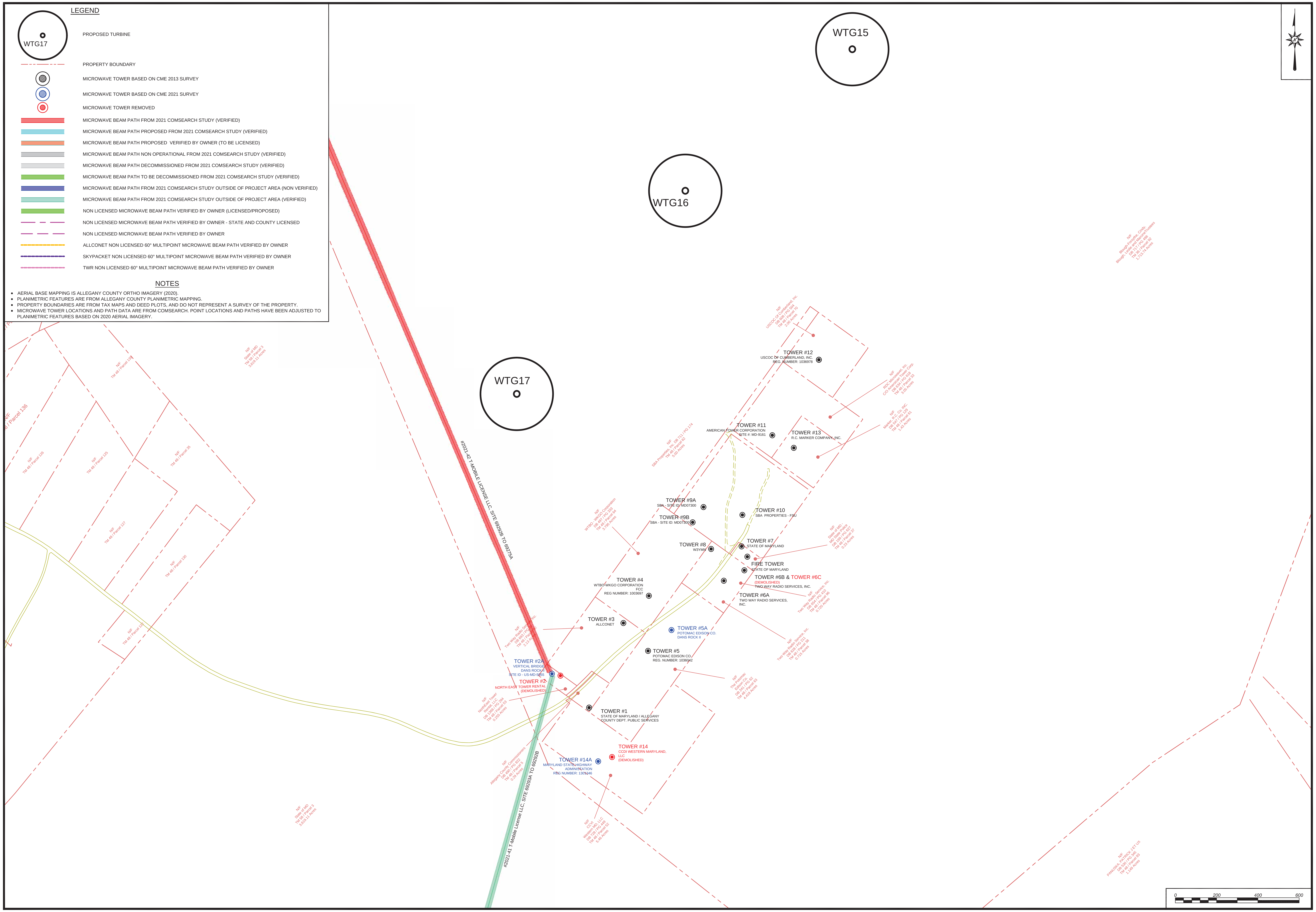
2021

LEGEND

- PROPOSED TURBINE
- PROPERTY BOUNDARY
- MICROWAVE TOWER BASED ON CME 2013 SURVEY
- MICROWAVE TOWER BASED ON CME 2021 SURVEY
- MICROWAVE TOWER REMOVED
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)
- MICROWAVE BEAM PATH NON OPERATIONAL FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER
- ALLCONET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

- AERIAL BASE MAPPING IS ALLEGANY COUNTY ORTHO IMAGERY (2020).
- PLANIMETRIC FEATURES ARE FROM ALLEGANY COUNTY PLANIMETRIC MAPPING.
- PROPERTY BOUNDARIES ARE FROM TAX MAPS AND DEED PLOTS, AND DO NOT REPRESENT A SURVEY OF THE PROPERTY.
- MICROWAVE TOWER LOCATIONS AND PATH DATA ARE FROM COMSEARCH. POINT LOCATIONS AND PATHS HAVE BEEN ADJUSTED TO PLANIMETRIC FEATURES BASED ON 2020 AERIAL IMAGERY.



C M E
ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T1: Microwave Beam Path Study - Tower #2A
Allegany Co. Dept. Public Safety - Dan's Mountain Project

for

Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781

Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

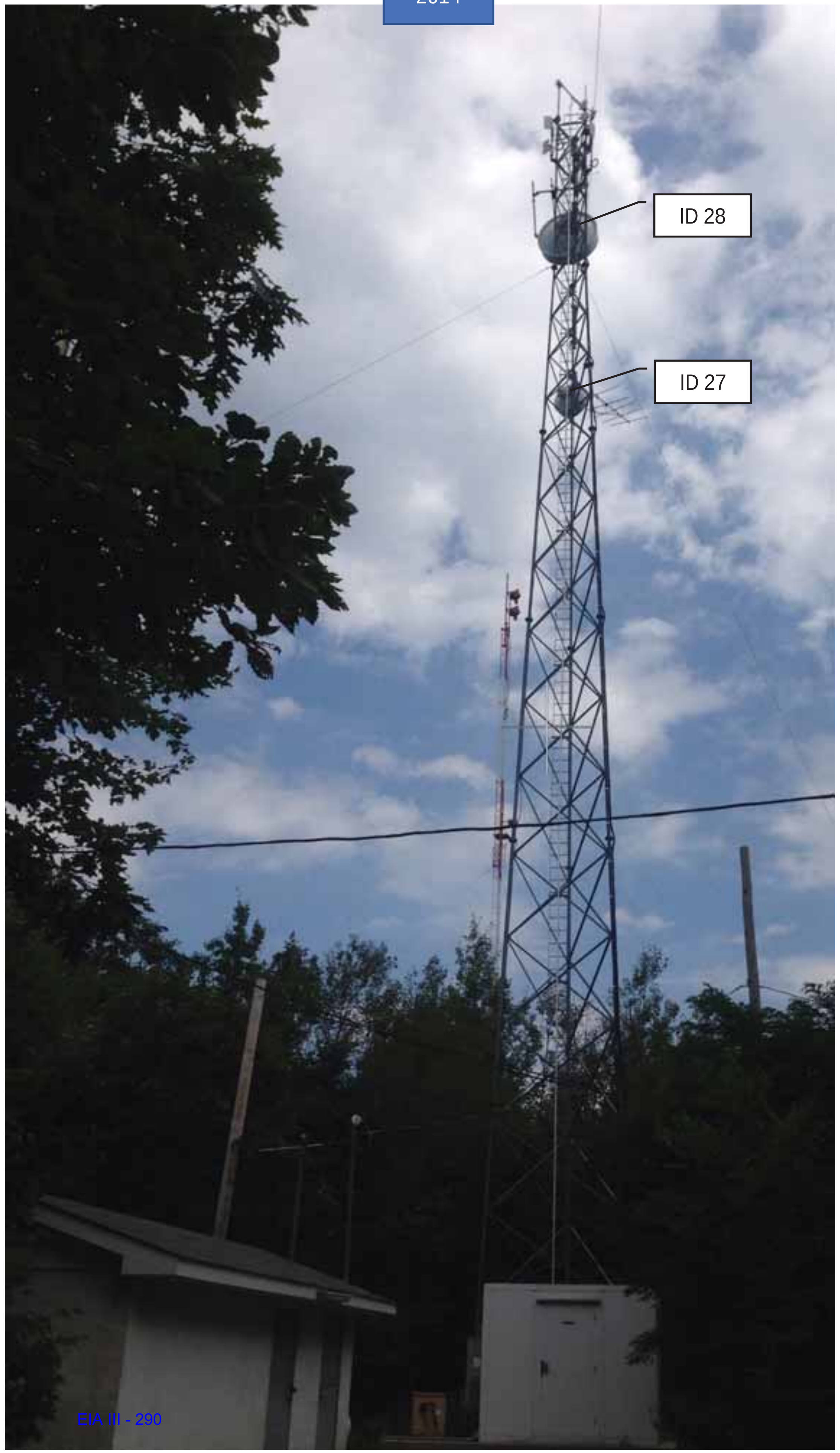
CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI
COPYRIGHT:	

SHEET TITLE

TOWER #2A EXHIBIT

2014



TOWER #3

Owner: Two Way Radio Service, Inc.
Owner Contact: Larry Elder
Work: 301-777-5479 ex. 114
Cell: 301-707-7833
Email: Larry.Elder@twrbb.com
Leaser: AllCoNet

Licensed Microwave Beam Paths:

- Comsearch ID #27 (2021-18) ALLECT to Knobbly Mountain S located in Wiley Ford, WV **(OUT OF PROJECT AREA)**
- Comsearch ID #28 (2021-29) ALLECT to Knobbly Mountain N located in Wiley Ford, WV **(OUT OF PROJECT AREA)**
- 2021 Comsearch ID #30 Allegany County Government **(Active-Impacted WTG16)**
- 2021 Comsearch ID #35 Conxx, Inc. **(OUT OF PROJECT AREA)**

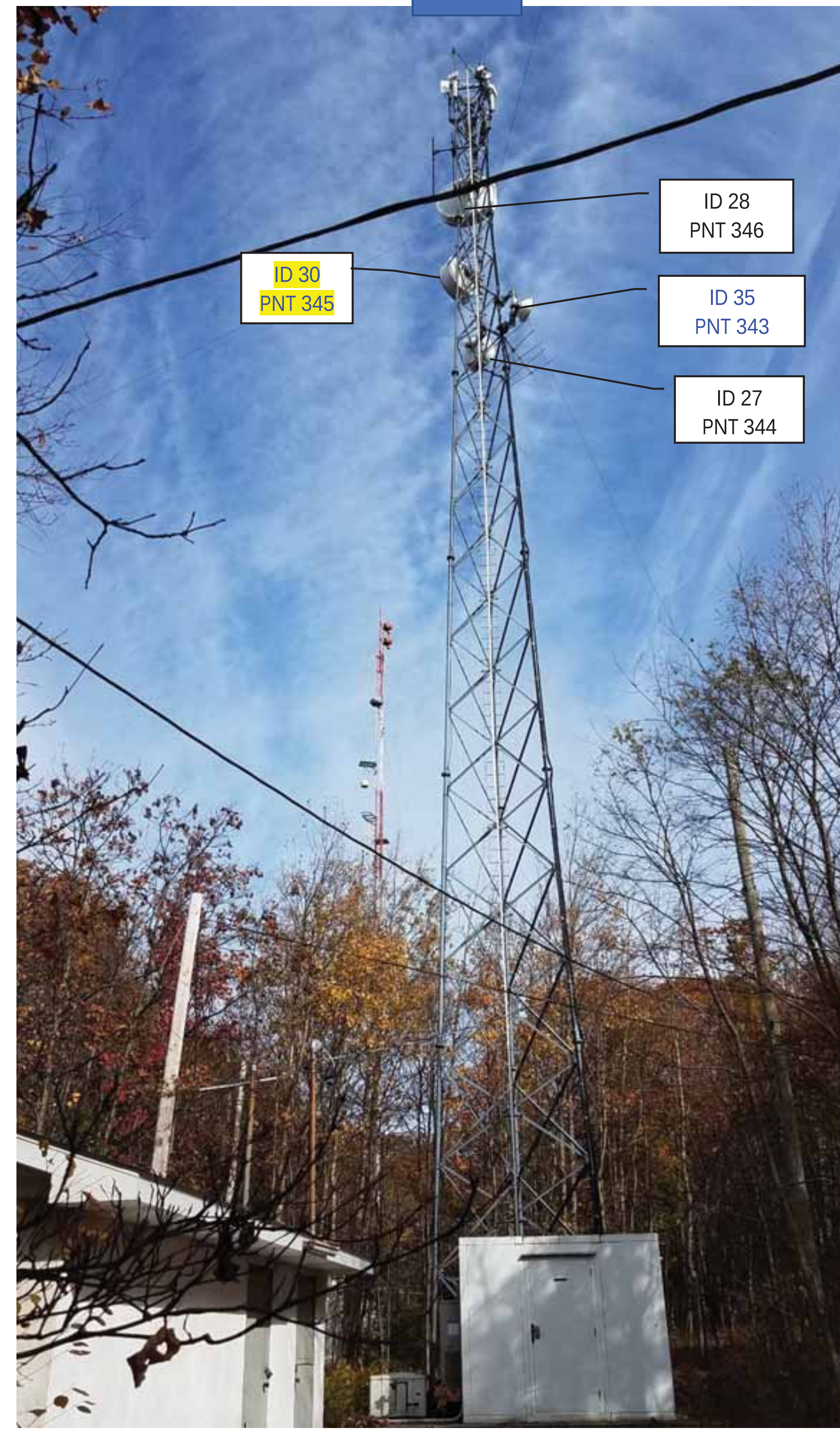
Unlicensed Microwave Beam Paths:

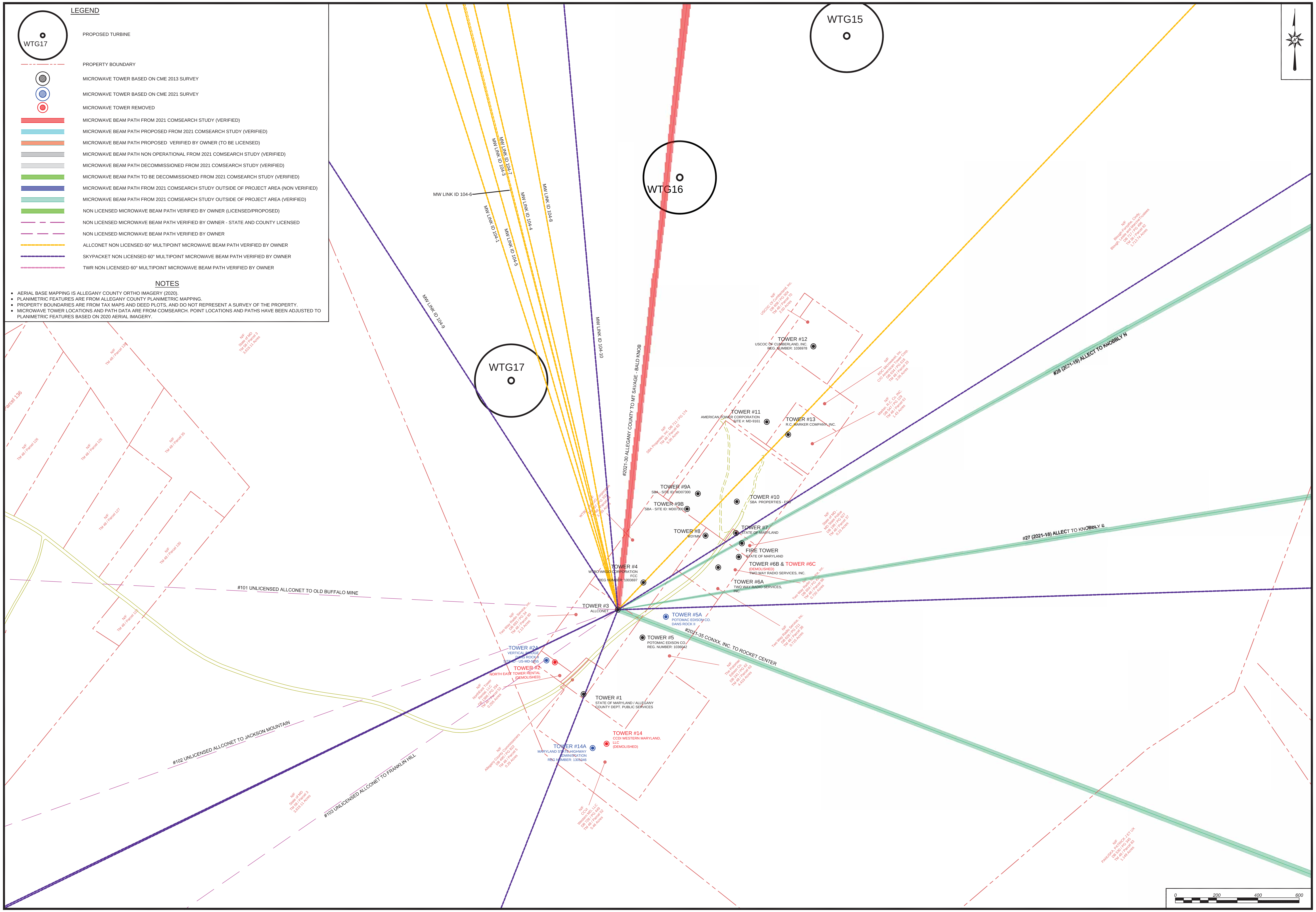
- Comsearch ID #101 Point-to-point to old Buffalo Mine site located near Lonaconing, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #102 Point-to-point to Jackson Mountain located in Lonaconing, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #103 Point-to-point to Franklin Hill located in Lonaconing, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #104-1 thru 23 - Total of twenty three (23) point-to-multipoint microwave beam paths from six (6) 60 degree sector antennas that in the aggregate provide 360 degree service.

Comment:

- Information compiled from CME on site investigation and Comsearch Query – Tower Owner Contacted and provided information. Larry is to provide information and current status and verification.
- New Comsearch ID 30 directly impacted by WTG16 (Needs verified by Owner)

2021





C M E
ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T3: Microwave Beam Path Study - Tower #3
Allegany County - Allconet - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781

Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

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SHEET TITLE

TOWER #3 EXHIBIT

2014

TOWER #4

Owner: WTBO – WKGO Corporation

Contact: Robbie May, Chief Engineer
350 Byrd Avenue, Cumberland, MD 21502
Work: 301-722-6666
Fax: 301-722-0945

Licensed Microwave Beam Path:

- Comsearch ID #4 WTBO to 350 Byrd Avenue located in Cumberland, MD.**(OUT OF PROJECT AREA)**
- 2021 Comsearch ID #33 FM Radio License, LLC **(OUT OF PROJECT AREA)**
- 2021 Comsearch ID #34 FM Radio License, LLC **(Active-Impacted WTG17)**

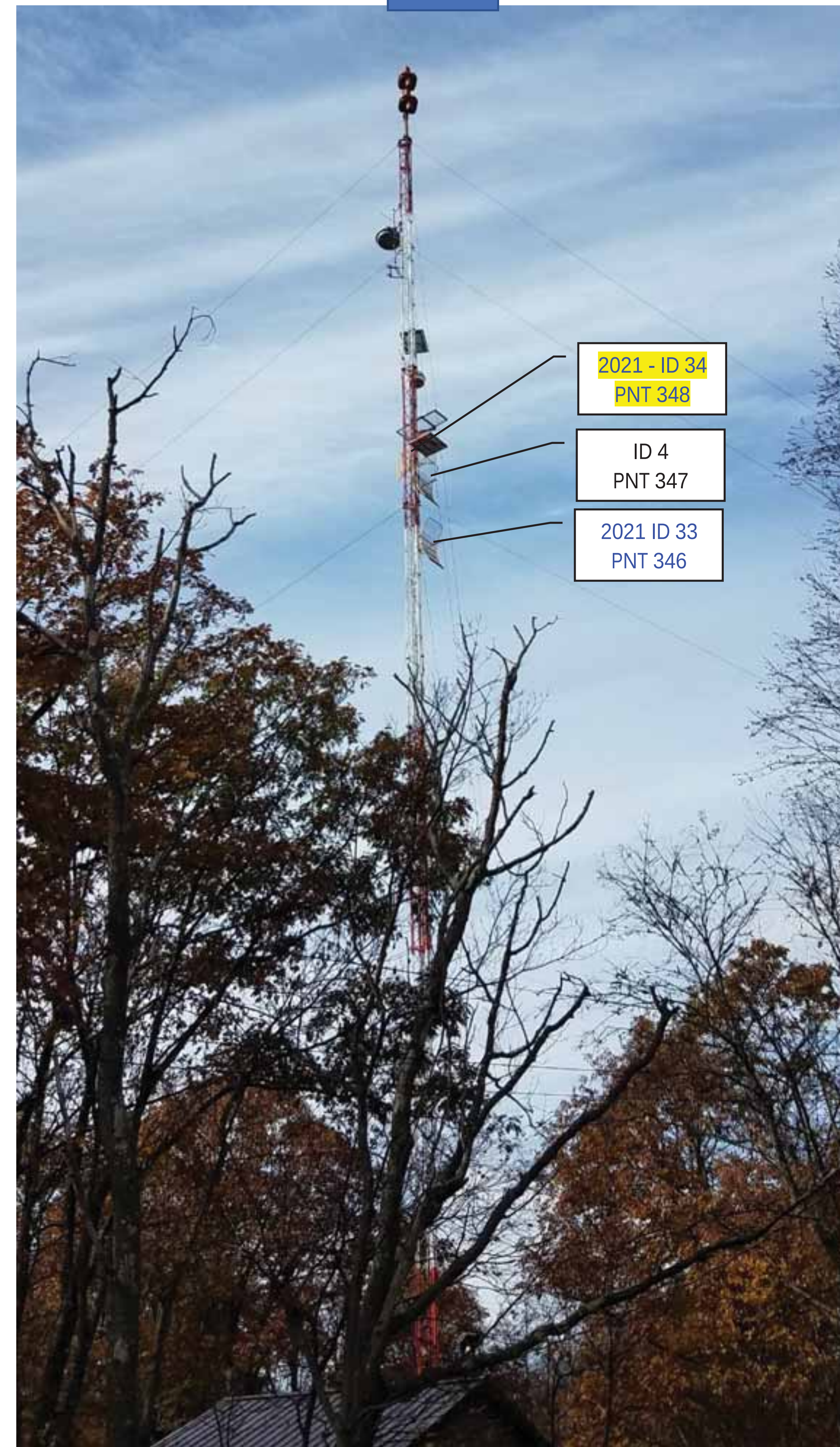
Licensed Non-Operational Microwave Beam Path:

- #114 - Always Communications - Equipment to be removed. (NEEDS VARIFIED THAT WAS REMOVED)

Comment:

- Information compiled from CME on site investigation and Comsearch Query – Tower Owner Contacted and provided information. Larry is to provide information and current status and verification on Monday Nov. 15th when he gets back to the office.

2021



LEGEND

- PROPOSED TURBINE (WTG17)
- PROPERTY BOUNDARY
- MICROWAVE TOWER BASED ON CME 2013 SURVEY
- MICROWAVE TOWER BASED ON CME 2021 SURVEY
- MICROWAVE TOWER REMOVED
- MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)
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- SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

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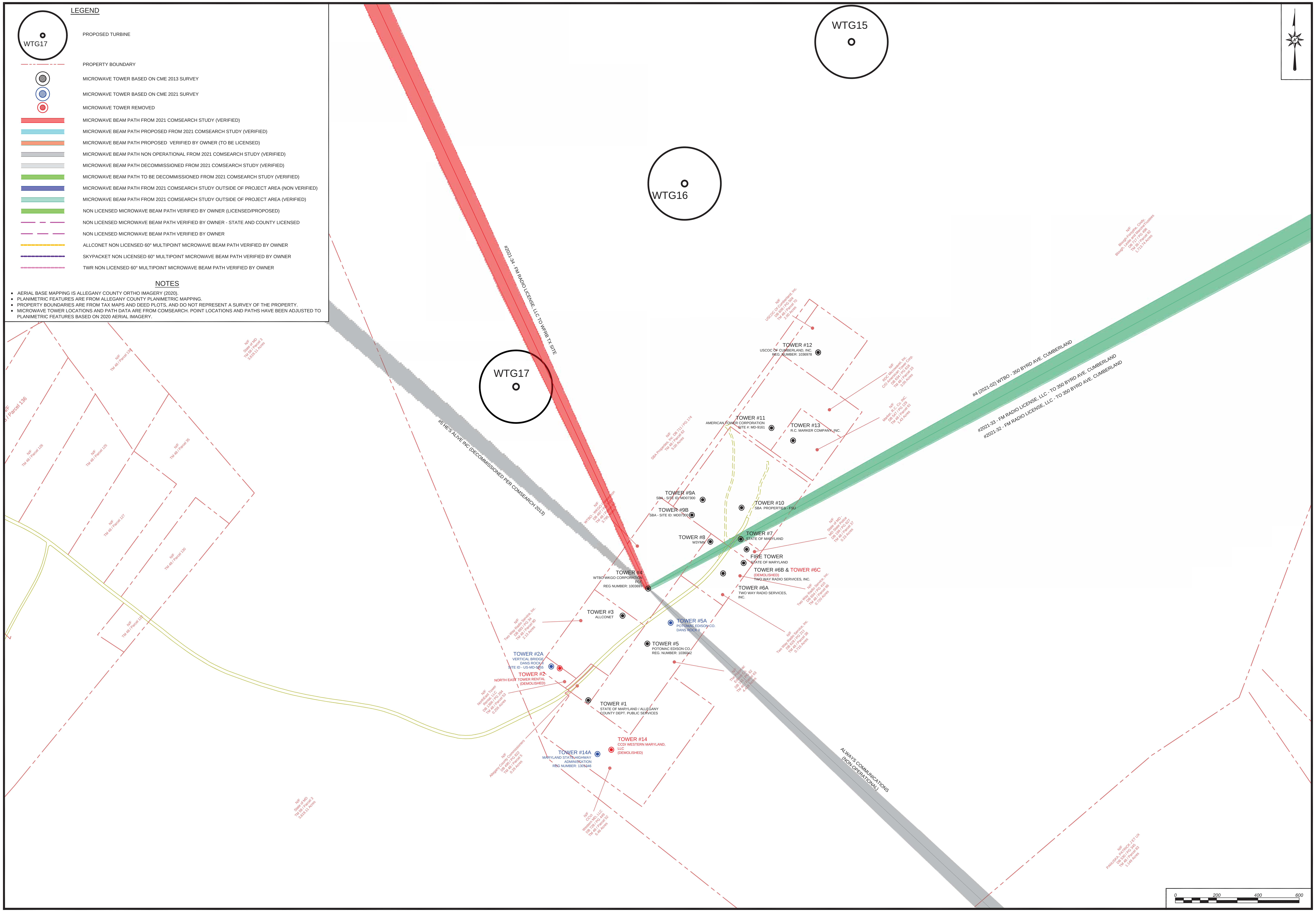

Exhibit T4: Microwave Beam Path Study - Tower #4
WTBO-WKGO Corporation - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

CME ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

REVISION		
NO.	DATE	

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

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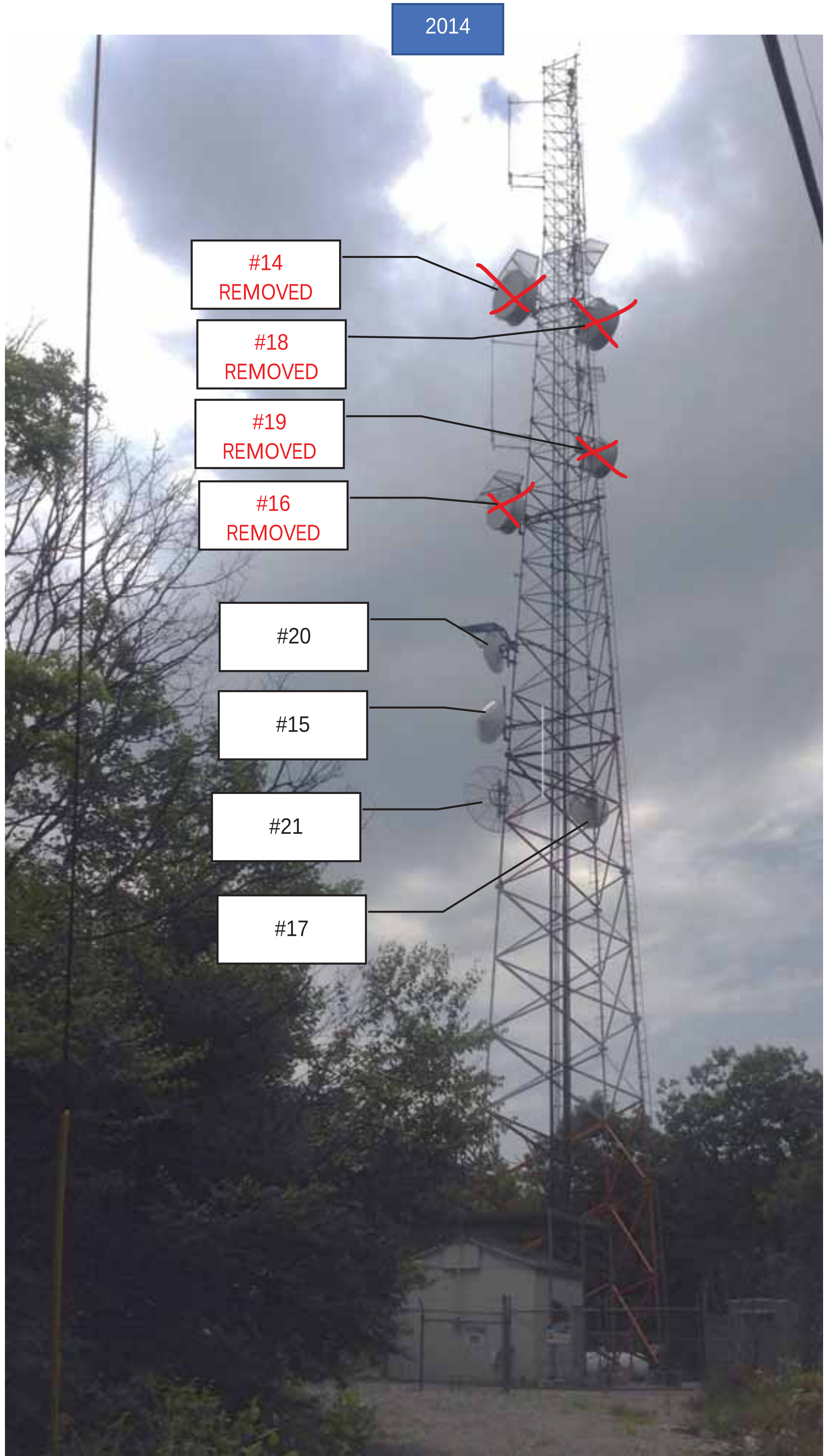
SHEET TITLE

TOWER #4 EXHIBIT



TOWER #5

<u>Owner:</u> Potomac Edison Co. / First Energy

Reg. Number: 1036042

Site ID:

<u>Contact:</u> Tim Burkhart
Diamond Companies LLC
Cell: 304-290-1003
Email: timburkhart@diamondcomm.com

<u>Licensed Microwave Beam Path</u>:

~~Comsearch ID #14 FELHC, Inc. to Meadow Mountain located in Thayerville, MD. (OUT OF PROJECT AREA)~~

Comsearch ID #15 FELHC, Inc. to Irons Mountain located in Cumberland, MD. **(OUT OF PROJECT AREA)**

~~Comsearch ID #16 FELHC, Inc. to Augusta, WV. (OUT OF PROJECT AREA)~~

Comsearch ID #17 FELHC, Inc. to Black Oak Passive located near Rawlings, MD. **(OUT OF PROJECT AREA)**

~~Comsearch ID #18 FELHC, Inc. to Sideling Hill located in MD. (OUT OF PROJECT AREA)~~

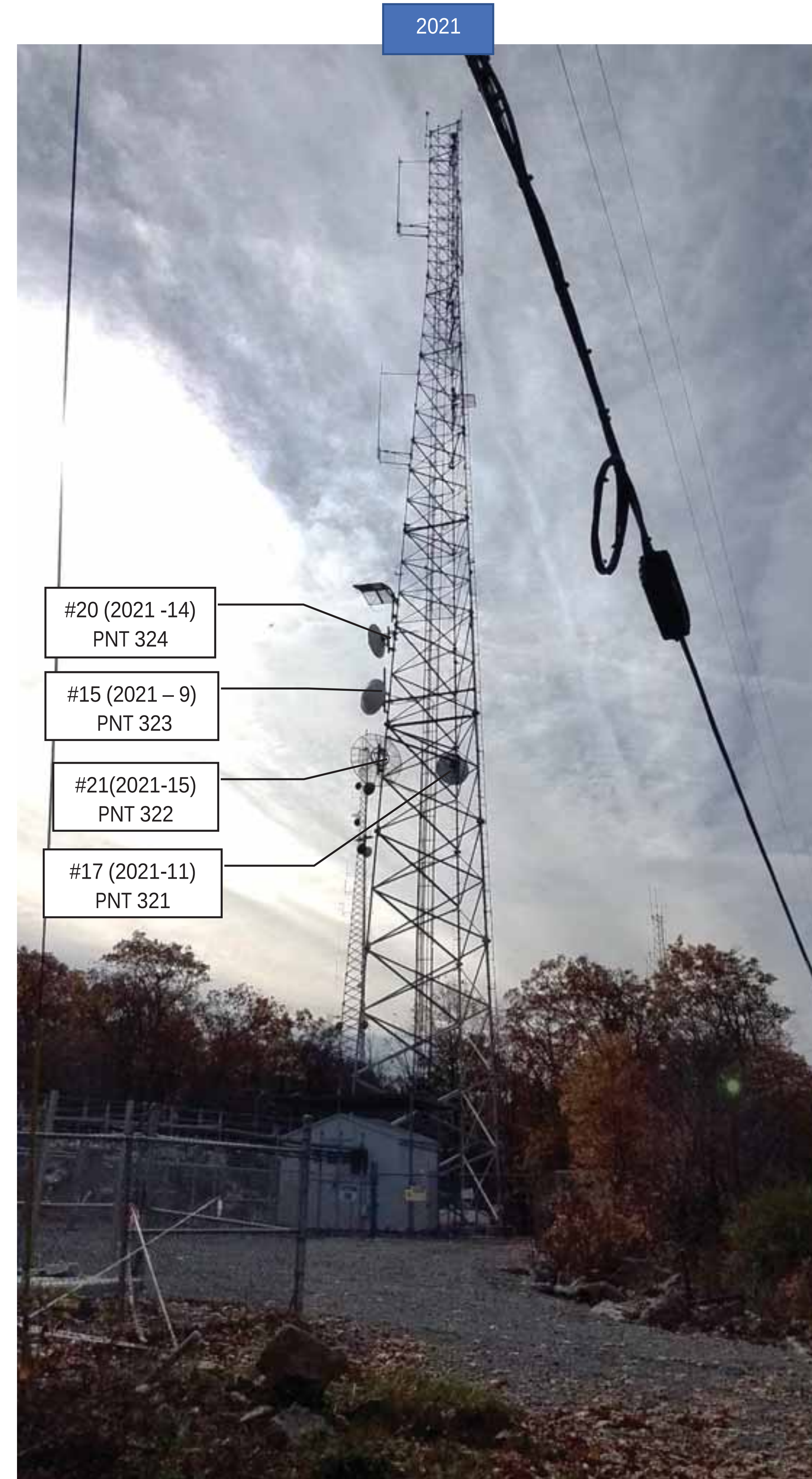
~~Comsearch ID #19 FELHC, Inc. to Irons Mountain located in Cumberland, MD. (OUT OF PROJECT AREA)~~

Comsearch ID #20 FELHC, Inc. to Helmick Rock located southeast of Moorefield, WV. **(OUT OF PROJECT AREA)**

Comsearch ID #21 FELHC, Inc. to Helmick Rock located southeast of Moorefield, WV. **(OUT OF PROJECT AREA)**

Comment:

- No Beams Located in Project Area
- Information compiled from CME on site investigation and Comsearch Query – Tower Operator Tim Burkhart Contacted and provided with information. Will update Monday.



TOWER #5A (NEW)

Owner: Potomac Edison Co. / First Energy
Reg. Number:
Site ID: Dans Rock II
Contact: Tim Burkhart
Diamond Companies LLC
Cell: 304-290-1003
Email: timburkhart@diamondcomm.com

Licensed Microwave Beam Path:

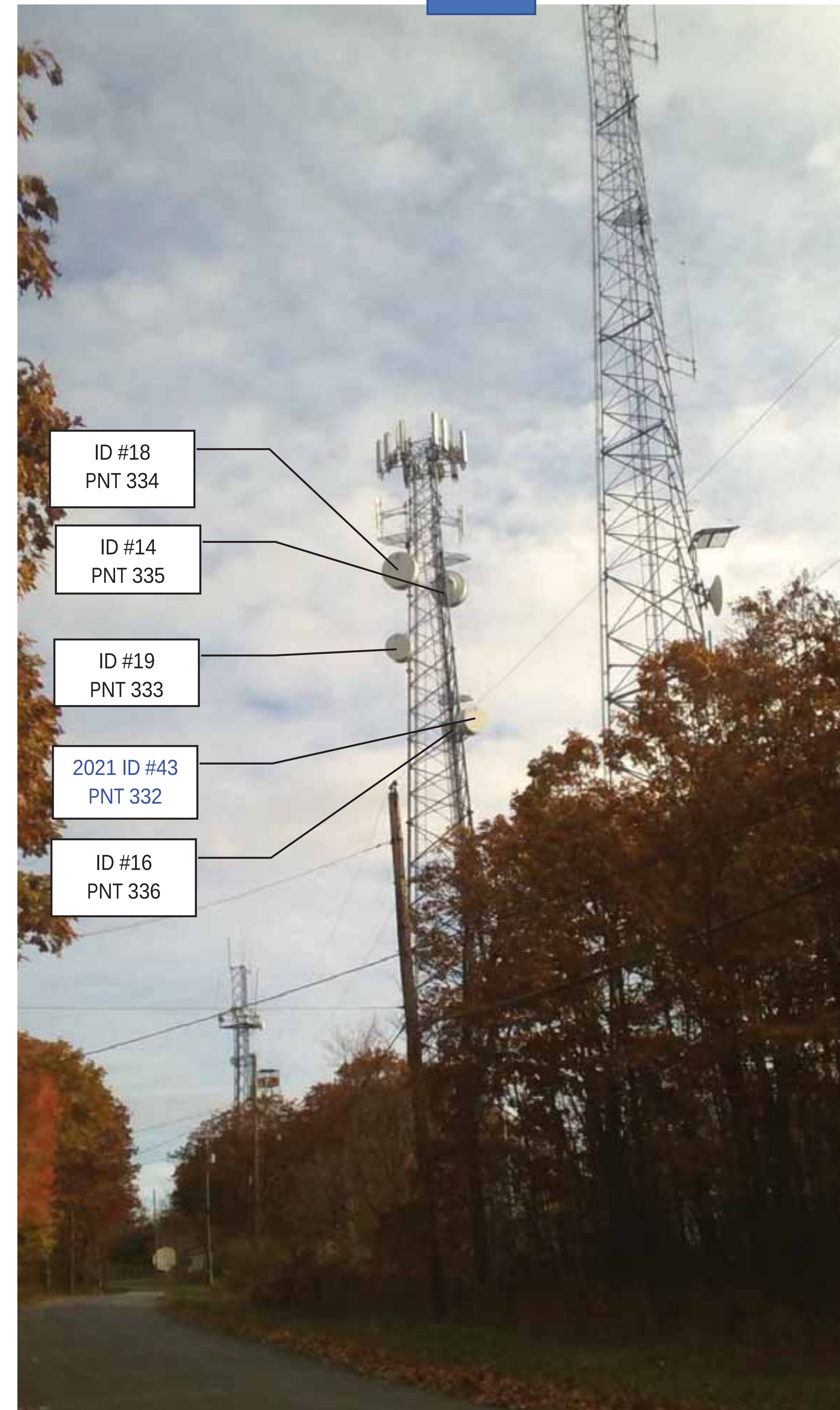
- Comsearch ID #14 FELHC, Inc. to Meadow Mountain located in Thayerville, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #16 FELHC, Inc. to Augusta, WV. **(OUT OF PROJECT AREA)**
- Comsearch ID #18 FELHC, Inc. to Sideling Hill located in MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #19 FELHC, Inc. to Irons Mountain located in Cumberland, MD. **(OUT OF PROJECT AREA)**
- 2021 Comsearch ID #43 FELHC, Inc. to Parr Run

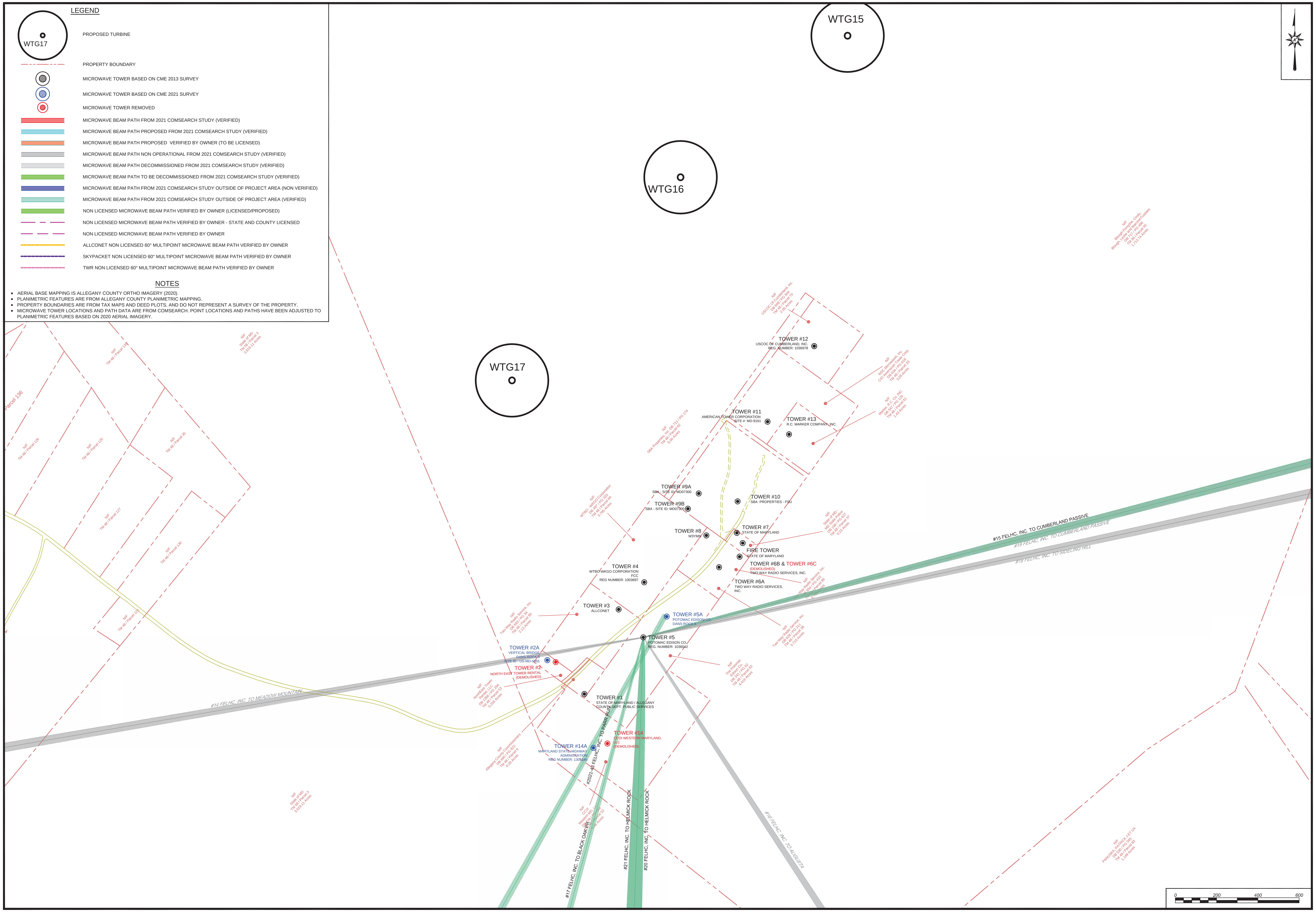
Unlicensed Microwave Beam Path:

Comment:

- Information compiled from CME on site investigation– Tower Operator Tim Burkhart Contacted and provided with information. Will update Monday.
- 11-12-2021 via email - Tim Confirms that tower 5 beams were relocated to tower 5a but wants to confirm with FE. Is on vacation and will have a response by Wednesday

2021





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CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T5: Microwave Beam Path Study - Tower #5
Potomac Edison Co. / Allegheny Power - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

REVISION
DATE
NO.

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

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SHEET TITLE

TOWER #5/5A EXHIBIT

TOWER #6A

Owner: Two Way Radio Service, Inc.
Owner Contact: Larry Elder
Work: 301-777-5479 ex. 114
Cell: 301-707-7833
Email: Larry.Elder@twrbb.com
Leaser: AllCoNet

Licensed Microwave Beam Paths:

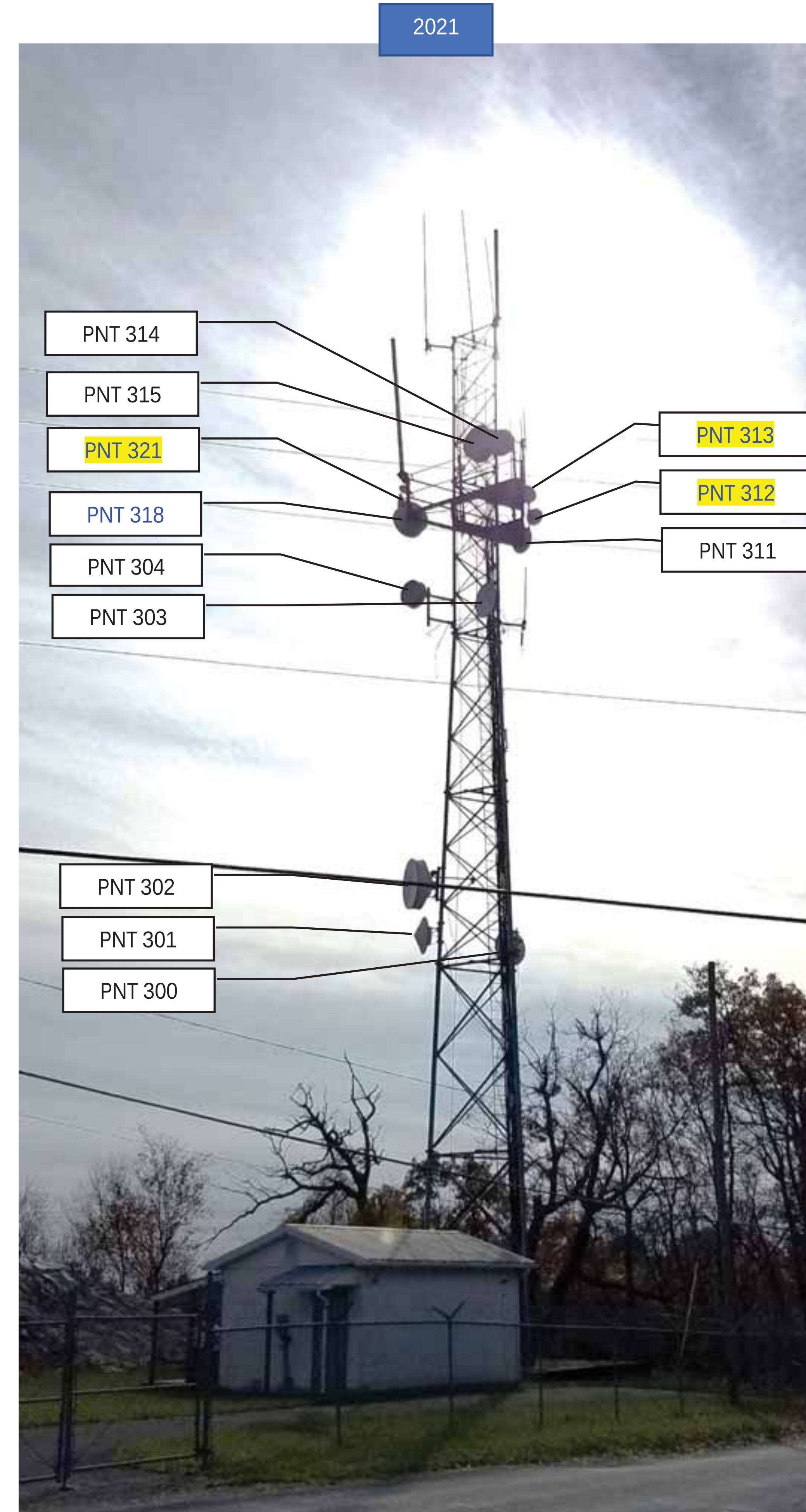
- ~~Comsearch ID #26 Allegany College of Maryland to Finnan Tower located in Cumberland, MD.~~
- ~~Comsearch ID #29 Allegany College of Maryland to Savage Mountain located west of Frostburg, MD.~~
- ~~Comsearch ID #30 Allegany College of Maryland to Town Hill located in Cumberland, MD.~~
- ~~Comsearch ID #31 Allegany College of Maryland to Finnan Water Tower located in Cumberland, MD.~~
- Comsearch ID #42 TWR, Inc. to Romney, WV. **(OUT OF PROJECT AREA)**
- Comsearch ID #43 TWR, Inc. to Warrior Mountain located in Flintstone, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #44 Two Way Radio Inc. to Big Savage Mountain located west of Frostburg, MD. **(ACTIVE - IN PROJECT AREA)**
- Comsearch ID #45 (2021-25) TWR, Inc. to Wills Mountain located in Cumberland, MD. **(OUT OF PROJECT AREA)**

Unlicensed Microwave Beam Paths:

- Comsearch ID #108 Point-to-point to New Dan's Tower off of View Point Lane located south of Frostburg, MD.
- Comsearch ID #107 Point-to-point for Allegany College of Maryland to the Culinary Institute located in Cumberland, MD.
- Comsearch ID #106 Point-to-point for Oldies 107 Radio Station to Pinnacle Subdivision located in Short Gap, WV.
- Comsearch ID #105 Point-to-point to a tower along Energy Way located near Bayard and Gormania, WV.
- Comsearch ID #109 Six (6) point-to-multipoint microwave beam paths from one (1) 60 degree sector antenna

Comment:

- Information compiled from CME on site investigation and Comsearch Query – Tower Owner Contacted. Larry is to provide information and current status and verification on Monday Nov. 15th when he gets back to the office.



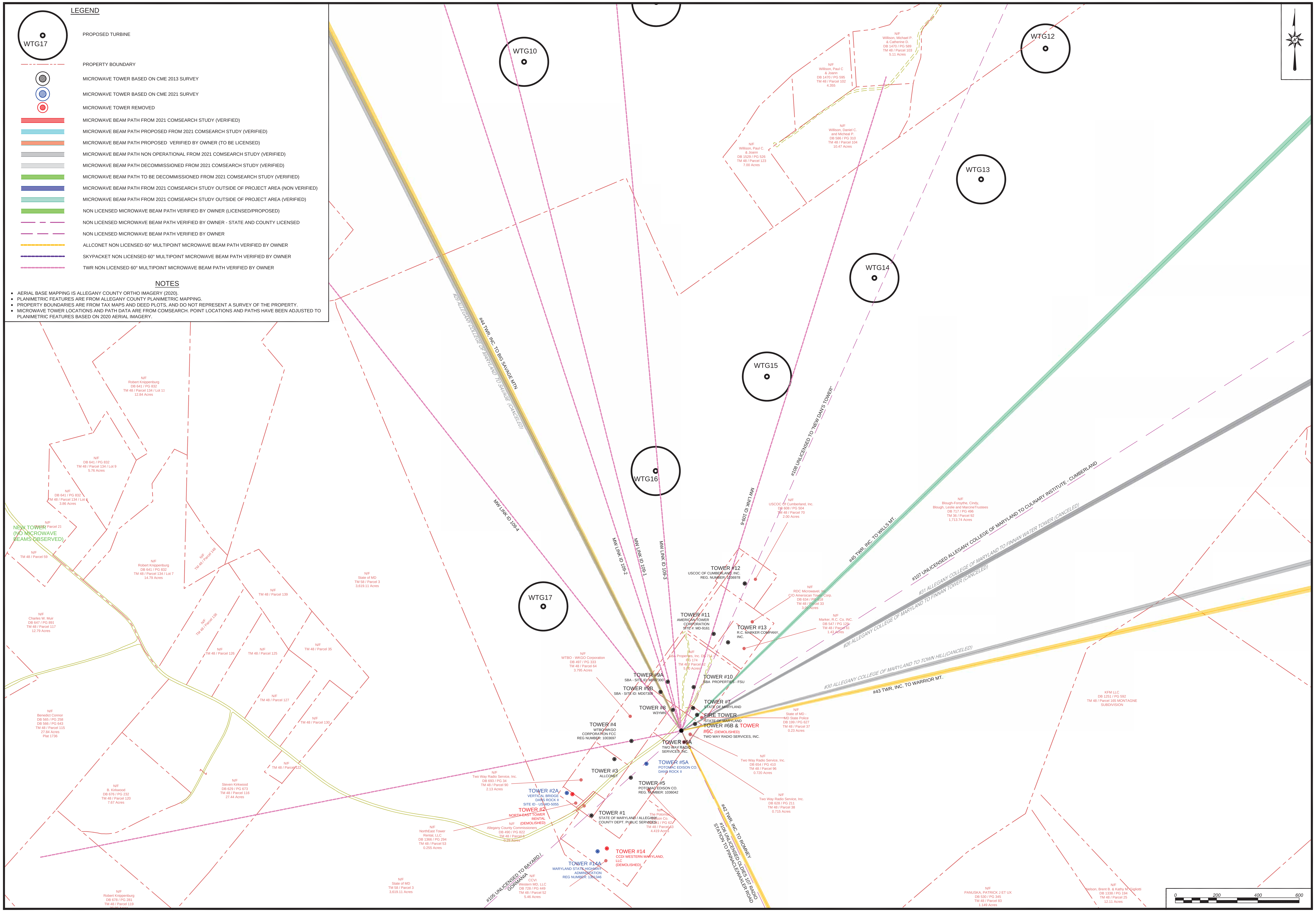


Exhibit T6A: Microwave Beam Path Study - Tower #6A
Two Way Radio Services, Inc. - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

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CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

REVISION
DATE
NO.

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

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SHEET TITLE

TOWER #6A EXHIBIT

2014

TOWER #6B

~~6C (REMOVED)~~

Owner: Two Way Radio Service, Inc.
Owner Contact: Larry Elder
Cell: 301-707-7833
Work: 301-777-5479 ex. 114

Email: Larry.Elder@twrbb.com
Leaser: AllCoNet

Licensed Microwave Beam Paths (#6B):

- Comsearch ID #7 (2021-5) WITF, Inc. to White Avenue located in Cumberland, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #32 (2021-20) West Virginia Radio Corporation to White Avenue located in Cumberland, MD. **(OUT OF PROJECT AREA)**
- Comsearch ID #33 (2021-21) West Virginia Radio Corporation to Savage Mountain located west of Frostburg, MD. (relocated to 6B?)
- Comsearch ID #34 (2021-22) West Virginia Radio Corporation from WQZK located in Keyser, WV. **(OUT OF PROJECT AREA)**

~~Licensed Microwave Beam Paths (#6C):~~

- ~~Comsearch ID #33 West Virginia Radio Corporation to Savage Mountain located west of Frostburg, MD.~~

Comment:

- Information compiled from CME on site investigation and Comsearch Query – Tower Owner Contacted. Larry is to provide information and current status and verification on Monday Nov. 15th when he gets back to the office.

2021

LEGEND

WTG17	PROPOSED TURBINE
	PROPERTY BOUNDARY
	MICROWAVE TOWER BASED ON CME 2013 SURVEY
	MICROWAVE TOWER BASED ON CME 2021 SURVEY
	MICROWAVE TOWER REMOVED
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)
	MICROWAVE BEAM PATH NON OPERATIONAL FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER
	ALLCONET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
	SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
	TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

- AERIAL BASE MAPPING IS ALLEGANY COUNTY ORTHO IMAGERY (2020).
- PLANIMETRIC FEATURES ARE FROM ALLEGANY COUNTY PLANIMETRIC MAPPING.
- PROPERTY BOUNDARIES ARE FROM TAX MAPS AND DEED PLOTS, AND DO NOT REPRESENT A SURVEY OF THE PROPERTY.
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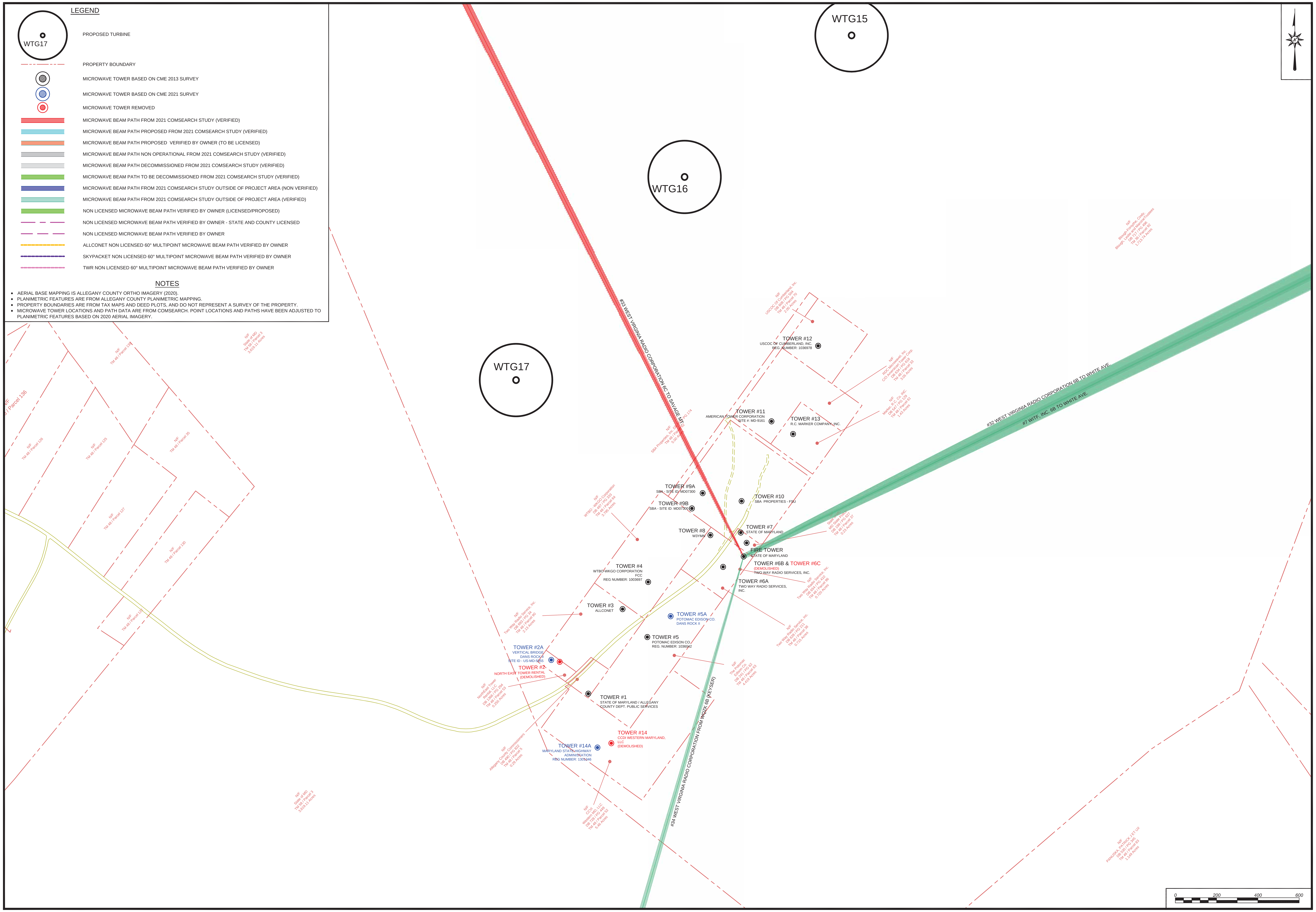

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ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T6B: Microwave Beam Path Study - Tower #6B
Two Way Radio Services, Inc. - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

COPYRIGHT:

SHEET TITLE

TOWER #6B EXHIBIT

2014

TOWER #7

<u>Owner:</u> State of Maryland – Maryland State Highway Administration

<u>Contact:</u> Rich Berg State of Maryland, MIEMSS
653 West Pratt St., Baltimore, Maryland 21201
Work: 410-706-3668
Cell: 410-365-5344
Email: rberg@miemss.org

<u>Unlicensed Microwave Beam Paths:</u>

- ~~#112 Point-to-Point (5.8 GHz) to Maryland State Police Barracks located in LaVale, MD. (**Inactive - OUT OF PROJECT AREA**)~~

Comment:

- Information compiled from CME on site investigation and email verification provided by Rich Berg Dated 11-12-2021

2021

2014

TOWER #8

Owner: Two Way Radio Service, Inc.
Owner Contact: Larry Elder
Work: 301-777-5479 ex. 114
Cell: 301-707-7833
Email: Larry.Elder@twrbb.com
Leaser: AllCoNet

No Microwave Beams observed or reported from comsearch.

2021

2014

TOWER #9A

Owner: SBA Properties

Leaser: Frostburg State University

Contact: Matthew Kohl,
Asset Optimization Analysis
SBA Communication Corporation
Phone: 561-226-9520

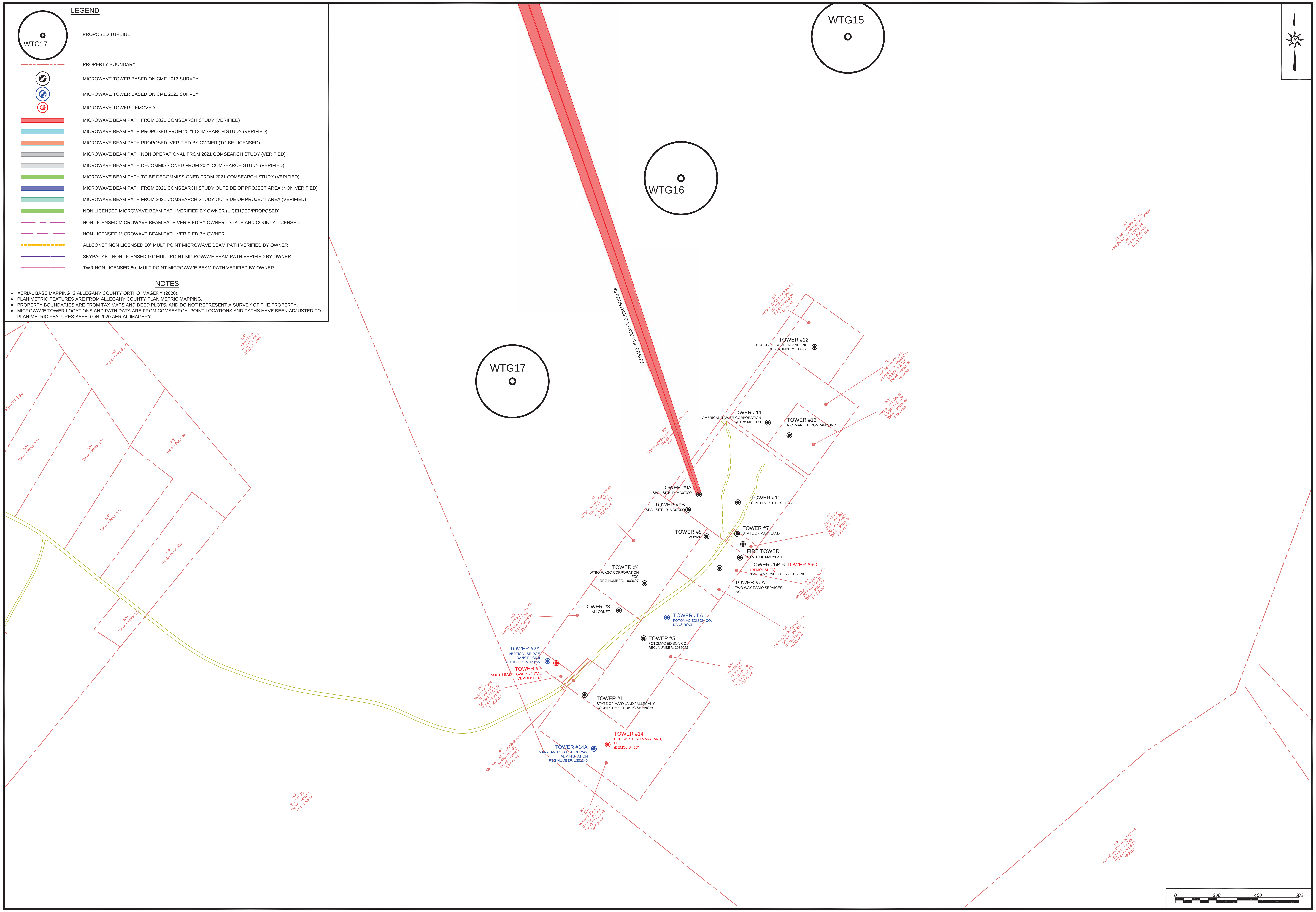
Leaser Contact: Maria-Elena Perez
WFWM, Frostburg State University,
Frostburg, MD 21532
Phone: 410-767-4112

Licensed Microwave Beam Path:

- Comsearch ID #6 (2021-4) Frostburg State University to Frostburg State University (Frampton Hall), Frostburg, MD. (**Active - In Project Area**)

- Information varified from CME on site investigation and Comsearch.

2021



LEGEND

PROPOSED TURBINE

PROPERTY BOUNDARY

MICROWAVE TOWER BASED ON CME 2013 SURVEY

MICROWAVE TOWER BASED ON CME 2021 SURVEY

MICROWAVE TOWER REMOVED

MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)

MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)

MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)

MICROWAVE BEAM PATH NON OPERATIONAL FROM 2021 COMSEARCH STUDY (VERIFIED)

MICROWAVE BEAM PATH DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)

MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)

MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)

MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)

NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)

NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED

NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER

ALLCONET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

- AERIAL BASE MAPPING IS ALLEGANY COUNTY ORTHO IMAGERY (2020).
- PLANIMETRIC FEATURES ARE FROM ALLEGANY COUNTY PLANIMETRIC MAPPING.
- PROPERTY BOUNDARIES ARE FROM TAX MAPS AND DEED PLOTS, AND DO NOT REPRESENT A SURVEY OF THE PROPERTY.
- MICROWAVE TOWER LOCATIONS AND PATH DATA ARE FROM COMSEARCH. POINT LOCATIONS AND PATHS HAVE BEEN ADJUSTED TO PLANIMETRIC FEATURES BASED ON 2020 AERIAL IMAGERY.

CME ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T9A: Microwave Beam Path Study - Tower #9A
SBA Properties - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

REVISION
DATE
NO.

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI
COPYRIGHT:	

SHEET TITLE

TOWER #9A EXHIBIT

2014

TOWER #9B

Owner: SBA Properties

SITE ID: MD07300

Leaser: Frostburg State University

Contact: Matthew Kohl,
Asset Optimization Analysis
SBA Communication Corporation
Phone: 561-226-9520

Comment:
No Microwave Beams observed or reported from comsearch.

2021

TOWER #10

Owner: SBA Properties

Leaser: Frostburg State University

Contact: Matthew Kohl,
Asset Optimization Analysis
SBA Communication Corporation
Phone: 561-226-9520

Comment:
No Microwave Beams observed or reported from comsearch.

2014

TOWER #11

Owner: RDC Microwave, Inc.

Leasers: Appalachia Engineering Service
Thought Transmissions, LLC
iSignal
Capitol Communications of America

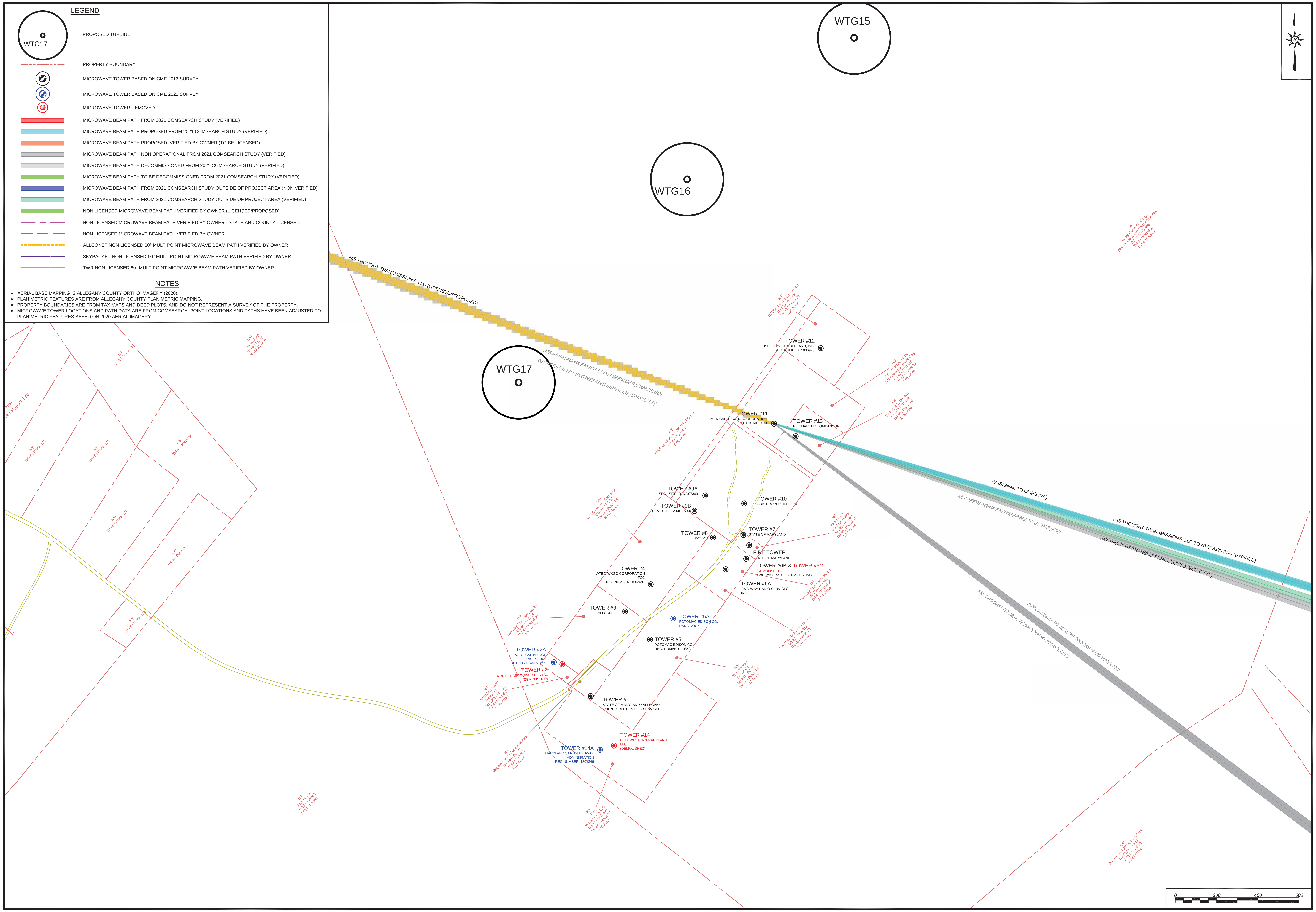
Leaser Contact: Protection Services
19700 Janelia Farm Blvd, Ashburn, Virginia 20147
Phone: 514-940-6209

Licensed Microwave Beam Path:

- Comsearch ID #2 iSignal to OMPS located in Virginia. **(Out of Project Area)(Unvarified)**
- ~~Comsearch ID #35 Appalachia Engineering to unknown location. (Licensed / Proposed)~~
- ~~Comsearch ID #36 Appalachia Engineering to unknown location. (Proposed)~~
- ~~Comsearch ID #37 Appalachia Engineering to West Virginia.~~
- ~~Comsearch ID #38 Capitol Communications of America to Virginia.~~
- ~~Comsearch ID #39 Capitol Communications of America to Virginia.~~
- Comsearch ID #46 Thought Transmissions, LLC to Virginia. (Expired) **(Out of Project Area)**
- Comsearch ID #47 (2021-26) Thought Transmissions, LLC to Virginia. **(Licensed/Proposed - Out of Project Area)**
- Comsearch ID #48 (2021-27) Thought Transmissions, LLC to unknown location. **(Licensed / Proposed – In Project Area)**

Comment:
No Microwave Beams observed. 2021 comsearch reported 2 Licensed/Proposed beams. No Microwave Beams Observed on Tower. Tower owner contacted, Voicemails/Emails sent. Awaiting responce

2021



LEGEND

WTG17	PROPOSED TURBINE
	PROPERTY BOUNDARY
	MICROWAVE TOWER BASED ON CME 2013 SURVEY
	MICROWAVE TOWER BASED ON CME 2021 SURVEY
	MICROWAVE TOWER REMOVED
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH PROPOSED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH PROPOSED VERIFIED BY OWNER (TO BE LICENSED)
	MICROWAVE BEAM PATH NON OPERATIONAL FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2021 COMSEARCH STUDY (VERIFIED)
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)
	MICROWAVE BEAM PATH FROM 2021 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED
	NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER
	ALLCONET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
	SKYPACKET NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
	TWR NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

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- PROPERTY BOUNDARIES ARE FROM TAX MAPS AND DEED PLOTS, AND DO NOT REPRESENT A SURVEY OF THE PROPERTY.
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CME
ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T11: Microwave Beam Path Study - Tower #11
American Tower Corporation - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

NO.	DATE	REVISION

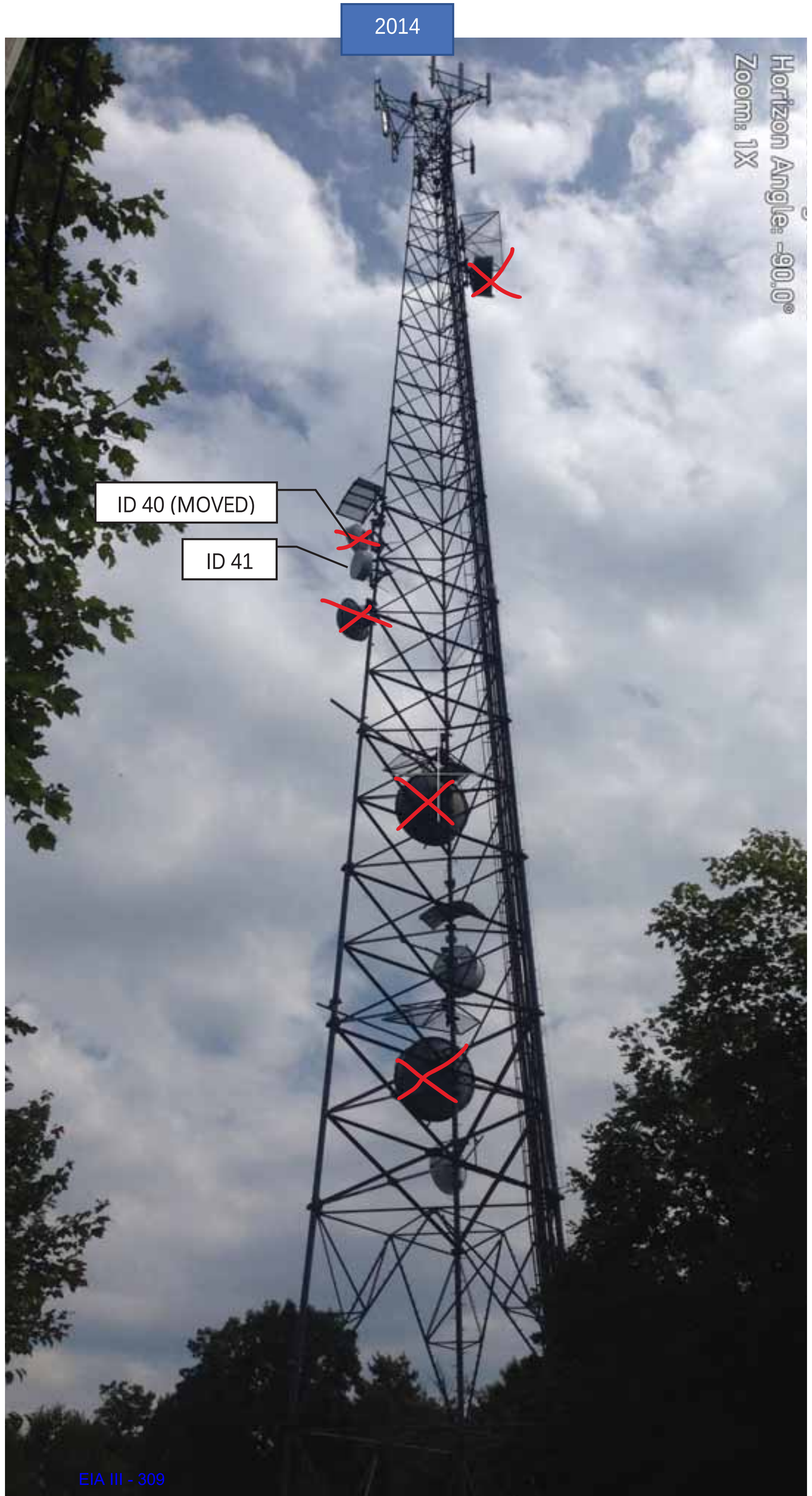
PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI
COPYRIGHT:	

SHEET TITLE

TOWER #11
EXHIBIT



TOWER #12

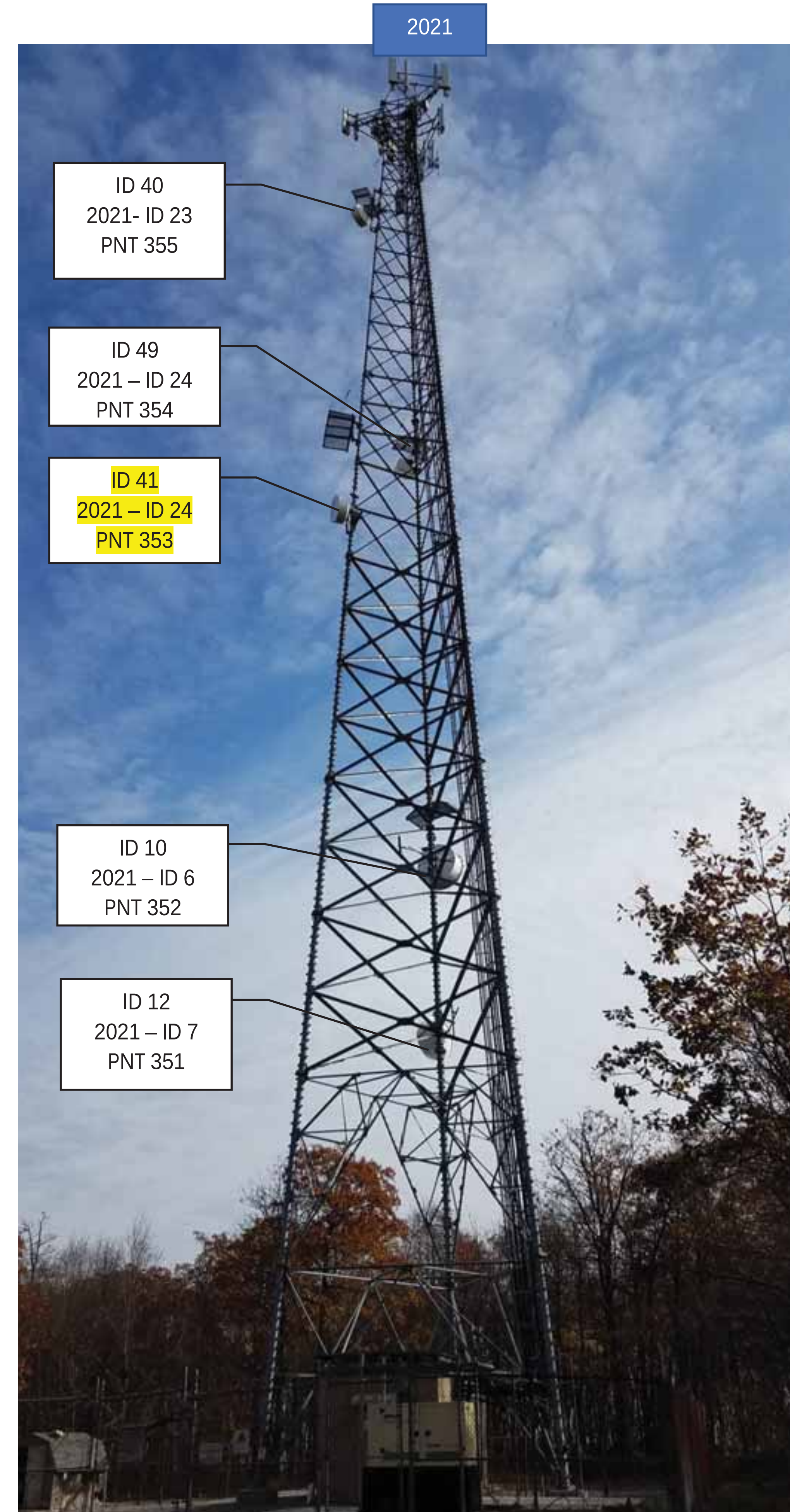
Owner: United States Cellular Corporation
Reg. Number 1036978
Site # 682302
Contact: Lynn R. Burnett – USCOC of Cumberland, Inc.
10 Corporate Drive, Suite 210,
Bedford, New Hampshire 03110
Phone: 603-533-2270
Fax: 603-533-2277

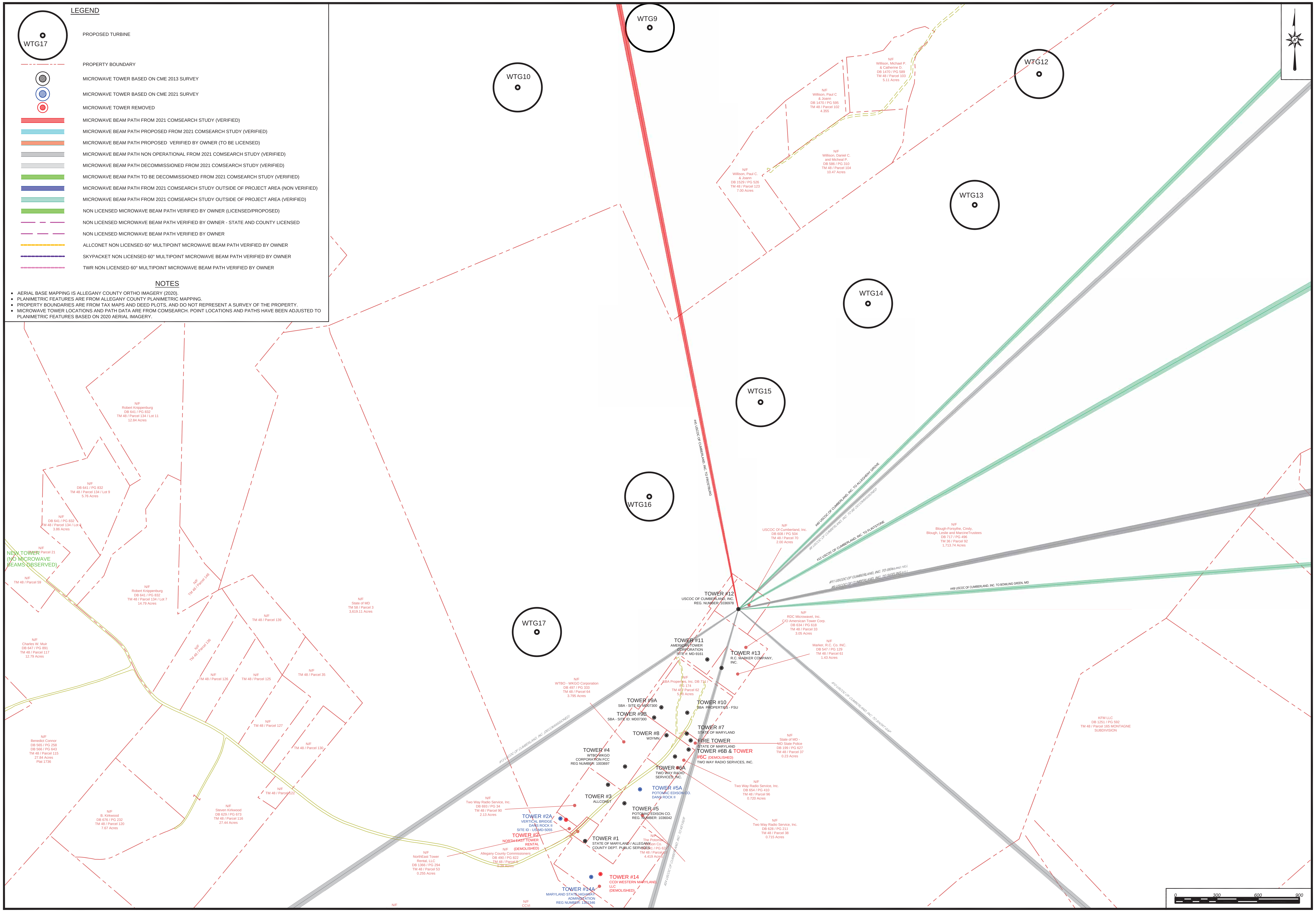
Licensed Microwave Beam Paths:

- ~~Comsearch ID #8 USCOC of Cumberland, Inc. to Cumberland, MD. (To be decommissioned.)~~
- ~~Comsearch ID #9 USCOC of Cumberland, Inc. to Sideling Hill located near Hancock, MD. **(Out of Project Area) (Needs Verified)**~~
- ~~Comsearch ID #10 (2021-6) USCOC of Cumberland, Inc. to Short Gap, WV. **(Out of Project Area)**~~
- ~~Comsearch ID #11 USCOC of Cumberland, Inc. to Sideling Hill located near Hancock, MD. **(Out of Project Area) (Needs Verified)**~~
- Comsearch ID #12 (2021-7) USCOC of Cumberland, Inc. to Flintstone, MD. **(Out of Project Area)**
- ~~Comsearch ID #13 USCOC of Cumberland, Inc. to Red House, MD (Decommissioned)~~
- Comsearch ID #24 USCOC of Cumberland, Inc. to Keyser, WV. **(Out of Project Area) (Needs Verified)**
- Comsearch ID #40 (2021-23) USCOC of Cumberland, Inc. to Allegheny Grove, PA.
- Comsearch ID #41 (2021-24) USCOC of Cumberland, Inc. to Frostburg, MD.
- Comsearch ID #49 (2021-28) USCOC of Cumberland, Inc. to Bowling Green, MD. **(Out of Project Area)**

Comment:

Information compiled from CME on site investigation and Comsearch Query –Tower owner contacted, Voicemails/Emails sent. Awaiting response





CME ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Exhibit T12: Microwave Beam Path Study - Tower #12
USCOC of Cumberland, Inc. - Dan's Mountain Project
for
Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781
Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	04-08-2015
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	AJP
CHECKED BY:	SCI

COPYRIGHT:

SHEET TITLE

TOWER #12 EXHIBIT

2014

TOWER #13

Owner: R.C. Marker Company, Inc.

Leasers: T & T Pump Company, Inc. dba West Virginia Paging

One Page Drive, Fairmont, WV 26554

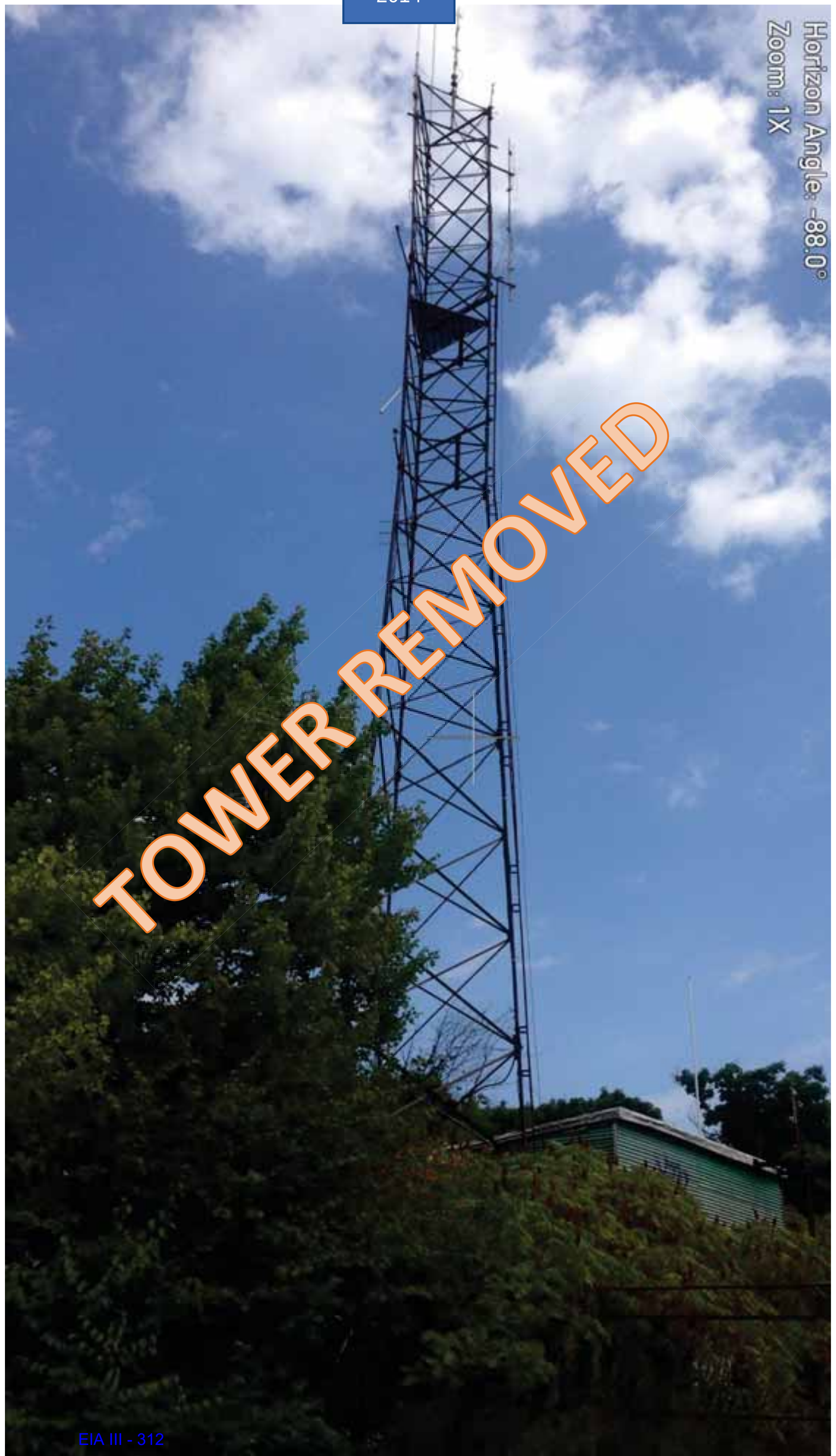
Phone: (304) 366-9775

Owner Contact: Robert J. Marker – President
P.O. Box 755, Cumberland, Maryland 21502
Phone: 301-777-8556
Cell: 301-876-7610
Email: djmarker@verizon.net

Comment:
No Microwave Beams observed or reported from comsearch.

2021

2014



~~← TOWER #14~~

~~Owner: CCVI Western MD, LLC~~
~~Contact: Dan Feirtag – CCVI Western Maryland~~
~~653 West Pratt St., Baltimore, Maryland 21201~~
~~Work: 410-706-3668~~
~~Cell: 410-365-5344~~
~~Email: rberg@miemss.org~~

TOWER #14A (NEW)→

Owner: CCVI Western MD, LLC
Contact: Dan Feirtag – CCVI Western Maryland
653 West Pratt St., Baltimore, Maryland 21201
Work: 410-706-3668
Cell: 410-365-5344
Email: rberg@miemss.org

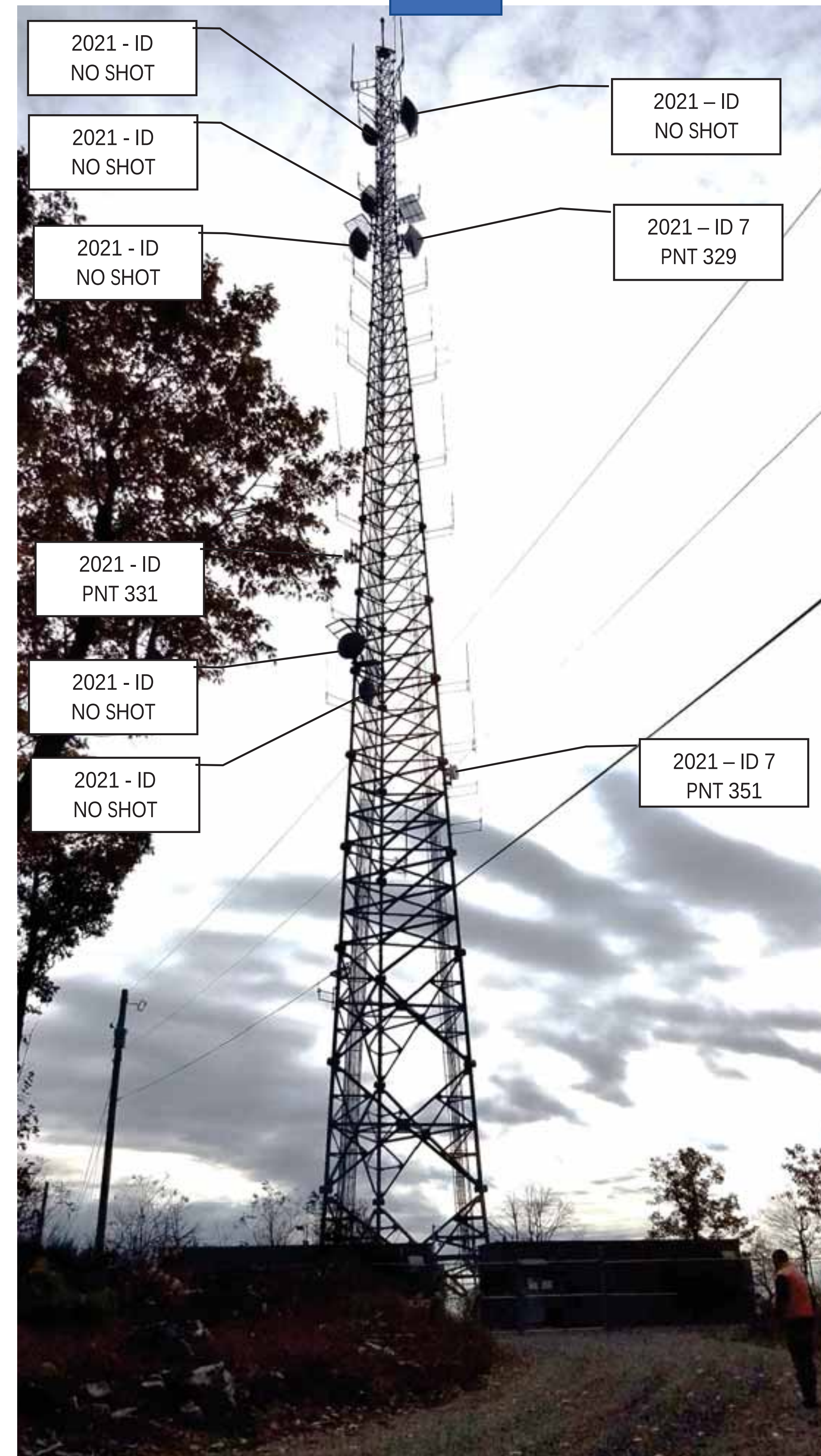
Licensed Microwave Beam Paths:

- Comsearch ID #31 Allegany County Gov To Haystack.
- Comsearch ID #36 State of Maryland, MIEMSS to Warrior Mountain
- Comsearch ID #37 State of Maryland, MIEMSS to Allegeny PSAP
- Comsearch ID #38 State of Maryland, MIEMSS to Allegeny PSAP
- Comsearch ID #39 State of Maryland, MIEMSS to Warrior Mountain
- Comsearch ID #40 State of Maryland, MIEMSS to Western Mary

Comment:

- Information compiled from CME on site investigation, Comsearch, and email verification provided by Rich Berg Dated 11-12-2021
- Reflectorless laser could not shoot 6 Black Microwave Antennas.

2021



LEGEND

- T21 — TURBINE WITH 100m SWEEP RADIUS
- PROPERTY BOUNDARY
- MICROWAVE TOWER BASED ON CME 2013 SURVEY
- FIRE TOWER BASED ON CME 2013 SURVEY
- MICROWAVE TOWER LOCATED ON CME 2008 MAPPING
- MICROWAVE BEAM PATH FROM 2013 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH PROPOSED FROM 2013 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH NON OPERATIONAL FROM 2013 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH DECOMMISSIONED FROM 2013 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH TO BE DECOMMISSIONED FROM 2013 COMSEARCH STUDY (VERIFIED)
- MICROWAVE BEAM PATH FROM 2013 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (NON VERIFIED)
- MICROWAVE BEAM PATH FROM 2013 COMSEARCH STUDY OUTSIDE OF PROJECT AREA (VERIFIED)
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER (LICENSED/PROPOSED)
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER - STATE AND COUNTY LICENSED
- NON LICENSED MICROWAVE BEAM PATH VERIFIED BY OWNER
- NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER
- NON LICENSED 60° MULTIPOINT MICROWAVE BEAM PATH VERIFIED BY OWNER

NOTES

- AERIAL BASE MAPPING IS ALLEGANY COUNTY ORTHO IMAGERY (2005).
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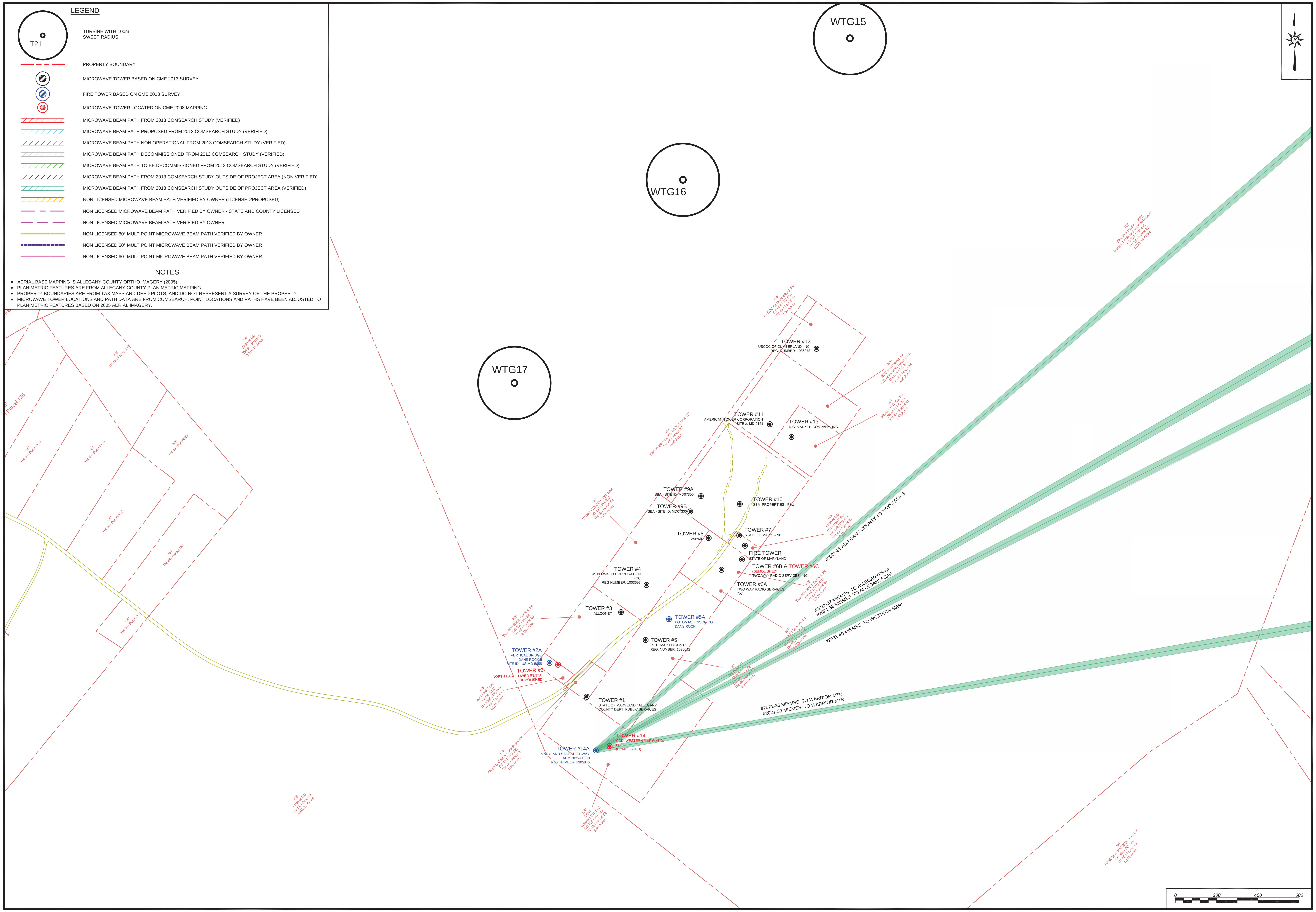

CME ENGINEERING

CME ENGINEERING LP
165 East Union Street,
Somerset, Pennsylvania 15501
Phone (814) 443-3344
Fax (814) 444-0365
Email: info@cmemgmt.com

Ex. T14A: Microwave Beam Path Study - Tower #14A
State of Maryland, MIEMSS - Dan's Mountain Project

for

Dan's Mountain Wind Force, LLC
645 Pittsburgh Street
Greensburg, PA 15601-2781

Situate in
Allegany County, Maryland

NO.	DATE	REVISION

PROFESSIONAL SEAL

CME MANAGEMENT LLC
GENERAL PARTNER OF CME ENGINEERING LP

DATE:	10-03-2014
PROJECT NO:	0426-S091
FOLDER NAME:	CAD
CAD DWG FILE:	Dans Mt Comsearch_Tower Exhibits.dwg
DRAWN BY:	JDR/WMD
CHECKED BY:	SCI
COPYRIGHT:	

SHEET TITLE

TOWER #14A EXHIBIT

2014

TOWER #15

Owner: Two Way Radio Service, Inc.
Owner Contact: Larry Elder
Work: 301-777-5479 ex. 114
Cell: 301-707-7833
Email: Larry.Elder@twrbb.com
Leaser: AllCoNet

Unlicensed Microwave Beam Paths:

- Comsearch ID #108 Point-to-point to New Dan's Tower off of View Point Lane located south of Frostburg, MD.
- Comsearch ID #116-1 thru 4 - Total of four (4) point-to-multipoint microwave beam paths from two (2) 60 degree sector antennas.

Comment:

- Owner Contacted and provided information. Larry is to provide information and current status and verification on Monday Nov. 15th when he gets back to the office.

FIRE TOWER

Owner: State of Maryland
Leaser: AllCoNet2

Contact: Rich Berg State of Maryland, MIEMSS
653 West Pratt St., Baltimore, Maryland 21201
Work: 410-706-3668
Cell: 410-365-5344
Email: rberg@miemss.org

Unlicensed Microwave Beam Paths:

- Comsearch ID #110 Point-to-point for AllCoNet2 to Volunteer Fire Department located in Rawlings, MD.
- Comsearch ID #111 Point-to-point for State of Maryland, MIEMSS to SHA Office located in LaVale, MD.
- Comsearch ID #113 Point-to-point for AllCoNet2 to Cash Valley Elementary School located in LaVale, MD.

Comment:

- Owner Contacted and provided information. Rich Berg no longer has responsibility for Allconet Links – Forwarded to new Contact Beth Thomas. bthomas@allconet.org
- No Visible Microwave Beams to Survey

							Dans Mountain Tower Location Data						Receiving Tower Location Data				Dans Mountain Antenna Data										Receiving Antenna Data					
Beam ID	2021 Beam ID	Beam Name	Licensed / Unlicensed	Status	Receiving Tower Location	Frequency	Lat (Comsearch) Decimal Degrees	Lon (Comsearch) Decimal Degrees	Lat (Survey) Decimal Degrees	Lon (Survey) Decimal Degrees	Lat Horizontal Difference (Feet)	Lon Horizontal Difference (Feet)	Lat (Comsearch) Decimal Degrees	Lon (Comsearch) Decimal Degrees	Lat (GoogleEarth) Decimal Degrees	Lon (GoogleEarth) Decimal Degrees	Ground Elev (Comsearch) Feet	Antenna Height (Comsearch) Feet	Ground Elev + Ant. Height (Comsearch) Feet	Ground Elev (Allegany Co. Topography) Feet	Ground Elev (Survey) Feet	Antenna Height Elev. (Survey) Feet	Antenna Height (Survey) Feet	Overall Structure Height (Survey) Feet	Antenna Height Elev. Difference Feet	Antenna Size (Feet)	Ground Elev (Survey) Feet	Antenna Height Elev. (Survey) Feet	Antenna Height (Survey) Feet	Antenna Height Elev. Difference Feet	Antenna Size (Feet)	Notes:
(1)		(2)	(3)		(4)	(23)	(5)	(6)	(7)	(8)	(9) (7)*69*5280	(10) (8)*1.15*5280	(11)	(12)	(13)	(14)	(15)	(16)	(17) (15)+(16)	(18)	AVG(19)	(20)	(21) ABS(19)-(20)	(30)	(22) (20)-(17)	(24)	(25)	(26)	(27) ABS(25)-(26)	(28) (26)-(20)	(29)	
Tower 1 - Allegany County Department of Public Safety (FAA Revised Location)																																
3	1	Allegany 911	Licensed	Out of Project Area	Constitution Park - Cumberland	Upper 6 GHz	39.5801	-78.9006	39.57893333	-78.90025833	418.97	1.80	39.6487	-78.7497	39.6489	-78.7497	2834.61	100.00	2934.61	2826.97	2825.40	2917.47	92.07	335.000	17.14	No Data	No Data	No Data	No Data	No Data	No Data	No Survey Data for Antenna Height
22	16	State of Maryland, MIEMSS	Licensed	In Project Area - Active	Big Savage Mountain	Upper 6 GHz	39.5801	-78.9010	39.57893333	-78.90025833	415.20	4.24	39.6742	-78.9622	39.6744	-78.9624	2834.61	79.99	2914.60	2826.97	2825.40	2903.00	77.60	335.000	11.60	No Data	No Data	No Data	No Data	No Data	No Data	
~~23~~		~~State of Maryland, MIEMSS~~	~~Inactive~~	~~Out of Project Area - Inactive~~	~~Warrior Mountain~~	~~940-960 MHz~~	~~39.5801~~	~~-78.9006~~	~~39.57893333~~	~~-78.90025833~~	~~418.97~~	~~1.80~~	~~39.6212~~	~~-78.6206~~	~~39.6209~~	~~-78.6204~~	~~2834.61~~	~~100.00~~	~~2934.61~~	~~2826.97~~	~~2825.40~~	~~2911.71~~	~~86.31~~	~~335.000~~	~~22.90~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
100		State of Maryland, MIEMSS	Unlicensed - Point to Point	In Project Area - Active	Bald Knob - Mt. Savage	4.9 GHz	No Data	No Data	39.57893333	-78.90025833	No Data	No Data	No Data	No Data	39.7162	-78.8836	No Data	No Data	No Data	2826.97	2825.40	2922.40	97.00	335.000	No Data	No Data	2017.28	2123.46	104.18	800.94	2.33 (Diameter)	Unlicensed - No ComSearch Data Available
~~115~~		~~State of Maryland, MIEMSS~~	~~Unlicensed - Point to Point~~	~~In Project Area - Active~~	~~MD State Police Barracks - LaVale~~	~~2.4 GHz~~	~~No Data~~	~~No Data~~	~~39.57893333~~	~~-78.90025833~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~39.6399~~	~~-78.8304~~	~~No Data~~	~~No Data~~	~~No Data~~	~~2826.97~~	~~2825.40~~	~~No Data~~	~~No Data~~	~~335.000~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Unlicensed - No ComSearch Data Available
Tower 2 - North East Tower Rental (No Licensed or UnLicensed Microwave Beams) **TOWER REMOVED**																																
		None	None		None	No Data	No Data	No Data	39.58006888	-78.90094728	No Data	No Data	No Data	No Data	None	None	No Data	No Data	No Data	2817.42	2817.12	None	No Data	178.446	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Surveyed Tower Location Only
Tower 2 - North East Tower Rental **NEW TOWER**																																
41		T-Mobile License LLC	Licensed	Out of Project Area - Active	69293A	Lower 6 GHz	39.5800	-78.9010	39.58009150	-78.90109320	-33.34	-0.73	39.4163	-78.9554	39.4163	-78.9554	2818.67	190.00	3006.67	2816.00	2818.60	3006.87	190.27	No Data	-0.20	No Data	No Data	No Data	No Data	No Data	No Data	Base /Top Elevation Not Surveyed
42		T-Mobile License LLC	Licensed	In Project Area - Active	69275A	11 GHz	39.5800	-78.9010	39.58009150	-78.90109320	-33.34	-0.73	39.6491	-78.9409	39.6501	-78.9395	2818.67	190.00	3006.67	2816.00	2818.60	3005.65	189.05	No Data	1.02	No Data	No Data	No Data	No Data	No Data	No Data	Base /Top Elevation Not Surveyed
Tower 3 - Two Way Radio Services, Inc. - Allconet																																
27	18	Allconet	Licensed	Out of Project Area - Active	Knobbly Mountain South	18 Ghz	39.5797	-78.9004	39.58078654	-78.89988529	-407.99	3.40	39.5938	-78.8009	39.5938	-78.8008	2834.66	89.99	2924.65	2834.86	2833.59	2915.70	82.11	120.450	8.95	No Data	No Data	No Data	No Data	No Data	No Data	
28	29	Allconet	Licensed	Out of Project Area - Active	Knobbly Mountain North	18 Ghz	39.5797	-78.9004	39.58078654	-78.89988529	-407.99	3.40	39.6345	-78.7781	39.6345	-78.7781	2834.66	95.01	2929.67	2834.86	2833.59	2938.06	104.47	120.450	-8.38	No Data	No Data	No Data	No Data	No Data	No Data	
49		Allconet	Proposed	Unknown	Knobbly Mountain North	18 Ghz	39.5797	-78.9004	39.58078654	-78.89988529	-407.99	3.40	39.6345	-78.7781	39.6345	-78.7781	2834.66	95.01	2929.67	2834.86	2833.59	2938.06	104.47	120.450	-8.38	No Data	No Data	No Data	No Data	No Data	No Data	Proposed Path
101		Allconet	Unlicensed - Point to Point	Unknown	Old Buffalo Mine - Lonaconing	5.8 GHz	No Data	No Data	39.58078654	-78.89988529	No Data	No Data	No Data	No Data	39.5823	-78.9683	No Data	No Data	No Data	2834.86	2833.59	2941.59	108.00	120.450	No Data	1 x 1 (Diamond)	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
102		Allconet	Unlicensed - Point to Point	Unknown	Jackson Mountain	5.8 GHz	No Data	No Data	39.58078654	-78.89988529	No Data	No Data	No Data	No Data	39.5570	-78.9811	No Data	No Data	No Data	2834.86	2833.59	2941.59	108.00	120.450	No Data	1 x 1 (Diamond)	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
103		Allconet	Unlicensed - Point to Point	Unknown	Franklin Hill - Lonaconing	5.8 GHz	No Data	No Data	39.58078654	-78.89988529	No Data	No Data	No Data	No Data	39.4894	-79.0629	No Data	No Data	No Data	2834.86	2833.59	2941.59	108.00	120.450	No Data	1 x 1 (Diamond)	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
104		Allconet	Unlicensed - Mult-Point 60 Sector	Unknown	360 Degree Coverage (23 Customers)	5.8 GHz	No Data	No Data	39.58078654	-78.89988529	No Data	No Data	No Data	No Data	N/A	N/A	No Data	No Data	No Data	2834.86	2833.59	2941.59	108.00	120.450	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
	30	Allegany County Government	Licensed	In Project Area - Active	Mt. Savage	11 GHz	39.5807	-78.8999	39.58078654	-78.89988529	-33.55	0.36	39.7162	-78.8836	39.7162	-78.8836	2838.13	92.10	2930.23	2834.86	2833.59	2929.88	96.29	120.450	0.35	No Data	No Data	No Data	No Data	No Data	No Data	
	35	Conxx, Inc.	Licensed	Out of Project Area - Active	Rocket Center	11 GHz	39.5807	-78.8999	39.58078654	-78.89988529	-33.55	0.36	39.5642	-78.8402	39.5636	-78.8402	2838.13	85.01	2923.14	2834.86	2833.59	2919.29	85.70	120.450	3.85	No Data	No Data	No Data	No Data	No Data	No Data	
Tower 4 - WTBO - WKGO Corporation																																
4	2	WTBO - WKGO Corporation	Licensed	Out of Project Area - Active	350 Bryd Avenue - Cumberland	950 MHz	39.5818	-78.8992	39.58115509	-78.89945576	234.95	-1.55	39.4787	-78.7511	39.6462	-78.7520	2840.03	No Data	No Data	2839.16	2835.93	2939.55	103.62	176.598	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No ComSearch or Survey Data For Antenna Height
~~5~~	~~3~~	~~He's Alive Inc.~~	~~Non-Operational~~	~~In Project Area - Inactive~~	~~Meadow Mountain~~	~~950 MHz~~	~~39.5823~~	~~-78.8979~~	~~39.58120000~~	~~-78.89880000~~	~~386.17~~	~~-6.67~~	~~39.7046~~	~~-79.0922~~	~~39.7046~~	~~-79.0922~~	~~2837.89~~	~~No Data~~	~~No Data~~	~~2839.16~~	~~2835.93~~	~~No Data~~	~~No Data~~	~~176.598~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Non-Operational Path
~~114~~		~~Always Communications~~	~~Non-Operational~~	~~Out of Project Area - Inactive~~	~~Frankfort Drive, Fort Ashby~~	~~No Data~~	~~No Data~~	~~No Data~~	~~39.58120000~~	~~-78.89950000~~	~~No Data~~	~~No Data~~	~~39.4787~~	~~-78.7511~~	~~39.6848~~	~~-78.7863~~	~~No Data~~	~~No Data~~	~~No Data~~	~~2839.16~~	~~2835.93~~	~~No Data~~	~~No Data~~	~~176.598~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Non-Operational Path
	32	FM Radio License, LLC	Licensed	Out of Project Area - Active	350 Bryd Avenue - Cumberland	950 MHz	39.5811	-78.8995	39.58115509	-78.89945576	-20.07	0.27	39.6460	-78.7518	39.6462	-78.7520	3015.09	No Data	No Data	2839.16	2835.93	2930.26	94.32	176.598	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
	33	FM Radio License, LLC	Licensed	Out of Project Area - Active	350 Bryd Avenue - Cumberland	950 MHz	39.5811	-78.8995	39.58115509	-78.89945576	-20.07	0.27	39.6460	-78.7518	39.6462	-78.7520	3015.09	No Data	No Data	2839.16	2835.93	2930.26	94.32	176.598	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
	34	FM Radio License, LLC	Licensed	In Project Area - Active	WFRB TX Site	950 MHz	39.5811	-78.8995	39.58115509	-78.89945576	-20.07	0.27	39.6846	-78.9650	39.6846	-78.9650	3015.09	No Data	No Data	2839.16	2835.93	2944.59	108.66	176.598	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
Tower 5 - Allegheny Power																																
15	9	FELHC, Inc.	Licensed	Out of Project Area - Active	Cumberland Passive	Upper 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.6220	-78.7117	39.6218	-78.7118	2837.89	85.01	2922.90	2841.04	2841.06	2921.30	80.24	223.067	1.60	No Data	No Data	No Data	No Data	No Data	No Data	AP indicates one path to Cumberland
16	10	FELHC, Inc.	Licensed	Out of Project Area - Active	Augusta	Upper 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.3040	-78.6536	39.3043	-78.6533	2837.89	100.00	2937.89	2841.04	2841.06	2934.45	93.39	223.067	3.44	No Data	No Data	No Data	No Data	No Data	No Data	
17	11	FELHC, Inc.	Licensed	Out of Project Area - Active	Black Oak Passive	Upper 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.5008	-78.9244	39.5007	-78.9245	2837.89	79.98	2917.87	2841.04	2841.06	2921.30	80.24	223.067	-3.42	No Data	No Data	No Data	No Data	No Data	No Data	
~~19~~	~~13~~	~~FELHC, Inc.~~	~~Licensed~~	~~Out of Project Area - Active~~	~~Cumberland Passive~~	~~Upper 6 GHz~~	~~39.5812~~	~~-78.8986~~	~~39.58042204~~	~~-78.89945103~~	~~281.40~~	~~-5.10~~	~~39.6220~~	~~-78.7117~~	~~39.6218~~	~~-78.7118~~	~~2837.89~~	~~120.01~~	~~2957.90~~	~~2841.04~~	~~2841.06~~	~~2921.30~~	~~80.24~~	~~223.067~~	~~36.61~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	AP indicates one path to Cumberland
20	14	FELHC, Inc.	Licensed	Out of Project Area - Active	Helmick Rock	940-960 MHz	39.5811	-78.8986	39.58042204	-78.89945103	251.04	-5.10	38.9829	-79.9081	38.9829	-79.9081	2837.89	49.87	2887.76	2841.04	2841.06	No Data	No Data	223.067	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Surveyed Antenna Elev Data
~~21~~	~~15~~	~~FELHC, Inc.~~	~~Licensed~~	~~Out of Project Area - Active~~	~~Helmick Rock~~	~~940-960 MHz~~	~~39.5811~~	~~-78.8986~~	~~39.58042204~~	~~-78.89945103~~	~~251.04~~	~~-5.10~~	~~38.9829~~	~~-79.9081~~	~~38.9829~~	~~-79.9081~~	~~2837.89~~	~~50.00~~	~~2887.89~~	~~2841.04~~	~~2841.06~~	~~No Data~~	~~No Data~~	~~223.067~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Surveyed Antenna Elev Data~~
Tower 5A - Allegheny Power (**NEW TOWER**)																																
14	8	FELHC, Inc.	Licensed	Out of Project Area - Active	Meadow Mountain	Upper 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.5199	-79.3024	39.5193	-79.3013	2837.89	170.01	3007.90	2841.04	2841.06	3004.72	163.67	223.067	3.18	No Data	No Data	No Data	No Data	No Data	No Data	Space Diversity Dishes
	14A	FELHC, Inc.	Licensed	Out of Project Area - Active	Meadow Mountain	Upper 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.5199	-79.3024	39.5193	-79.3013				2841.04	2841.06	2983.90	142.84	223.067	-2983.90	No Data	No Data	No Data	No Data	No Data	No Data	Space Diversity Dishes
18	12	FELHC, Inc.	Licensed	Out of Project Area - Active	Sideling Hill	Lower 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.6895	-78.2997	39.6895	-78.2998	2837.89	164.99	3002.88	2841.04	2841.06	3002.27	161.21	223.067	0.62	No Data	No Data	No Data	No Data	No Data	No Data	Space Diversity Dishes
	12A	FELHC, Inc.	Licensed	Out of Project Area - Active	Sideling Hill	Lower 6 GHz	39.5812	-78.8986	39.58042204	-78.89945103	281.40	-5.10	39.6895	-78.2997	39.6895	-78.2998	2837.89	164.99	3002.88	2841.04	2841.06	3002.27	161.21	223.067	0.62	No Data	No Data	No Data	No Data	No Data	No Data	Space Diversity Dishes
	43	FELHC, Inc.	Licensed	Out of Project Area - Active	Parr Run	Lower 6 GHz	39.5807	-78.8991	39.58070620	-78.89905680	-2.26	0.28	39.4034	-79.0206	39.4034	-79.0206	2840.95	121.00	2961.96	2840.00	2841.00	2963.17	122.17	No Data	-1.21	No Data	No Data	No Data	No Data	No Data	No Data	
Tower 6A - Two Way Radio Services, Inc.																																
~~26~~		~~Allegany College of Maryland~~	~~Canceled~~	~~Out of Project Area - Canceled~~	~~Finnan Tower~~	~~11 GHz~~	~~39.5814~~	~~-78.8981~~	~~39.58137644~~	~~-78.89817396~~	~~4.54~~	~~-0.72~~	~~39.6542~~	~~-78.7361~~	~~39.6543~~	~~-78.7362~~	~~2893.67~~	~~100.00~~	~~2993.66~~	~~2852.30~~	~~2850.15~~	~~2943.78~~	~~93.63~~	~~140.091~~	~~49.88~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
~~29~~		~~Allegany College of Maryland~~	~~Canceled~~	~~Out of Project Area - Canceled~~	~~Big Savage Mountain~~	~~11 GHz~~	~~39.5814~~	~~-78.8981~~	~~39.58137644~~	~~-78.89817396~~	~~4.54~~	~~-0.72~~	~~39.6742~~	~~-78.9622~~	~~39.6744~~	~~-78.9624~~	~~2778.84~~	~~100.00~~	~~2878.84~~	~~2852.30~~	~~2850.15~~	~~2947.30~~	~~97.15~~	~~140.091~~	~~-68.47~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
~~30~~		~~Allegany College of Maryland~~	~~Canceled~~	~~Out of Project Area - Canceled~~	~~Town Hill~~	~~11 GHz~~	~~39.5814~~	~~-78.8981~~	~~39.58137644~~	~~-78.89817396~~	~~4.54~~	~~-0.72~~	~~39.6542~~	~~-78.7361~~	~~39.6906~~	~~-78.2670~~	~~2778.84~~	~~100.00~~	~~2878.84~~	~~2852.30~~	~~2850.15~~	~~2896.47~~	~~46.32~~	~~140.091~~	~~-17.63~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
~~31~~		~~Allegany College of Maryland~~	~~Canceled~~	~~Out of Project Area - Canceled~~	~~Finnan Water Tower~~	~~11 GHz~~	~~39.5814~~	~~-78.8981~~	~~39.58137644~~	~~-78.89817396~~	~~4.54~~	~~-0.72~~	~~39.6439~~	~~-78.7422~~	~~39.6543~~	~~-78.7362~~	~~2778.84~~	~~100.00~~	~~2878.84~~	~~2852.30~~	~~2850.15~~	~~2943.78~~	~~93.63~~	~~140.091~~	~~-64.94~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
42		Two Way Radio, Inc	Licensed/Proposed	Out of Project Area - Active	Romney	11 GHz	39.5814	-78.8982	39.58137644	-78.89817396	-5.58	0.12	39.3098	-78.7170	39.3096	-78.7168	2844.45	49.87	2894.32	2852.30	2850.15	2890.48	40.33	140.091	3.84	No Data	No Data	No Data	No Data	No Data	No Data	
43		Two Way Radio, Inc	Licensed/Proposed	Out of Project Area - Active	Warrior Mountain	11 GHz	39.5814	-78.8982	39.58137644	-78.89817396	-5.58	0.12	39.6362	-78.6099	39.6362	78.6099	2844.45	60.04	2904.49	2852.30	2850.15	2890.63	40.48	140.091	13.87	No Data	No Data	No Data	No Data	No Data	No Data	
44		Two Way Radio, Inc	Licensed/Proposed	In Project Area - Active/Proposed	Big Savage Mountain	11 GHz	39.5814	-78.8982	39.58137644	-78.89817396	4.54	0.12	39.6748	-78.9619	39.6748	-78.9619	2844.63	100.07	2944.70	2852.30	2850.15	2944.48	94.33	140.091	0.22	No Data	No Data	No Data	No Data	No Data	No Data	
45	25	Two Way Radio, Inc	Licensed	Out of Project Area - Active	Wills Mountain	11 GHz	39.5814	-78.8982	39.58137644	-78.89817396	-5.58	0.12	39.6746	-78.7790	39.6746	-78.7790	2844.45	100.06	2944.52	2852.30	2850.15	2950.64	100.49	140.091	-6.12	No Data	No Data	No Data	No Data	No Data	No Data	
105		Dan's to Bayard, WV	Unlicensed - Point to Point	Out of Project Area - ?	Bayard / Gormania, WV	5.8 GHz	No Data	No Data	39.58137644	-78.89817396	No Data	No Data	No Data	No Data	39.2671	-79.3292	No Data	No Data	No Data	2852.30	2850.15	No Data	No Data	140.091	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
106		Oldies 107 Radio Station	Unlicensed - Point to Point	Out of Project Area - ?	Pinnacle Subdivision/Waxler Road - Short Gap	24.2 GHz	No Data	No Data	39.58137644	-78.89817396	No Data	No Data	No Data	No Data	39.5249	-78.8618	No Data	No Data	No Data	2852.30	2850.15	No Data	No Data	140.091	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
107		Allegany College of Maryland	Unlicensed - Point to Point	Out of Project Area - ?	Culinary Institute - Cumberland	5.8 GHz	No Data	No Data	39.58137644	-78.89817396	No Data	No Data	No Data	No Data	39.6518	-78.7609	No Data	No Data	No Data	2852.30	2850.15	No Data	No Data	140.091	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
108		New Dans Tower	Unlicensed - Point to Point	In Project Area - (See Note)	New Dans Tower - Frostburg	5.8 GHz	No Data	No Data	39.58137644	-78.89817396	No Data	No Data	No Data	No Data	39.6015	-78.8871	No Data	No Data	No Data	2852.30	2850.15	2935.55	85.55	140.091	No Data	2 x1 (Rectangle)	2714.83	2761.12	46.29	No Data	No Data	Unlicensed - No ComSearch Data Available
109		Two Way Radio, Inc	Unlicensed - Mult-Point 60 Sector	In Project Area - (See Note)	360 Degree Coverage (6 Customers)	5.8 GHz	No Data	No Data	39.58137644	-78.89817396	No Data	No Data	No Data	No Data	N/A	N/A	No Data	No Data	No Data	2852.30	2850.15	2917.69	67.54	140.091	No Data	4.5 H (Metal Post)	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
Tower 6B - Two Way Radio Services, Inc. **(Tower 6c Removed)**																																
7	5	WITF Inc.	Licensed	Out of Project Area - Active	White Ave. Cumberland	950 MHz	39.5815	-78.8978	39.58152120	-78.89782548	-17.84	-0.12	39.6434	-78.7428	39.6439	-78.7425	2869.56	0.00	0.00	2870.00	N/A	2916.72	No Data	46.767	None	No Data	No Data	No Data	No Data	No Data	No Data	No ComSearch Data For Antenna Height
32	20	West Virginia Radio Corporation	Licensed	Out of Project Area - Active	White Ave. Cumberland	11 GHz	39.5814	-78.8981	39.58152120	-78.89782548	-48.20	1.40	39.6439	-78.7422	39.6439	-78.7422	2875.14	50.00	2925.14	2870.00	N/A	2916.72	No Data	46.767	8.42	No Data	No Data	No Data	No Data	No Data	No Data	
33	21	West Virginia Radio Corporation	Licensed	In Project Area - Active	Big Savage Mountain	11 GHz	39.5814	-78.8981	39.58152120	-78.89782548	-48.20	1.40	39.6744	-78.9619	39.6748	-78.9619	2875.14	50.00	2925.14	2870.00	N/A	2898.08	No Data	46.767	27.06	No Data	No Data	No Data	No Data	No Data	No Data	
34	22	West Virginia Radio Corporation	Licensed	Out of Project Area - Active	Keyser	11 GHz	39.5814	-78.8981	39.58152120	-78.89782548	-48.20	1.40	39.4189	-78.9536	39.4193	-78.9534	2875.14	50.00	2925.14	2870.00	N/A	2908.08	No Data	46.767	17.06	No Data	No Data	No Data	No Data	No Data	No Data	
	17	WITF Inc.	Licensed	Out of Project Area - Active	White Ave. Cumberland	950 MHz	39.5815	-78.8978	39.58152120	-78.89782548	-17.84	-0.12	39.6434	-78.7428	39.6439	-78.7425	2869.56	0.00	0.00	2870.00	N/A	2916.72	No Data	46.767	None	No Data	No Data	No Data	No Data	No Data	No Data	No ComSearch Data For Antenna Height
Fire Tower - State of Maryland (UnLicensed Microwave Beams)																																
110		Allconet	Unlicensed	Out of Project Area - ?	Volunteer Fire Department - Rawlings	No Data	No Data	No Data	39.58170319	-78.89777786	No Data	No Data	No Data	No Data	39.5347	-78.8779	No Data	No Data	No Data	2872.43	No Data	No Data	No Data	82.636	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
111		State of Maryland, MIEMSS	Unlicensed	Out of Project Area - ?	State Highway Admin - LaVale	2.4 GHz	No Data	No Data	39.58170319	-78.89777786	No Data	No Data	No Data	No Data	39.6336	-78.8322	No Data	No Data	No Data	2872.43	No Data	No Data	No Data	82.636	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
113		Allconet	Unlicensed	Out of Project Area - ?	Cash Valley Elementary - LaVale	No Data	No Data	No Data	39.58170319	-78.89777786	No Data	No Data	No Data	No Data	39.6683	-78.8129	No Data	No Data	No Data	2872.43	No Data	No Data	No Data	82.636	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Unlicensed - No ComSearch Data Available
Tower 7 - State of Maryland - Maryland State Highway Administration																																
~~112~~		~~State of Maryland, MIEMSS~~	~~Unlicensed~~		~~MD State Police Barracks - LaVale~~	~~5.8 Ghz~~	~~No Data~~	~~No Data~~	~~39.58183790~~	~~-78.89788201~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~39.6399~~	~~-78.8304~~	~~No Data~~	~~No Data~~	~~No Data~~	~~2856.13~~	~~2854.92~~	~~No Data~~	~~No Data~~	~~121.163~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Unlicensed - No ComSearch Data Available
Tower 8 - Two Way Radio Services, Inc. - Mountain Amateur Radio Club (No Licensed or UnLicensed Microwave Beams)																																
		None	None		None	No Data	No Data	No Data			No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	2852.07	2851.14	No Data	No Data	104.656	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Surveyed Tower Location Only
Tower 9A - SBA Properties - Frostburg State University																																
6	4	Frostburg State University	Licensed	In Project Area - Active	Frampton Hall	950 MHz	39.5818	-78.8978	39.58235154	-78.89855109	-219.15	-4.53	39.6523	-78.9322	39.6522	78.9320	2880.72	0.00	0.00	2844.49	2839.52	2890.03	50.51	112.949	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Comsearch Data for Antenna Height
Tower 9B - SBA Properties (No Licensed or UnLicensed Microwave Beams)																																
		None	None		None	No Data	No Data	No Data	39.58214523	-78.89873087	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	2845.32	2839.52	No Data	No Data	118.657	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Surveyed Tower Location Only
Tower 10 - SBA Properties (No Licensed or UnLicensed Microwave Beams)																																
		None	None		None	No Data	No Data	No Data	39.58225669	-78.89787932	No Data	No Data	No Data	No Data	None	None	No Data	No Data	No Data	2849.00	None	None	None	104.286	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
Tower 11 - American Tower Corporation																																
2		iSignal	Licensed	Out of Project Area - ?	Omps - Virginia	11 GHz	39.5831	-78.8972	39.58332572	-78.89739342	-98.43	-1.04	39.4613	-78.3468	39.4613	-78.3465	2851.02	352.03	3203.04	2828.34	2828.19	2941.94	113.75	162.004	261.11	No Data	No Data	No Data	No Data	No Data	No Data	
~~35~~		~~Appalachia Engineering Services~~	~~Licensed~~		~~Proposed~~	~~Lower 6 GHz~~	~~39.5833~~	~~-78.8974~~	~~39.58332572~~	~~-78.89739342~~	~~-7.35~~	~~-0.03~~	~~39.6816~~	~~-79.2621~~	~~39.6816~~	~~-79.2620~~	~~2841.17~~	~~120.01~~	~~2961.18~~	~~2828.34~~	~~2828.19~~	~~2908.14~~	~~79.95~~	~~162.004~~	~~53.04~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Licensed / Proposed Path
~~36~~		~~Appalachia Engineering Services~~	~~Proposed~~		~~Proposed~~	~~Lower 6 GHz~~	~~39.5833~~	~~-78.8974~~	~~39.58332572~~	~~-78.89739342~~	~~-7.35~~	~~-0.03~~	~~39.6816~~	~~-79.2621~~	~~39.6816~~	~~-79.2620~~	~~2841.17~~	~~120.01~~	~~2961.18~~	~~2828.34~~	~~2828.19~~	~~2908.14~~	~~79.95~~	~~162.004~~	~~53.04~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Proposed Path
~~37~~		~~Appalachia Engineering Services~~	~~Licensed~~		~~807002 - West Virginia~~	~~Upper 6 GHz~~	~~39.5833~~	~~-78.8974~~	~~39.58332572~~	~~-78.89739342~~	~~-7.35~~	~~-0.03~~	~~39.5833~~	~~-78.8974~~	~~39.4155~~	~~-78.3469~~	~~2841.17~~	~~120.01~~	~~2961.18~~	~~2828.34~~	~~2828.19~~	~~2906.66~~	~~78.47~~	~~162.004~~	~~54.52~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
~~38~~		~~Capital Communications of America~~	~~Licensed~~		~~1234276 (WQON614) - Virginia~~	~~Lower 6 GHz~~	~~39.5833~~	~~-78.8974~~	~~39.58332572~~	~~-78.89739342~~	~~-7.35~~	~~-0.03~~	~~39.5833~~	~~-78.8974~~	~~39.0347~~	~~-77.9282~~	~~2841.17~~	~~96.00~~	~~2937.17~~	~~2828.34~~	~~2828.19~~	~~2906.66~~	~~78.47~~	~~162.004~~	~~30.50~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
~~39~~		~~Capital Communications of America~~	~~Licensed~~		~~1234276 (WQON614) - Virginia~~	~~Lower 6 GHz~~	~~39.5833~~	~~-78.8974~~	~~39.58332572~~	~~-78.89739342~~	~~-7.35~~	~~-0.03~~	~~39.5833~~	~~-78.8974~~	~~39.0347~~	~~-77.9282~~	~~2841.17~~	~~96.00~~	~~2937.17~~	~~2828.34~~	~~2828.19~~	~~2906.66~~	~~78.47~~	~~162.004~~	~~30.50~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
46		Thought Transmissions, LLC	Expired	Out of Project Area - ?	ATC88320 - Virginia	Upper 6 GHz	39.5831	-78.8970	39.58332572	-78.89739342	-68.07	-2.56	39.4615	-78.3469	Proposed	Proposed	2828.05	170.01	2998.06	2828.34	2828.19	2941.94	113.75	162.004	56.12	No Data	No Data	No Data	No Data	No Data	No Data	License Expired
47	26	Thought Transmissions, LLC	Licensed	Out of Project Area - Active/Proposed	W41AO - Virginia	Upper 6 GHz	39.5831	-78.8970	39.58332572	-78.89739342	-68.07	-2.56	39.4517	-78.3464	39.4517	-78.3464	2828.05	85.99	2914.04	2828.34	2828.19	2918.57	90.38	162.004	-4.53	No Data	No Data	No Data	No Data	No Data	No Data	
48	27	Thought Transmissions, LLC	Licensed	In Project Area - Active/Proposed	Proposed	11 Ghz	39.5831	-78.8970	39.58332572	-78.89739342	-68.07	-2.56	39.5831	-78.8970	39.6816	-79.2620	2828.05	85.99	2914.04	2828.34	2828.19	2942.59	114.40	162.004	-28.55	No Data	No Data	No Data	No Data	No Data	No Data	Licensed / Proposed Path
Tower 12 - USCOC of Cumberland, Inc.																																
~~8~~		~~USCOC of Cumberland, Inc.~~	~~Decommissioned~~	~~Out of Project Area - Canceled~~	~~Cumberland~~	~~11 GHz~~	~~39.5844~~	~~-78.8966~~	~~39.58434309~~	~~-78.89661934~~	~~5.06~~	~~-0.07~~	~~39.6634~~	~~-78.7895~~	~~39.6631~~	~~-78.7897~~	~~2791.96~~	~~120.01~~	~~2911.97~~	~~2802.95~~	~~2802.56~~	~~2898.71~~	~~96.15~~	~~244.175~~	~~13.26~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	To Be Decomissioned Soon
~~9~~		~~USCOC of Cumberland, Inc.~~	~~Licensed~~	~~Out of Project Area - ?~~	~~Sideling Hill~~	~~Lower 6 GHz~~	~~39.5844~~	~~-78.8966~~	~~39.58434309~~	~~-78.89661934~~	~~5.06~~	~~-0.07~~	~~39.6868~~	~~-78.3017~~	~~39.6872~~	~~-78.3014~~	~~2791.96~~	~~170.01~~	~~2961.97~~	~~2802.95~~	~~2802.56~~	~~2932.66~~	~~130.10~~	~~244.175~~	~~29.31~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
10	6	USCOC of Cumberland, Inc.	Licensed	Out of Project Area - Active	Short Gap	Lower 6 GHz	39.5844	-78.8966	39.58434309	-78.89661934	5.06	-0.07	39.5193	-78.7948	39.5194	-78.7947	2803.45	75.00	2878.45	2802.95	2802.56	2879.57	77.00	244.175	-1.12	No Data	No Data	No Data	No Data	No Data	No Data	
~~11~~		~~USCOC of Cumberland, Inc.~~	~~Licensed~~	~~Out of Project Area - ?~~	~~Sideling Hill~~	~~Lower 6 GHz~~	~~39.5844~~	~~-78.8966~~	~~39.58434309~~	~~-78.89661934~~	~~5.06~~	~~-0.07~~	~~39.6868~~	~~-78.3017~~	~~39.6872~~	~~-78.3014~~	~~2791.96~~	~~100.00~~	~~2891.96~~	~~2802.95~~	~~2802.56~~	~~2874.51~~	~~71.95~~	~~244.175~~	~~17.45~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
12	7	USCOC of Cumberland, Inc.	Licensed	Out of Project Area - Active	Flintstone	Lower 6 GHz	39.5844	-78.8966	39.58434309	-78.89661934	5.06	-0.07	39.7072	-78.6275	39.7073	-78.6267	2803.45	50.00	2853.45	2802.95	2802.56	2853.74	51.18	244.175	-0.29	No Data	No Data	No Data	No Data	No Data	No Data	
~~13~~		~~USCOC of Cumberland, Inc.~~	~~Decommissioned~~	~~Out of Project Area - Canceled~~	~~Red House~~	~~Lower 6 GHz~~	~~39.5844~~	~~-78.8966~~	~~39.58434309~~	~~-78.89661934~~	~~5.06~~	~~-0.07~~	~~39.2946~~	~~-79.4252~~	~~39.2946~~	~~-79.4252~~	~~2791.96~~	~~189.99~~	~~2981.95~~	~~2802.95~~	~~2802.56~~	~~2989.10~~	~~186.53~~	~~244.175~~	~~-7.15~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	Decomissioned - Red House
~~24~~		~~USCOC of Cumberland, Inc.~~	~~Licensed~~	~~Out of Project Area - ?~~	~~Keyser~~	~~Lower 6 GHz~~	~~39.5844~~	~~-78.8966~~	~~39.58434309~~	~~-78.89661934~~	~~5.06~~	~~-0.07~~	~~39.6212~~	~~-78.6206~~	~~39.4163~~	~~-78.9555~~	~~2791.96~~	~~189.99~~	~~2981.95~~	~~2802.95~~	~~2802.56~~	~~2989.10~~	~~186.53~~	~~244.175~~	~~-7.15~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	~~No Data~~	
40	23	USCOC of Cumberland, Inc.	Licensed	Out of Project Area - Active	Allegheny Grove	11 Ghz	39.5844	-78.8966	39.58434309	-78.89661934	5.06	-0.07	39.6285	-78.8413	39.6284	-78.8414	2803.45	204.00	3007.45	2802.95	2802.56	3006.79	No Data	244.175	0.66	No Data	No Data	No Data	No Data	No Data	No Data	
41	24	USCOC of Cumberland, Inc.	Licensed	In Project Area - Active	Frostburg	11 GHz	39.5844	-78.8966	39.58434309	-78.89661934	5.06	-0.07	39.6387	-78.9120	39.6387	-78.9120	2803.45	125.56	2929.01	2802.95	2802.56	2931.70	129.13	244.175	-2.68	No Data	No Data	No Data	No Data	No Data	No Data	
49	28	USCOC of Cumberland, Inc.	Licensed	Out of Project Area - Active	Bowling Green	11 GHz	39.5844	-78.8966	39.58434309	-78.89661934	5.06	-0.07	39.5845	-78.8958	38.6106	-78.8999	2803.45	150.01	2953.46	2802.95	2802.56	2955.79	153.23	244.175	-2.33	No Data	No Data	No Data	No Data	No Data	No Data	
Tower 13 - R.C. Marker Company, Inc.																																
		None	None		None	No Data	No Data	No Data	39.58316362	-78.89701962	No Data	No Data	No Data	No Data	None	None	No Data	No Data	No Data	2830.58	None	None	None	196.041	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
Tower 14 - CCVI Western MD, LLC **TOWER REMOVED**																																
		None	None		None	No Data	No Data	No Data	39.57900026	-78.90003130	No Data	No Data	No Data	No Data	None	None	No Data	No Data	No Data	2828.30	None	None	None	120.415	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
Tower 14A - MIEMSS NEW TOWER																																
	31	Allegany County Government	Licensed	Out of Project Area - Active	HayStack	11 GHz	39.5789	-78.9003	39.57893900	-78.90026790	-8.14	-0.11	No Data	No Data	None	None	2821.66	100.07	2921.73	2822.00	2822.42	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
	36	State of Maryland, MIEMSS	Licensed	Out of Project Area - Active	Warrior Mountain	Lower 6 GHz	39.5789	-78.9003	39.57893900	-78.90026790	-8.14	-0.11	No Data	No Data	None	None	2821.66	299.88	3121.54	2822.00	2822.42	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
	37	State of Maryland, MIEMSS	Licensed	Out of Project Area - Active	Allegheny PSAP	Lower 6 GHz	39.5789	-78.9003	39.57893900	-78.90026790	-8.14	-0.11	No Data	No Data	None	None	2821.66	250.01	3071.67	2822.00	2822.42	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
	38	State of Maryland, MIEMSS	Licensed	Out of Project Area - Active	Allegheny PSAP	Lower 6 GHz	39.5789	-78.9003	39.57893900	-78.90026790	-8.14	-0.11	No Data	No Data	None	None	2821.66	250.01	3071.67	2822.00	2822.42	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
	39	State of Maryland, MIEMSS	Licensed	Out of Project Area - Active	Warrior Mountain	Lower 6 GHz	39.5789	-78.9003	39.57893900	-78.90026790	-8.14	-0.11	No Data	No Data	None	None	2821.66	299.88	3121.54	2822.00	2822.42	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
	40	State of Maryland, MIEMSS	Licensed	Out of Project Area - Active	Western Mary	Lower 6 GHz	39.5789	-78.9003	39.57893900	-78.90026790	-8.14	-0.11	No Data	No Data	None	None	2821.66	250.01	3071.67	2822.00	2822.42	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Tower Location Not Surveyed
Tower 15 - Two Way Radio Services, Inc. - New Dan's Tower (Receiving Tower)																																
108		New Dans Tower	Unlicensed - Point to Point	In Project Area - Active (See Note)	New Dans Tower - Frostburg	5.8 GHz	No Data	No Data	39.58137644	-78.89817396	No Data	No Data	No Data	No Data	39.6015	-78.8871	No Data	No Data	No Data	2710.00	2712.19	2935.55	85.55	223.360	No Data	2 x1 (Rectangle)	2714.83	2761.12	46.29	No Data	No Data	
116		Two Way Radio, Inc	Unlicensed - Mult-Point 60 Sector	Out of Project Area - ?	360 Degree Coverage (4 Customers)	5.8 GHz	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	39.6015	-78.8871	No Data	No Data	No Data	No Data	No Data	No Data	No Data	223.360	No Data	No Data	2714.83	2761.12	46.29	No Data	No Data	
Tower Not Found (Has been removed since 2008 Comsearch) - Additional Microwave Beam Paths																																
1		iSignal	Proposed		I-68 Exit 14	11 GHz	39.5831	-78.8972	39.58305556	-78.89722222	0.00	0.00	39.6816	-79.2621	39.6816	-79.2621	2828.05	139.11	2967.16	No Data	No Data	No Data	No Data		No Data	No Data	No Data	No Data	No Data	No Data	No Data	Proposed Path
25	17	WITF Inc.	Non-Operational		WROG STL	950 MHz	39.5828	-78.8972	39.58277778	-78.89722222	0.00	0.00	39.6436	-78.7344	N/A	N/A	2837.89	0.00	N/A	N/A	N/A	N/A	N/A		N/A	No Data	No Data	No Data	No Data	No Data	No Data	Non-Operational Path - No Towers

Notes:

(7) & (8) - Latitude and Longitude Coordinates Derived from Allegany County 2006 High Resolution Panels
(9) - Diffeference of ComSearch Latitude Data and Survey Latitude Data Converted to Feet
(10) - Diffeference of ComSearch Longitude Data and Survey Longitude Data Converted to Feet
(13) & (14) - Tower Location through Visual Inspection by CME Engineering Representative from Google Earth
(15) - ComSearch Ground Elevation Converted from Meters to Feet
(16) - ComSearch Antenna Height Converted from Meters to Feet
(18) - Ground Elevation Interpolated using Rise/Run Method - Allegany County 2008 Topography
(19) - Averaged from Survey Data Located Around the Permeter of the Tower Fencing (Survey Dates: Aug. 1, 2013 and Aug. 2, 2013)
(20) - Surveyed Antenna Heights using VRS and Reflectorless Equipment on August 28, 2013
(22) - Difference Between ComSearch Data and CME Surveyed Data
(23) - Frequencies per Comsearch (Licensed Paths) and Tower Owner/Leasee (Unlicensed Paths)
(24) - Surveyed Antenna Size using VRS and Reflectorless Equipment on December 18, 2013
(25) - Surveyed Ground Elevation using VRS and Reflectorless Equipment on December 18, 2013
(26) - Surveyed Antenna Heights using VRS and Reflectorless Equipment on December 18, 2013
(28) - Difference Between Surveyed Antenna Elevation at Dan's Mountain Tower and Surveyed Antenna Elevation at Receiving Tower
(29) - Surveyed Antenna Size using VRS and Reflectorless Equipment on December 18, 2013
(30) - Surveyed Structure height to top of highest point on structure using VRS and Reflectorless equipment on April 14, 2015

Appendix C. MSW Television and Radio Study

A Report for

Broadcast Wind, LLC

Regarding

Analysis of Predicted Impairment to Television and FM Broadcast Reception from Construction of a Wind Farm at Dan's Mountain (Frostburg, MD)

March 28, 2023

Prepared By:

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Introduction

Laurel Renewable Partners has proposed to construct a wind farm on Dan's Mountain near Frostburg, MD. Prior to construction Laurel Renewable Partners has contracted with Broadcast Wind, LLC to perform, among other things a study to assess any potential impairment as a result of the proposed wind farm on television and FM broadcast reception in the vicinity.

Subsequently the firm of Meintel, Sgrignoli, & Wallace, LLC (MSW), a Broadcast Engineering consulting firm, was retained by Broadcast Wind, LLC to conduct a computer study to assess any potential predicted impairment due to the proposed wind farm on television and FM broadcast reception in the immediate area surrounding the proposed wind farm location. The study was to assess which television stations would potentially be affected as well as assess the potential impairment on FM broadcast stations located near the proposed site of the wind farm.

Study Methodology

The television stations included in the study were determined based on whether the stations' predicted FCC protected service contours encompassed the proposed wind farm location. After making a determination of the potentially affected television stations, before construction and after construction studies were performed and the results were compared to assess any predicted service impairments. The studies were conducted using computer software based on that used by the FCC (FCC OET-69) to assess coverage and interference of proposed television broadcast station facilities. In the after construction study the individual wind turbines were modeled as additional path obstructions. Each individual turbine site was given a footprint approximately equal to its blade diameter and the proposed height. These obstructions were then added to the terrain site elevation for the area encompassed by the turbine footprint.

The OET-69 analysis software divides the area within a station's protected contour into a matrix of square grid cells (in this case the cell size was 0.5 km on a side) and then uses the Longley-Rice propagation model to predict the field strength at each individual cell. The output of these studies was then analyzed to determine which cells (if any) showed a reduction in the predicted field strength, due to the wind farm, that would create a potential for unreliable service. It should be noted that the post wind farm construction analyses only considered cells that were predicted in the pre-construction analyses to be above the defined service threshold for the specific station. These results are provided in the form of KML files that can be imported into Google Earth to depict the potentially affected areas. When displayed the KML file will show each individual grid cell where the predicted service degradation met the criteria to be considered significant enough to make service unreliable.

The studies of the FM stations were conducted in the same manner as the television analyses with appropriate changes to the analysis parameters to account for the difference in the service planning factors between the television and FM broadcast services. In this case the results were also provided as KML files depicting the areas of potential impact.

For both the television and FM analyses two sets of KML files were provided. One set shows the areas where the post wind farm construction predicted field strength of the broadcast station was reduced to a level below the defined service threshold. The second set depicts the areas where the predicted field strength was reduced by 15 dB or more but remained above the service threshold. The purpose of the two sets of KML files is to show a potential worst-case scenario where the field strength is reduced below the service threshold and then a secondary set of locations where the impact may or may not be noticeable as the field strength remains above the threshold for service.

As discussed above, for these studies each wind turbine is modeled as a solid terrain obstruction with a height above ground level equal to the maximum extent of the blade above the support structure. In addition, the turbine is given a footprint equal to plus or minus 2 arc seconds in all directions from the site location. The height determined here is added to the ground elevation retrieved from the terrain elevation data base when a path profile point is located within the footprint of a turbine. This methodology is intended to present a worst-case path loss scenario when predicting field strength.

Below are wind farm parameters used for the analysis discussed in this report.

Dans Mountain Proposed Wind Turbines - February 25, 2023

Site Locations

Turbine ID	LAT – N	LON W
WTG- 01	39.618173	78.874295
WTG- 02	39.615775	78.879492
WTG- 03	39.612764	78.885369
WTG- 04	39.600463	78.896277
WTG- 05	39.595475	78.900825
WTG- 06	39.597641	78.886969
WTG- 07	39.592718	78.890449
WTG- 08	39.588177	78.895018
WTG- 09	39.584258	78.901149

Support Structure Height	117 m
Turbine Blade Diameter	158 m

Study Results

Using the methodology discussed above it was determined that there are eight potentially impaired television stations as listed below.

Television Stations with Predicted Service Contours that Encompass the Proposed Dan's Mountain Wind Farm

Call Sign	Channel	City	State
WWCP-TV	8	Johnstown	PA
W41DK-D	16	Keyser	WV
W21DZ-D	21	Romney	WV
WDVM	23	Hagerstown	MD
WGPT	26	Oakland	MD
WWPB	29	Hagerstown	MD
WNPB-TV	34	Morgantown	WV
WJAC-TV	35	Johnstown	PA

The above listed eight stations were analyzed according to the methodology previously discussed and it was determined that all showed some potential impairment, but in all cases the impact was minor. The predicted impairment to five (W21DZ-D, W41DK-D, WJAC, WNPB and WWPC) of the eight stations was to areas with no population. The station with the most significant predicted impairment was WGPT with 31 potentially impacted cells, but those cells contained a total population of only 172.

The FM stations with contours that encompass the wind farm, and included in the analysis are listed below.

FM Stations with Predicted Service Contours that Encompass the Proposed Dan's Mountain Wind Farm

Call Sign	Channel	City	State
WLVV	202	Midland	MD
WFWM	220	Frostburg	MD
WQZK-FM	231	Keyser	WV
WLIC	246	Frostburg	MD
WDZN	258	Midland	MD
WVMD	261	Romney	WV
WDYK	263	Ridgeley	WV
WWPN	266	Westernport	MD
W278BL	278	Cumberland	MD
WFRB-FM	287	Frostburg	MD
W289BR	289	Cumberland	MD
WRQE	291	Cumberland	MD
W294CF	294	Frostburg	MD
WCBC-FM	296	Keyser	WV

Of the fourteen FM stations studied eleven showed some level of predicted potential impairment from the construction of the proposed wind farm. The stations that showed no potential reception impairment were WCBC-FM, WDZN and WQZK-FM. Unlike the television stations several of the FM stations have a significant number of points where there is potential for degradation, most of which is due to the close proximity to the proposed wind farm.

On the following page is a tabulation for both television and FM showing the number of cells and total population within those cells that have been predicted to potentially have degraded service. The results have been broken down into the two categories discussed above. The Table on the left side provides the details for the locations where the predicted post construction field strength of the station has been reduced below the defined service threshold. While the table on the right details the locations where the predicted post construction field strength of the station has been reduced by 15db or more but not below the defined service threshold.

Dans Mountain Wind Farm Predicted Impact on Television and FM Broadcast Reception								
Field Strength Reduced Below Threshold					**Field Strength Reduced by > 15 dB**			
					Remains Above Threshold			
Call Sign	**Service**	**Grid Cells**	**Total Popluation**		**Call Sign**	**Service**	**Grid Cells**	**Total Popluation**
		Impacted	**Impacted**				**Impacted**	**Impacted**
W21DZ-D	DTV	8	0		W21DZ-D	DTV	4	0
W42DK-D	DTV	7	0		W42DK-D	DTV	0	0
WDVM	DTV	23	38		WDVM	DTV	7	0
WGPT	DTV	31	172		WGPT	DTV	0	0
WJAC	DTV	2	0		WJAC	DTV	0	0
WNPB	DTV	1	0		WNPB	DTV	0	0
WWCP	DTV	1	0		WWCP	DTV	0	0
WWPB	DTV	15	5		WWPB	DTV	4	0
W278BL	FM	92	9,087		W278BL	FM	1	0
W289BR	FM	303	11,790		W289BR	FM	5	0
W294CF	FM	276	11,500		W294CF	FM	4	0
WCBC-FM	FM	0	0		WCBC-FM	FM	0	0
WDYK	FM	20	179		WDYK	FM	0	0
WDZN	FM	0	0		WDZN	FM	0	0
WFRB-FM	FM	196	1,403		WFRB-FM	FM	55	89
WFWM	FM	1,649	9,885		WFWM	FM	194	2,278
WLIC	FM	483	3,595		WLIC	FM	11	231
WLVV	FM	725	5,319		WLVV	FM	84	1
WQZK-FM	FM	0	0		WQZK-FM	FM	0	0
WRQE	FM	3,610	23,958		WRQE	FM	450	11,548
WVMD	FM	3	0		WVMD	FM	0	0
WWPN	FM	2	0		WWPN	FM	0	0

.

Conclusions

Based on the analyses described above there is predicted service degradation to eight television stations as well as the eleven FM stations that are located adjacent to the proposed Dan's Mountain wind farm. It is noted that these predictions are based on the methodology discussed above and are intended to show areas most likely to be affected by the construction of the proposed wind farm. The locations shown to have predicted impairment are sites where the television and FM broadcast stations are predicted to have reliable existing service but where when considering the wind farm the predicted field strength is predicted fall to a level where service would no longer be reliable. These predictions are based on computer modeling and real-world factors may cause different results; however, it is expected that impairments will be caused and in particular to those stations where a significant area is predicted to be affected. It is once again reiterated, that the study results only concern the areas of predicted potential impairment and no determination was made if the predicted impairment would be considered material to consumer reception.

It is further noted that the television portion of this study was based on predicted service using the FCC planning factors for individual viewing locations. It did not consider cable system receive sites that might have high gain antennas on tall towers. Such locations may not have reliable predicted service using the normal FCC planning factors but do have service due to the superior receive antenna installation and therefore may potentially not be impaired.

This report prepared and submitted this 28th Day of March 2023 by:

William R. Meintel
Senior Partner
Meintel, Sgrignoli & Wallace

Appendix D. GE Turbine Specifications

GE Renewable Energy

- Original Document -

Technical Documentation Wind Turbine Generator Systems Cypress 158 - 50/60Hz

WT General Description

Rev. 10 - Doc-0075288 - EN 2022-06-03

Attachments to this pdf can be found by clicking the paper clip icon ( ) commonly found on the left-hand side when using Adobe Acrobat.

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GE Renewable Energy

- Original Document -

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Table of Contents

Document Revision Table

Rev.	Date (YYYY/MM/DD)	Affected Pages	Change Description
08	2021/11/19	14	MODIFIED section 2.2 UPDATED Table 5 CHANGED values for B1, D1, D4 and new on the list B3 and B4 UPDATED table chapter 3 table 1 UPDATED CW Temperature range chapter 3.1 table 3
09	2022/03/15	5	ADDED new HH for Japan
		8	ADDED Japan specific lightning protection details
		11, 12	ADDED new HH for Japan in table 3 and table 4
10	2022/06/03	4	ADDED Acronym table
		5	RENAMED section 1
		9	ADDED Nacelle Crane and Rescue Equipment information
		5, 7, 10	UPDATED wordings of section 2, 2.3, 3
		5, 10, 11	ADDED 6.3 configuration
		14	ADDED Reference section

Acronyms and Definitions

Acronym	Definition
SCADA	Supervisory Control and Data Acquisition
LNTE	Low Noise Trailing Edge
CHT	Concrete Hybrid Tower
LEP	Leading Edge Protection
TFB	Tower Flange Bolts
STW	Standard Weather
CW	Cold Weather
HSS	High Speed Shaft
NDE	Non-Drive End
HPU	Hydraulic Power Unit
WTGS	Wind Turbine Generator System

1 Purpose of the Document

The purpose of this document is to summarize the general descriptions and specifications of the Cypress wind turbine and its primary components.

2 General Description of the Wind Turbine and Major Components

Cypress is a three-bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 158 meters. The turbine rotor and machine head are mounted on top of:

- a tubular steel tower with a hub height of 96 m
- a tubular steel tower with a hub height of 101 m (config supports up to 6.1)
- a tubular steel tower with a hub height of 100.4 m (for Japan market only)
- a tubular steel tower with a hub height of 107.4 m
- a tubular steel tower with a hub height of 117 m (config supports up to 6.1)
- a tubular steel tower with a hub height of 120.9 m (config supports up to 6.3)
- a tubular steel tower with a hub height of 125.4 m (config supports up to 6.1)
- a tubular steel tower with a hub height of 141 m
- a concrete hybrid tower with a hub height of 150 m
- a tubular steel tower with a hub height of 151 m
- a concrete hybrid tower with a hub height of 161 m (config supports up to 6.3)

The Cypress wind turbine employs active yaw control (designed to steer the wind turbine with respect to the wind direction), active blade pitch control (to control turbine rotor speed) and a variable speed generator with a power electronic converter system.

The Cypress wind turbine features a modular drivetrain design where the primary drivetrain components, including main shaft bearing, gearbox, generator and yaw drives, are attached to a bedplate.

2.1 Rotor

Rotor speed is regulated by a combination of blade pitch angle adjustment and generator/converter torque control. The rotor spins in a clockwise direction under normal operating conditions when viewed from an upwind location.

Full blade pitch angle range is approximately 90 degrees, with the zero-degree position being with the blade flat to the prevailing wind. Pitching the blades to a full feather pitch angle of approximately 90 degrees accomplishes aerodynamic braking of the rotor, thus reduces the rotor speed.

2.2 Blades

There are three logistics optimized rotor blades used on the Cypress wind turbines. Optionally, the blades can have Leading Edge Protection (LEP).

In order to optimize noise emissions, the rotor blades are attached with Low-Noise-Trailing-Edges (LNTEs) at the pressure side of the blade's rear edge. LNTEs are thin jagged plastic strips. The rotor blades of the Cypress wind turbines are attached with these strips at the factory.

Figure 1: LNTEs at the wind turbine rotor blade

Blade Split

For easy transportation of blade, GE developed a solution with a split blade which has transportation requirements comparable to 137 m rotor product. The two parts of the blade are connected with a mechanical connection which has been extensively tested. The blade is also available in one piece; for turbines with the Ice Mitigation System, it is always one piece.

2.3 Blade Pitch Control System

The rotor uses a pitch system for adjustment of the blade pitch angle during operation.

The active pitch controller enables the wind turbine rotor to control speed. When above rated wind speed, the blade will rotate, or feather, the blade to “spill” aerodynamic lift and slow the rotor. When below rated wind speed, energy from wind gusts is captured as the rotor speeds up.

Independent back up is provided to feather the blades and shut down the wind turbine in the event of a grid line outage or other fault.

2.4 Hub

The hub is used to connect the three rotor blades to the turbine main shaft. The hub also houses the blade pitch system and is mounted directly to the main shaft. To carry out maintenance work, the hub can be entered through one of three hatches at the area nearer to the nacelle roof.

2.5 Gearbox

The gearbox in the wind turbine is designed to transmit torsional power between the low-rpm turbine rotor and high-rpm electric generator. The gearbox is a multi-stage planetary/helical design. The gearbox is mounted to the wind turbine bedplate. The gearbox mounting is designed to decrease vibration and noise transfer to the bedplate. The gearbox is lubricated by a forced, cooled lubrication system and a filter assist to maintain oil cleanliness.

2.6 Bearings

The blade pitch bearing is designed to allow the blade to pitch about a span-wise pitch axis. The inner race of the blade pitch bearing is outfitted with a blade drive gear that enables the blade to pitch.

The spherical roller main bearing supports and aligns the main shaft to the main gearbox and is absorbing radial and axial loads from the rotor.

2.7 Brake System

The blade pitch system acts as the primary braking system for the wind turbine. Braking under usual operating conditions is accomplished by feathering the blades out of the wind. Only two feathered rotor blades are required to slower the rotor safely into idling mode, and each rotor blade has its own backup to move the blade in the event of a grid line loss.

2.8 Generator

The generator is a doubly fed induction generator. It is mounted to the generator frame with a mounting designed to decrease vibration and noise transfer to machine.

2.9 Gearbox/Generator Coupling

For protection of the drive train from excessive torque loads, a special coupling with a torque-limiting device is provided between the generator and gearbox output shaft.

2.10 Yaw System

A bearing positioned between the machine head and tower facilitates yaw motion. Yaw drives mesh with the gear of the yaw bearing and steer the wind turbine to monitor the wind in yaw. The yaw drive system contains an automatic yaw brake. This brake engages when the yaw drive is not operating and prevents the yaw drives from being loaded due to turbulent wind conditions.

The controller activates the yaw drives to align the nacelle to the wind direction based on the wind vane sensor mounted on the top of the nacelle.

The wind turbine records machine head yaw position following excessive rotation in one direction, the controller automatically brings the rotor to a complete stop, untwists the internal cables, and restarts the wind turbine.

2.11 Tower

The wind turbine is mounted on top of a tubular steel tower (or a hybrid tower). Access to the turbine is through a door at the base of the tower. Internal service platforms and interior lighting is included. A ladder provides access to the nacelle and also supports a fall arrest safety system.

Optional climb assist or service lifts are available on request.

2.12 Nacelle

The nacelle houses the primary components of the wind turbine generator. Access from the tower into the nacelle is through the bottom of the nacelle. The nacelle is ventilated and illuminated by electric lights. A hatch provides access to the blades and hub. The nacelle enclosure floor is designed to collect liquids (e.g., oil, grease) in cases of leakage with a safety factor of 1.5. Such function has been proven by a test.

2.13 Wind Sensor and Lightning Rod

An ultrasonic wind sensor and lightning rod are mounted on top of the nacelle housing. Access is accomplished through the hatch in the nacelle.

2.14 Lightning Protection (according to IEC 61400-24 Level I)

The rotor blades have the lightning receptors mounted in the blade. The turbine is grounded and shielded to protect against lightning; however, lightning is an unpredictable force of nature, and it is possible that a lightning strike could damage different components notwithstanding the lightning protection used in the wind turbine.

Cypress Japan configurations (50Hz & 60Hz) have higher lightning protection in line with 'winter lightning' as per IEC 61400-24. Please refer to the latest revised edition of Japan specific Lightning protection document for details (Lightning_Protection_Cypress-xxHz_Japan_158m_EN_Doc-0088782).

2.15 Wind Turbine Control System

The wind turbine can be controlled locally. Control signals can also be sent from a remote computer through a Supervisory Control and Data Acquisition System (SCADA), with local lockout function given at the turbine controller.

Service switches at the tower top prevent service personnel at the bottom of the tower from operating specified systems of the turbine while service personnel are in the nacelle. To override any wind turbine operation, emergency-stop buttons located in the tower base and in the nacelle can be activated to stop the turbine in the event of an emergency.

2.16 Power Converter

The wind turbine uses a power converter system that consists of a converter on the rotor side, a DC intermediate circuit, and a power inverter on the grid side.

The converter system consists of a power module and the related electrical equipment.

2.17 Transformer and Medium Voltage Switch Gear

Transformer

The three winding transformer is located at the rear of the nacelle. The transformer is a dry type transformer supporting medium voltage range of 10 - 35 kV range. The transformer is fully separated from the remaining machine head. The transformer is in GE scope, a pad mounted variant is not available.

Medium Voltage Switchgear

The medium voltage switchgear is mounted in the tower entry area.

2.18 Rescue Equipment

The machine head is equipped with rescue equipment as standard to enable the evacuation of up to two persons simultaneously from the machine head. The rescue equipment is designed and installed in accordance with the local regulations of the country of installation.

2.19 Nacelle Crane

The design of the crane is to allow for permanently mounted onboard style crane at the center of the machine head near the top panel as a permanent crane parking position. There are three other defined positions inside the machine head for crane usage to lift/lower the loads.

3 Technical Data for the Cypress Wind Turbines

Turbine	**4.2/4.5/4.8/5.0/5.2/5.3/5.5/5.8/6.1/6.3 - 158**
Rated output [MW]	4.2/4.5/4.8/5.0/5.2/5.3/5.5/5.8/6.1/6.3
Rotor diameter [m]	158
Number of blades	3
Swept area [m²]	19607
Rotational direction (viewed from an upwind location)	Clockwise
Maximum speed of the blade tips [m/s]	50Hz - 82.0 m/s 60Hz - 83.6 m/s
Orientation	Upwind
Speed regulation	Pitch control
Aerodynamic brake	Full feathering
Color of outer components	RAL 7035 (light grey) and RAL 7023 (concrete grey, for concrete sections of hybrid tower only)
Reflection degree/Gloss degree Steel tower	30 - 60 gloss units measured at 60° as per ISO 2813
Reflection degree/Gloss degree Rotor blades, Nacelle, Hub	60 - 80 gloss units measured at 60° as per ISO 2813
Reflection degree/Gloss degree Hybrid Tower	Concrete gray (similar RAL 7023); gloss matte

Table 1: Technical data Cypress-158 wind turbine

Atmospheric corrosion protection (corrosion categories as defined by ISO 12944 2:2017)	
Tower Shell Coating internal/external	C-2/C-3 (standard)/ C-4/C-5 (enhanced)
Tower Flange Bolts (TFB) internal/external	C-4/C-4 (standard) / C-4/C-4 (enhanced)
Tower Mechanical Fasteners and internals internal/external	C-3/C-3 (standard) / C-3/C-5 (enhanced)
Hub internal/external	C-5/C-5
Nacelle & Hub Fasteners internal/external	C-3/C-5
Automatic Lubrication System, Yaw Drive Bolts internal	C-3
Pitch Motor, Pitch Gearbox internal	C-4
Main Shaft, Pillow Block, Gearbox internal	C-4
Bedplate, Generator Frame internal	C-5

Table 2: Atmospheric corrosion protection

3.1 Operational Limits

Turbine	**4.2/4.5/4.8/5.0/5.2/5.3/5.5/5.8/6.1/6.3 - 158**
Hub height	96 m tubular steel tower (only 50Hz) 100.4 m tubular steel tower (50/60Hz) (Japan market only) 101 m tubular steel tower (50/60Hz) 107.4 m tubular steel tower (only 60Hz) 117 m tubular steel tower (only 60Hz) 120.9 m tubular steel tower (only 50Hz) 125.4 m tubular steel (only 60Hz) 141 m tubular steel tower (only 50Hz) 150 m hybrid tower (only 50Hz) 151 tubular steel tower (only 50Hz) 161 m hybrid tower (only 50Hz)
Wind turbine design standard	* IEC 61400-1, Ed. 3 ** DIBt 2012
Height above sea level	Maximum 1000 m with the maximum standard operational temperature of up to +40 °C. Above 1000 m, the maximum operational temperature is reduced per DIN IEC 60034 1 (e.g., maximum operational temperature reduced up to +30 °C at 2000 m). For installations above 1000 m isolation distances of medium voltage terminals must also be re-evaluated. De-rated operation additionally driven by ambient temperature, power rating or specific grid requirements and conditions may occur. Details on these can be found in Hot Weather High Altitude and the Grid Interconnection documentation.
Standard Weather Option (STW)	Operation from -15 °C up to +40 °C. De-rated operation driven by ambient temperature, power rating or specific grid requirements and conditions may occur. Details on these can be found in Hot Weather High Altitude and Grid Interconnection documentation. Survival temperature of -20 °C to +50 °C without the grid. Survival means turbine not in operation including the heat transfer system due to lack of energy supply by the grid.
Cold Weather Option (CW)	Operation from -30 °C up to +40 °C. De-rated operation driven by ambient temperature, power rating or specific grid requirements and conditions may occur. Details on these can be found in Cold Weather Options, Hot Weather High Altitiude and Grid Interconnection documentation. Survive extreme temperature of -40 °C to +50 °C without the grid. Survive means: turbine not in operation including the heat transfer system due to lack of energy supply by the grid.
Wind class	IEC S + WZ (S)

Table 3: Operational limits

3.2 Cypress Overview Drawing and Dimensions

This chapter presents an overview of the relevant dimensions for the wind energy turbine with 158 m rotor diameter.

The table shown below fits to the GE drawing 450W1333.

Description		Dimension for hub height in [m]										
		96 m (tubular steel tower)	100.4 m (tubular steel tower-Japan only)	101 m (tubular steel tower)	107.4 m (tubular steel tower 60Hz only)	117m (tubular steel tower 60Hz only)	120.9 m (tubular steel tower)	125.4 m (tubular steel tower 60Hz only)	141 m (tubular steel tower)	150 m (hybrid tower)	151 m (tubular steel tower)	161 m (hybrid tower)
Hub height [m]	A2	96	100.4	101	107.4	117	120.9	125.4	141	150	151	161
Total height [m]	A3	175	179.4	180	186.4	196	199.9	204.4	220	229	230	240
Height upper daylight identification (Only when required) [m]	A4	-	-	60	60	-	60	60	60	60	-	60
Height lower daylight identification (Only when required) [m]	A5	-	-	40	40	-	40	40	40	40	-	40
Top of soil to top of foundation EU [m]	A6	1.3	-	1.3		-	1.3			1.51		1.31
Top of soil to top of foundation Australia [m]	A6	0.2	-	0.2		-	0.2			-		-
Top of soil to top of foundation Australia & North America [m]	A6	0.745	-	0.745	0.745	0.745	-	0.745	-	-		-
Top of soil to top of foundation Japan [m]			*									
Height aviation light [m]	A7	100 ∓1	104 ∓1	105 ∓1	111.7 ∓1	-	125 ∓1	129 ∓1	145 ∓1	154 ∓1		165 ∓1
Foundation diameter [m]	B2	22	*	22	20-25	20-25	25.8	20-25	25.8	23.5 and 25		23.5 and 25
Distance aviation lights (only when required) [m]	C1		NA	52.5 ∓4	52.5 ∓4	-	62.5 ∓4	62.5 ∓4	72.5 ∓4	77 ∓4		82.5 ∓4
Tower bottom diameter [m]	C7	4.3	4.8	4.3	4.3	4.56	4.3	4.3	5	7.9	5.3	8.5

Table 4: Cypress Dimension Overview

* Depends on customer specific foundation design

General information for all hub heights		
Description	**Parameter**	**Dimension**
Rotor diameter	A1	158 m
Longest chord	A8	4.0 m
Chord at 90% rotor radius	A9	1.35 m
Aviation light spacing on machine head	B1	~ 4.4 m
Blade tip distance in ideal position	C2	9.55 m
Blade tip distance in operation position	C3	5.55 m
Blade tip distance in ideal position	C4	20.48 m
Blade tip distance in operation position	C5	16.53 m
Tower top diameter	C6	3.7 m
Nacelle length (incl. ventilation outlets)	D1	~ 12.8 m (~ 13.2 m)
Distance from Yaw Bearing to Centre line crossing	D2	1.38 m
Aviation marking stripe width	D3	2 m
Nacelle height	D4	~ 3.8 m
Distance tower center - hub center	D5	4.17 m
Overhang	D6	4.18 m
Distance tower top - hub center	D7	1.92 m
Tilt drivetrain	D8	4°
cone angle	D9	85°
Eccentricity area in idle	B3	20314,95 m^2
Eccentricity area in operation	B4	19989,58 m^2

Table 5: General information for all hub heights

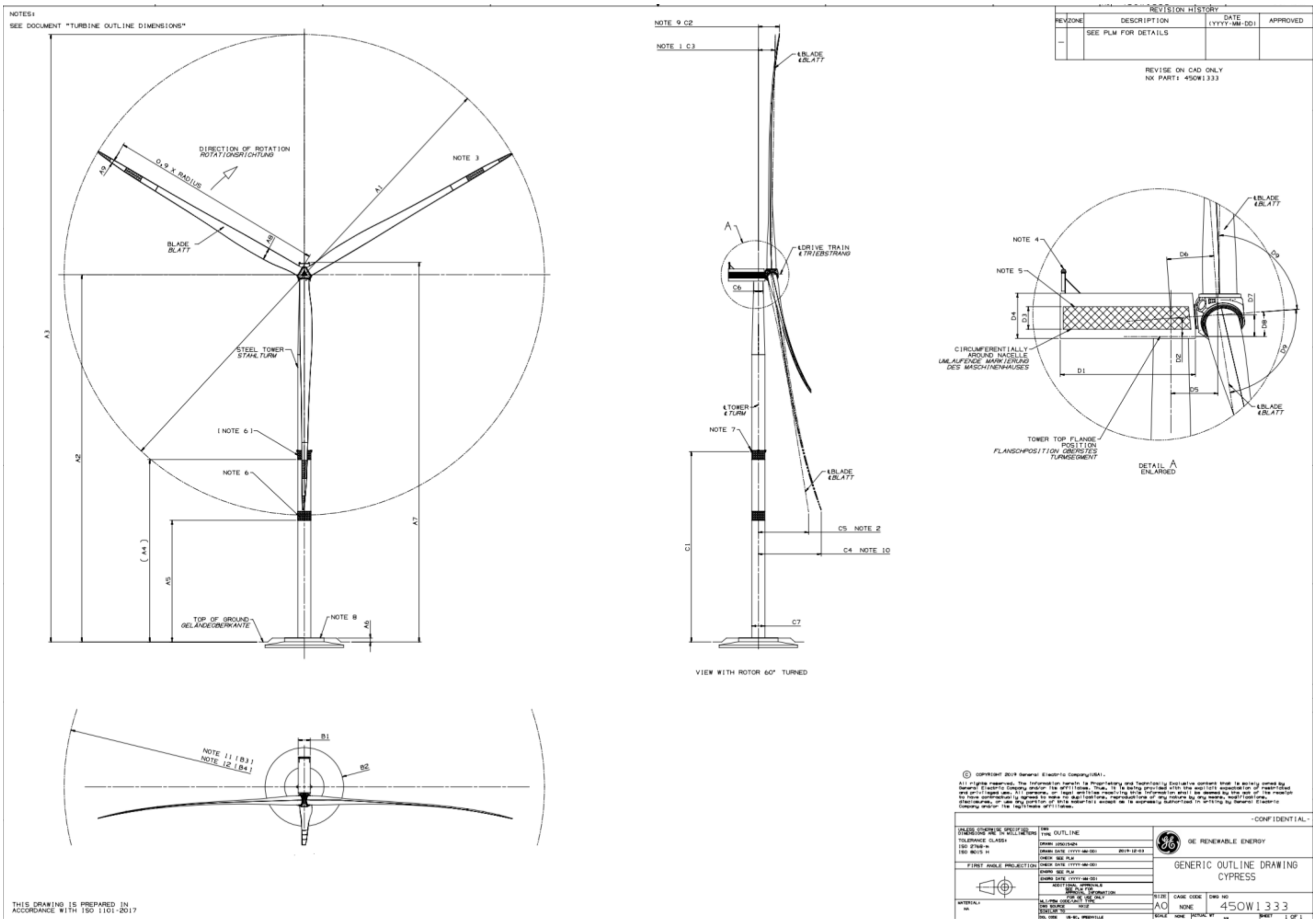

Figure 2: Generic outline drawing Cypress 450W1333

NOTE: Generic outline drawing 450W1333 is attached to this file as a separate document.

4 References

1. IEC 61400-1: Wind turbines Part 1: Design requirements
2. DIBt 2012: Fluid & Energy Engineering
3. IEC 60034 1: Rotating electrical machines – Part 1: Rating and performance
4. ISO 12944 2:2017: Paints and varnishes - Part 2: Corrosion protection of steel structures by protective paint systems - Classification of environments
5. ISO 2813: Paints and varnishes — Determination of gloss value at 20°, 60° and 85°
6. IEC 61400-24: Wind energy generation systems - Part 24: Lightning protection

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h) Biographies of Key Contributors

Robert Miller is the founder and president of Broadcast Wind LLC. He has worked in the broadcast and communications industries for over 30 years. His career includes management positions within GE American Communications, NBC Finance, NBC Network Operations, CNBC, MSNBC, and the NBC Television Stations Division. His professional roles have included corporate finance, operations management, project management, and business development.

In 2010, Robert founded Broadcast Wind, LLC, a company specializing in Wind Energy, RF, and Electrical Engineering. The company is dedicated to the responsible facilitation of renewable energy within RF environments and to the establishment of standards and practices needed to assure the non-interference of wind turbines with RF signals.

Robert has a Bachelor of Science degree in Accounting from Pennsylvania State University and an MBA from Rider University.

Dr. Frank Marlowe is vice president of engineering at Broadcast Wind LLC. Dr. Marlowe has led major initiatives in the development of television broadcasting, digital signal processing, cable television, satellite broadcasting, semiconductor design, and microwaves at Sarnoff Labs in Princeton NJ. He has also conducted research in Liquid crystals, flat panel displays, television, computer memories, and digital integrated circuits. Dr. Marlowe holds 15 US patents issued in television, computers, and related fields. He has a Ph.D. in Electrical Engineering from Rutgers University and an MSEE from Princeton University.

Bill Meintel is an Electrical Engineer with more than 40 years of experience in the communications field. Bill's first position was as a field engineer for the United States Federal Communications Commission (FCC) and later in the FCC Media Bureau's Policy and Rules Division. There, Bill directed the development of major spectrum utilization modeling projects as well as representing the United States at major international broadcasting conferences. Since entering private practice in 1989, he has been heavily involved in broadcast technical consulting, computer modeling, and spectrum planning. He has been extensively involved in spectrum planning for Digital Television in the US and internationally as a consultant to both government and industry.

Bill is President of the IEEE Broadcast Technology Society, a member of the Engineering Honor Society Tau Beta Pi, and senior partner in the consulting firm of Meintel, Sgrignoli, and Wallace.

Dennis Wallace, C.B.T.E. has an extensive background in Digital Television Systems. Dennis managed all the Laboratory RF Testing of the Grand Alliance ATSC HDTV System, having served as the RF Systems Engineer at the Advanced Television Test Center (ATTC). He managed test plans, configurations, and operations for Grand Alliance Testing and several Data-casting Systems. Prior to joining ATTC, Dennis held positions in Field Operations Engineering, Applications Engineering, and was Product Manager for two Television transmitter manufacturers.

In July 1997, Dennis founded Wallace & Associates a broadcast engineering and consulting firm specializing in Digital Television, RF Propagation Measurements, Spectrum Policy issues, and Technical Consulting. His clients include major broadcast groups, The DTV Station Project, ATTC, Trade Associations, and both Professional and Consumer Electronics Manufacturers.

Dennis has authored several papers on the topics of Digital Television transmission and results of testing of the DTV systems, which have been published in the IEEE Transactions and other publications. Dennis has been a presenter at the IEEE Broadcast Technology Symposium, NAB, and several SBE Conferences, as well as providing DTV presentations for SCTE and IEEE Chapters. In 1999, Mr. Wallace was awarded the prestigious Matti S. Siukola award by the IEEE Broadcast Technology Society.

Mr. Wallace is a Certified Broadcast Television Engineer by the Society of Broadcast Engineers. He is also a member of the IEEE Broadcast Technology Society, SMPTE, an Associate member of the Federal Communications Bar Association, and is active on several industry standards committees and the ATSC.

Dennis Jimeno has over 20 years of experience in wireless communications, having worked on several engineering projects including the design, testing, and/or optimization of mobile cellular, point-to-multipoint, microwave, and air surveillance networks both domestically and abroad. His responsibilities included meeting project milestones, generating status reports, and providing technical training to engineers in the local market.

As part of his present role as a telecommunications Engineer with Comsearch, Mr. Jimeno provides technical guidance to the Wind Energy Services Group as they perform interference and obstruction studies for proposed wind farm projects nationwide. He has reviewed and approved multiple impact assessments of wind energy facilities with respect to a variety of communication systems including microwave, radar, TV broadcast, AM/FM radio, and land mobile & emergency services.

Mr. Jimeno earned his B.S. degree in Electrical Engineering from Virginia Tech in Blacksburg, VA. He also holds an M.S. degree in Electrical Engineering from George Washington University in Washington, DC and his area of concentration was on wireless and mobile communications.

Stephen Lockwood is an electrical engineer with more than 30 years of experience in the field of telecommunications engineering. He specializes in the development of systems design and specifications, preparing interference analysis and documentation, conducting antenna and radio propagation analysis, inspecting telecommunications facilities, and the construction of radio facilities.

His background includes extensive project management in the design and construction of communications facilities from low frequencies to microwave frequencies. His expertise also includes the creation of environmental impact studies detailing radio frequency exposure issues, radio frequency interference, intermodulation testing, Non-Ionizing Electromagnetic Radiation (NIER) modeling and testing, analysis of human exposure to electromagnetic fields, and the specification of ground systems for transmitter sites.

Work has been performed for clients ranging from various private and public commercial ventures to all levels of government, from cities to the federal governments. Mr. Lockwood conducts safety audits and training for major utilities around the world and has provided expert testimony in land use hearings and lawsuits involving telecommunications engineering.

Education:
BS, Engineering Physics (1988) - Oklahoma Christian Univ. of Science & Arts
BS, Electrical Engineering (1989) - Oklahoma Christian Univ. of Science & Arts

Registration:
Professional Engineer, Electrical - State of Washington (1994)
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Appendix F. Data Sources

a) Data Source(s)

Federal Aviation Administration (FAA)

Federal Communications Commission (FCC)

National Telecommunications and Information Administration (NTIA)

Department of Defense (DOD)

Department of Homeland Security (DHS)

National Oceanic and Atmospheric Administration (NOAA)

National Weather Service (NWS)

Inter-Department Radio Advisory Committee (IRAC)