

Town of Florida, New York
Site Plan Application Documents Review
Special Permit Application for a WECS



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July 21, 2022

Mr. Stephen B. Le Fevre, P.G., C.P.G.
Senior Managing Hydrogeologist
Barton & Loguidice
10 Airline Drive, Suite 200
Albany, NY 12205

APPLICANT: Borrego Solar Systems
ADDRESS: 153 YMCA Road, Town of Florida, New York
STRUCTURE: Single Wind Turbine Generator, 650 feet (Blade Tip Height)

Dear Mr. Le Fevre,

At your request, on behalf of the Town of Florida ("Town"), CityScape Consultants, Inc. ("CityScape"), in its capacity as telecommunications consultant for the Town, has considered the report provided by Comsearch, an engineering company in Sterling, Virginia, whom Borrego Solar Systems ("Applicant") engaged to perform communications studies to determine the potential effects of the Applicant's proposed single wind turbine generator on radio and over-the-air TV communications services in the area as per Section 45.4 – Wind Turbine Facilities Law in the Town Ordinance. The turbine would be located at 153 YMCA Road. The blade tip height of the turbine would be 198 meters (650 feet) above ground level and the rotor diameter would be 150 meters wide.

CityScape has reviewed Comsearch's documents to confirm that the methodology employed by Comsearch's assessments of potential impact to area radiofrequency (RF) communications and the conclusions drawn from the assessments regarding possible interference by the turbine are based on generally-accepted engineering standards and principles. I personally am well qualified to review and comment on Comsearch's reports, as I have two decades worth of experience and knowledge in the field of RF signal disruption by wind turbines, and prior to joining CityScape had also prepared numerous assessment reports similar in many respects to Comsearch's reports.

The Comsearch reports are broken down according to the particular categories of over-the-air RF communications services and are as follows:

- 1) Microwave Study
 - 2) AM and FM Radio Report
 - 3) Off-Air Television Report
 - 4) Mobile Phone Carrier Report
 - 5) Communication Tower Study
 - 6) Land Mobile and Emergency Services Report
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There are two primary modes of potential interference to RF services caused by wind turbines: 1) unintended RF emissions from electrical components inside the nacelle of the turbine tower and the ground-level transformer near the tower base, both of which can cause interference to RF receivers, and 2) RF energy transmitted over-the-air from a radio or TV station and reflected by the tower and rotor blades; the undesired reflected signals can cause interference to the desired direct signals from the station to the intended receiver, thereby causing interference in the receiver. These modes of interference are noted in the Comsearch report. The following are our analyses of the Comsearch reports previously named.

1. MICROWAVE STUDY

Background

To conduct a microwave study, the *First Fresnel Zone* (FFZ) normally is calculated for each microwave path crossing an area of interest. The Fresnel Zone is an ellipse-shaped area aligned along the direct path between transmitter and receiver. The mid-point of a microwave path is the location where the widest Fresnel zone radius R occurs, which is calculated for a path using the following formula:

$$R \cong 8.65 \sqrt{\frac{D}{F_{\text{GHz}}}}$$

where D is the microwave path length in kilometers and F_{GHz} is the frequency in gigahertz. We refer to R as the Worst Case Fresnel Zone radius.

The First Fresnel Zone is the space where the siting of obstructions should be avoided so that the microwave link signal presented to the receiver end of the link is not adversely affected.

Methodology Used

Comsearch searched the FCC microwave database and identified two separately licensed microwave links within two miles of the proposed turbine site. These two identified links actually traverse the same path with the same end-points, transmitting in opposite directions. Comsearch employed the generally accepted method of calculating the First Fresnel Zone of the microwave path and determining this as the “no-build” zone for wind turbines. Neither the turbine tower nor the rotor blades should penetrate the Fresnel Zone of the microwave path.

Conclusions Drawn

Comsearch concludes that the wind turbine would not obstruct the Fresnel Zone of the microwave path. CityScape agrees with this determination. The microwave path is approximately 1.9 kilometers from the proposed turbine. Being that the proposed rotor radius is 75 meters and the Fresnel Zone radius of the path is only 16.3 meters, there is no possibility for the turbine causing interference to the microwave link.

2. AM & FM RADIO REPORT

Background

Large metallic structures such as wind turbines can adversely affect the transmitted signals of AM broadcast stations (which operate at frequencies between 540 KHz and 1700 KHz) up to the maximum FCC-required notification distance of three kilometers from the AM station transmitter to the nearest turbine. Even when the notification distance is exceeded, occasionally, depending upon ground conditions, local AM receivers may experience slight signal changes due to local effects, but such anomalies are not recognized by the FCC or the standards of good engineering practice as having an unduly adverse effect.

Real-world experience with wind farms has shown that FM broadcast station signals (88 to 108 MHz) are fairly insensitive to wind turbines, even in cases where the FM transmitting antenna is surrounded by turbines that are higher than the FM antenna. Because of the “capture effect” supported by the “discriminator” in FM receivers, significant disruptions to FM radio reception are not expected. Although the received signal level may vary with the blade rotation at some receiver locations in the immediate area, good quality FM radios should factor out such time-varying signals.

Methodology Used

Comsearch searched the FCC broadcast AM and FM transmitter databases and determined the distances from the proposed turbine to the AM and FM stations within 30 kilometers of the project site, which is an acceptable approach. The FCC-defined notification zone for AM stations is up to 3 kilometers from the transmitter. There is no FCC-defined notification zone for FM stations. The nearest AM station transmitter is that of WVTM in Amsterdam, New York, located 4.54 kilometers away, and the nearest FM station transmitter is that of W284BZ¹, 4.52 kilometers away.

Conclusions Drawn

Comsearch concludes that since the nearest AM station is greater than the maximum notification distance of 3 kilometers and that the nearest FM station is 4.52 kilometers away, neither station would be adversely affected. CityScape agrees with this determination for reasons explained previously.

3. OFF-AIR TELEVISION ANALYSIS

Background

The rotating blades of a wind turbine have the potential to disrupt over-the-air broadcast TV reception within two or more miles of the turbine, especially when the direct path from the

¹ W284BZ is a low-power station that re-transmits the programming of AM station WVTM on the FM band.

viewer's residence is obstructed by terrain. Interference is caused when signals reflected by the blades arrive at the viewer's TV antenna along with the direct signal. This is known as "multipath interference." However, as turbine manufacturers have replaced all-metal blades with blades constructed of mostly nonmetallic materials, this effect has been reduced. Also, the new generation of HDTV receivers is better equipped to deal with minor multipath interference (which is manifested by "pixilating" or "freezing" of the digital picture) than analog TV sets, as special circuitry is employed to suppress the weaker reflected signal. Occasionally, however, multipath interference from one or more turbines can cause video failure in HDTV receivers, especially if the receiver location is in a valley or other place of low elevation.

There is some possibility of signal disruption for residences that have to point their outdoor antennas through the turbine area, or that utilize "rabbit ear" antennas and/or older HDTV receivers. Most of this effect should be dissipated for locations three or more miles from a turbine, but some residual problems could be noted for HDTV receivers that receive direct signals from the TV station that, due to significant terrain attenuation over the long distance between the transmitter and the receiver, are weaker than the received signals reflected from the turbine blades.

Methodology Used

Comsearch searched the FCC broadcast TV database to compile a list of TV stations within 150 kilometers of the proposed turbine, which would include stations likely to have receivable signals in the vicinity of the turbine. This list was narrowed down to 18 facilities (six low-power stations and 12 conventional high power stations) that may experience degradation of their signals, caused by multipath interference, at locations within 10 kilometers of the proposed turbine due to having "clear line-of-sight (LOS) to a proposed turbine but not to the respective station." This is an acceptable approach; however, it would have been useful to confirm that all 18 TV stations serve some or all of the 10-kilometer radius area with a minimum acceptable signal level based on their FCC-defined service contour areas.

Conclusions Drawn

Comsearch acknowledges that turbine interference to received TV signals is possible, but, in their opinion, is unlikely. They describe technical means to mitigate the interference, should it occur, at the TV receiver locations such as to replace an inferior indoor or outdoor antenna with a better-quality outdoor antenna, or offer cable or satellite TV to residents that are demonstrably experiencing turbine-related interference. All of Comsearch's suggested solutions are acceptable and are relatively low-cost means to mitigate this type of interference². However, since turbine interference to received TV broadcast signals is a known and well-documented occurrence, CityScape suggests considering engaging an engineering firm to conduct pre- and post-construction TV field strength measurements at various locations within the potential interference area.

² Often the wind energy developer proposing the turbines offers to pay or reimburse affected residents for the cost of these mitigation measures.

4. MOBILE PHONE CARRIER REPORT

Background

There is no credible evidence known to this writer to suggest that cell phone reception has been a problem in and around wind turbines. Since cell phone service is mobile by design, operation of personal mobile devices in the area should theoretically not be significantly affected. Cellular networks employ redundant coverage and multiple transceiver locations to compensate for disruptions at any one location.

Methodology Used

Comsearch has compiled a list of personal wireless services available in the market area that includes Montgomery County, New York, but the list does not include services operating or licensed on the new mid-band frequencies between 2.5 and 6 gigahertz. It is possible that mid-band service has not yet reach this area. Also, Comsearch identified one individually-licensed wireless base station site 8.85 kilometers from the proposed turbine. As Comsearch points out, most wireless base station sites are licensed by the FCC on a market basis, not on a site location basis. Thus, it is possible that wireless base stations other than those listed in the Comsearch report exist not far from the proposed turbine site.

Comsearch addresses the potential of RF interference caused by unintended RF signals emitted by the turbine itself, as described earlier in this report. Using the emission limits prescribed in Paragraph 15.109, Part 15 of the FCC Rules and Regulations as the benchmark, Comsearch has calculated setback distances for both personal wireless handsets, which are mobile, and personal wireless base stations which are fixed. The engineering equations used by Comsearch, detailed in their report, to determine the setbacks appear to CityScape to be correct.

Conclusions Drawn

The setbacks determined by Comsearch are: 1) no setback needed beyond 3 meters from a mobile handset, and 2) a minimum setback of 77 meters from the nearest wireless base station. Comsearch opines that, other than observing the recommended setbacks, turbine interference to personal wireless operation is not expected to be a problem that requires mitigation, and CityScape agrees.

CityScape recommends that Solar Systems be requested to provide information, if it exists, that describes expected unintended RF emission levels from the proposed wind turbines on frequencies that may be in use in the area, both commercial and non-commercial. Also, consideration should be given to pre- and post-construction field strength measurements if there are emissions that fall in the frequency bands used for public safety or used by a public utility in the area.

5. COMMUNICATION TOWER STUDY

Background

The purpose of conducting a *Communication Tower Report* is to identify communications towers that may support communications that have not been identified in searches conducted specifically for the broadcast, personal wireless and land mobile services. However, some towers are not documented in accessible databases, and the transmitting antennas mounted on them could also be undocumented. Also, most towers under 200 feet in height are not required to be registered in the FCC Antenna Structure Registry. These are reasons why a site visit is often suggested as part of the due diligence process to look for such exceptions.

Methodology Used

Comsearch searched for communication towers in the FCC Antenna Structure Registration (ASR) database (and other sources) within two miles of the proposed turbine. This is an adequate search distance for communications towers³ No towers were found in the mentioned data sources, but two communication sites were identified that are beyond 2 kilometers and both support land mobile facilities, one of which is operated by the Town of Florida. The other station is operated by a construction contractor, presumably for construction operations.

Conclusions Drawn

The Comsearch report has no recommendations concerning the communication tower analysis results, which is understandable. Generally for any tower site that is known to support only multi-directional or wide-area coverage transmitting facilities (such as base station wireless antennas) but the equipment specifications are unknown, a reasonable and safe rule-of-thumb setback is 500 meters, which takes into account the radius of the rotor blades. Since the distances to the two tower sites are more than 2 kilometers, no interference to any multi-directional or wide-area coverage facilities that may be located on these towers, including the land mobile services, is expected.

6. LAND MOBILE & EMERGENCY SERVICES REPORT

Background

Land mobile stations are licensed to and operated mostly by business, industrial, power and water, public safety and other non-commercial entities. There have been very few, if any, documented cases of wind turbines interfering with land mobile transmitting facilities beyond 500 meters from the nearest turbine; however, many local ordinances do address emergency services (E911) as a special concern and have put in place special use permit conditions to address it. Land mobile stations, with few exceptions, are multi-directional or wide area coverage

³ To do a search for undocumented microwave facilities, however, this search distance should be extended to include both ends of the microwave path.

facilities and not microwave point-to-point links as described in Section 1 of this report, and thus are less likely to be affected by wind turbines.

Methodology Used

Comsearch compiled a list of land mobile facilities derived from FCC databases, and found only two fixed land mobile sites within 2 miles of the proposed wind turbine, the same land mobile stations identified in Section 5 of the Comsearch report. Thus, no undue impact is expected to be caused to these stations, as stated previously.

Comsearch also compiled a list of 42 public safety operations serving Public Safety Region #30 which includes Montgomery County. The licenses are regionally based, not site based. Also in the report is a list of 441 mobile licenses whose service areas overlap the area of interest. These areas are defined by a certain radius from the fixed transmitting station or another designated reference point.

Conclusions Drawn

Comsearch states that land mobile stations, including public safety stations, “are typically unaffected by the presence of wind turbines, and we do not anticipate any significant harmful effect to these services.” This is generally true. The possible exception, as noted by Comsearch, is when the turbine is close to the fixed base station, or the mobile radio receiving transmissions from the base station, so as to cause interference due to unintended RF emissions from the turbine. In that case, Comsearch recommends using the same recommended minimum setback as for the personal wireless base stations (77 meter), although we are not certain whether that setback is appropriate for all land mobile stations since the transmitting and receiving equipment is not the same as for personal wireless. Comsearch notes the redundancy of coverage provided by some land mobile services, but this doesn’t apply to land mobile stations that operate singularly rather than being part of a network of base station sites. In many wind turbine reports I wrote in the past, I recommended a worst-case setback distance of 500 meters from any land mobile transmitter.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, CityScape finds that the Comsearch report generally relies on accepted analysis methods, engineering principals and standards, with exceptions noted in our report.

CityScape makes the following recommendations concerning the wind turbine project:

- 1) A due diligence site inspection should be conducted to check for communications sites in the area of interest that are not identified in the Comsearch report;
 - 2) Consideration should be given to hiring an engineering firm to conduct pre- and post-construction broadcast TV field strength measurements at various locations within the potential interference area;
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3) Solar Systems should provide information, if it exists, that describes predicted or measured unintended RF emission levels from the proposed wind turbine model on frequencies that may be in use in the area, both commercial and non-commercial; also, consideration should be given to pre- and post-construction field strength measurements if there are emissions that fall in the frequency bands used for public safety or used by a public utility in the area.

If you have any questions concerning our report, please don't hesitate to call.

Sincerely,



B. Benjamin Evans
Senior Project Engineer
CityScape Consultants, Inc.