

Mohawk Solar

Case No. 17-F-0182

1001.26 Exhibit 26

Effect on Communications

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EXHIBIT 26 EFFECT ON COMMUNICATIONS

(a) Existing Broadcast Communication Sources

This Exhibit identifies all existing broadcast communication sources within a two-mile radius of the Facility and the associated interconnection. A Communications Tower Study prepared by Comsearch (see Appendix 26-A) identified two structures and eight communication antennas (one FM antenna, one microwave transmission antenna, and six land mobile antenna) within two miles of the Facility and the associated interconnection.

The Applicant is not aware of any research conducted to date that indicates utility-scale solar generation facilities interfere with or otherwise affect communication systems. The Facility lacks tall structures and does not have exposed moving parts. The photovoltaic (PV) arrays generate weak electromagnetic fields (EMFs) during the day that dissipate at short distances. These EMFs are generated in the same extremely low frequency (ELF) range as electrical appliances and wiring found in most homes and buildings” (MDER, 2015). In a recent study of three (3) solar arrays in Massachusetts, electric fields levels measured along the boundary of each project were not elevated above background levels (Massachusetts Clean Energy Center, 2012). Accordingly, the Facility is not expected to have any material impact on communication systems related to AM/FM radio, television, telephone, microwave transmission, military or civilian radar,¹ air traffic control, armed forces, GPS, LORAN, amateur radio, or the NYS Mesonet system.

(1) AM Radio

No AM radio stations are located within two miles of the Facility and the associated interconnection. AM radio stations are not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

(2) FM Radio

One FM radio station is located within two miles of the Facility and the associated interconnection (see Figure 26-1 and Figure 2 included in Appendix 26-A). The call sign of the station is WCAN and it is located

¹ The Federal Aviation Administration (“FAA”) has concluded that solar arrays do not cause radar interference: “Radar interference occurs when objects are placed too close to a radar sail (or antenna) and reflect or block the transmission of signals between the radar antenna and the receiver (either a plane or a remote location)... Due to their low profiles, solar PV systems typically represent little risk of interfering with radar transmissions. In addition, solar panels do not emit electromagnetic waves over distances that would interfere with radar signal transmissions, and any electrical facilities that do carry concentrated current are buried beneath the ground and away from any signal transmission... Off-airport solar projects are even more unlikely [than on-airport solar projects] to cause radar interference unless located close to airport property and within the vicinity of a radar equipment and transmission pathways” (Plante et al., 2010).”

approximately 1.1 miles from the nearest PV panel array. As stated in Section (a), the installation and operation of solar facilities is not anticipated to affect FM radio stations and will not be addressed further in this Application.

(3) Television

No television broadcasting sources are located within two miles of the Facility and the associated interconnection. Television broadcasting sources are not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

(4) Telephone

No cellular sites were identified as located within two miles of the Facility and the associated interconnection. Telephone sources are not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

(5) Microwave Transmission

One microwave transmission tower is located within two miles of the Facility and the associated interconnection (see Figure 26-1 and Figure 2 included in Appendix 26-A). The tower licensee is Montgomery County, call sign WQNJ708, and is located approximately 1.1 miles from the nearest PV panel. As stated in Section (a), the installation and operation of solar facilities is not anticipated to affect microwave transmission communication systems and will not be addressed further in this Application.

(6) Emergency Services

Comsearch assessed emergency service communication sources within two miles of the Facility (Appendix 26-B). Registered frequencies for the following types of first responder entities were evaluated: police, fire, emergency medical services, emergency management, hospitals, public works, local school districts, transportation and other state, county, and municipal agencies. Land mobile and emergency services incumbent data were derived from the FCC's Universal Licensing System and the FCC's Public Safety & Homeland Security Bureau. Comsearch identified six site-based licenses and 29 regional area-wide licenses designated for public safety use. The licensee, call sign, frequency bands, antenna height, and distance to solar site for the site-based licenses are provided in Table 26-1. The licensee, area of operation, and frequency band for area-wide licenses are provided in Table 26-2.

Table 26-1. Site-Based Licensed Communication Sources

Licensee	Call Sign	Frequency Bands (MHz)	Antenna Height (meters)	Distance to Facility Boundary (miles)
Village of Canajoharie	WPPX317	150-174	9.0	0.6
Town of Minden	KUI750	25-50	18.0	0.6
New York State Canal Corporation	WHV323	150-174	5.0	1.0
CSX Transportation Inc.	WQWG497	150-174	4.3	1.1
Village of Canajoharie	WPPX317	150-174	15.0	1.1
Montgomery County	KTO69	150-174	12.0	1.2

Table 26-2. Area-Wide Licensed Communication Sources

Licensee	Area of Operation	Frequency Band (MHz)
American National Red Cross	Statewide: New York	25-50, 450-470
Amsterdam, City of	Countywide: Montgomery, NY	25-50
Bergen Volunteer Fire Department	Statewide: New York	150-174
Central Islip Hauppauge Volunteer Ambulance, Inc.	Statewide: New York	150-174
Erie, County of	Statewide: New York	450-470
Massasauga Search and Rescue, Inc.	Statewide: New York	150-174
Montgomery, County of	Countywide: Montgomery, NY	25-50, 150-174
National Ski Patrol System, Inc.	Statewide: New York	150-174
New York, City of	Statewide: New York	4940-4990
New York City Police Department	Statewide: New York	150-174
New York, State of	Statewide: New York	0-10, 25-50, 150-174, 220-222, 4940-4990
New York State Department of Corrections and Community Supervision	Statewide: New York	150-174, 450-470, 4940-4990
New York State Department of Environmental Conservation	Statewide: New York	25-50, 150-174, 450-470
New York State Department of Health	Statewide: New York	25-50, 150-174, 450-470
New York State Department of Labor	Statewide: New York	150-174
New York State Department of Transportation	Statewide: New York	0-10, 4940-4990
New York State Division of State Police	Statewide: New York	150-174, 450-470, 800/900,

Licensee	Area of Operation	Frequency Band (MHz)
New York State Emergency Management Office	Statewide: New York	25-50
New York State Office of Parks, Recreation and Historic Preservation (OPRHP)	Statewide: New York	450-470
New York State (OPRHP) - Albany Region	Statewide: New York	150-174
New York State (OPRHP) - Long Island Region	Statewide: New York	150-174
New York State (OPRHP) - Niagara Region	Statewide: New York	150-174
Niagara Frontier Search and Rescue	Statewide: New York	150-174
Northeast Mobile Search and Rescue, Inc.	Statewide: New York	150-174
Northeastern Forest Fire Protection Compact	Statewide: New York	25-50
Ossining, Village of	Statewide: New York	25-50
Triborough Bridge and Tunnel Authority	Statewide: New York	4940-4990
Western New York Search Dogs, Inc.	Statewide: New York	150-174
Woodbury, Town of	Statewide: New York	4940-4990

Although these services operate in different frequency ranges and provide different types of service (e.g., voice, video and/or data applications), there is commonality among these different communication sources regarding the impact of a solar project:

1. The heights of the PV panels (which range from 15 feet to 20 feet above ground level) are generally lower than the antenna height of the land mobile systems identified, and the closest land mobile system is separated from the PV panels by over a half-mile.
2. The FCC has established setback distance criteria for interference emissions in the land mobile bands. If these criteria are applied conservatively, a minimum setback distance of 77.5 meters for PV inverters is derived. No PV inverters are located within 77.5 meters of land mobile communication sources.
3. Land mobile systems are designed to operate reliably in a non-line-of-sight (NLOS) environment, with multiple base transmitter stations, overlap between adjacent transmitter sites, and frequencies of operation that allow the signal to propagate over and through the solar panels.

Therefore, no significant harmful effects to emergency service communication sources near the Facility are anticipated. Reception is not likely to be degraded by Facility components and no change in coverage is likely to occur.

(7) Municipal/School District Services

Municipal and school district communication sources were included in the assessment of emergency services communication sources described above in Section (a)(6) and in Appendix 26-B. No school district communication sources are located within two miles of the Facility and the associated interconnection. Several municipal and communication sources were identified and are listed in Tables 26-1 and 26-2.

For the reasons set forth in section (a)(6) above, land mobile sites and area-wide public safety communications are unaffected by the presence of PV panels. As municipal communications sources fall into these categories, no impacts are anticipated as a result of Facility construction or operation.

(8) Public Utility Services

Public utility communication sources were included in the assessment of emergency services communication sources described above in Section (a)(6). No public utility communication sources were identified within two miles of the Facility and the associated interconnection. For the reasons set forth in Section (a)(6) above, land mobile sites and area-wide public safety communications are unaffected by the presence of PV panels. As public utility communications sources fall into these categories, no impacts are anticipated as a result of Facility construction or operation.

(9) Doppler/Weather Radar

NEXRAD (next-generation radar) or Doppler weather radar are operated by the National Weather Service, the Federal Aviation Administration (FAA), and the U.S. Air Force. NEXRAD detects precipitation, winds, and temperature and humidity discontinuities. From these data, computer algorithms generate a suite of meteorological and hydrological products and alerts used for determining short-term forecasts, advisories, and warnings for significant weather events such as tornadoes, large hail, wind shear, downbursts, flash floods, and other weather phenomena. The data are also used by FAA air traffic controllers for the safe and efficient operation of the National Airspace System.

Large structures with moving parts, like wind turbines, can span the same Doppler frequencies and share similar dynamic range as weather spectra, causing conventional radar clutter and adversely impacting data quality and

the performance of NEXRAD weather detection algorithms when sited improperly. However, given the profile of PV arrays, the lack of moving parts, and FAA's conclusion that solar arrays do not cause radar interference (Plante et al., 2010), the proposed Facility is not anticipated to negatively impact radar data quality.

Comsearch used the Department of Defense (DoD) radar screening tool to determine whether potential issues with National Weather Service NEXRAD WSR-88D are anticipated (Appendix 26-C). No potential issues were identified with NEXRAD WSR-88D radar system as a result of the Facility. However, the Applicant will keep the National Oceanic Atmospheric Administration (NOAA) informed as the Facility develops so any potential corrupted radar data can be flagged.

(10) Air Traffic Control

The closest air traffic control tower is located approximately 35 miles east of the Facility at the Schenectady County Airport (AirNav.com, 2018). The FAA is the organization in the United States government responsible for air traffic control and for evaluating and issuing determinations on petitions for objects that penetrate the nation's airspace. Air traffic control is not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

Comsearch used the DoD radar screening tool to determine whether potential issues with FAA long range radar systems are anticipated (Appendix 26-C). There are two FAA radar systems whose coverage could be impacted based on the geographical location of the Facility. Based on the 20-foot maximum height of the solar array panels in addition to the ground elevation, the Facility would not exceed any criteria. In addition, the Facility is not located near an airport or heliport and will not emit frequencies that could interfere with surrounding navigation radars. Therefore, harmful impacts to surrounding FAA long range radar systems are not anticipated.

(11) Armed Forces

According to the Military Installations, Ranges, and Training Areas GIS dataset maintained by the DoD, the nearest Armed Forces installation is the Griffiss Air Force Base, located approximately 42 miles west of the proposed Facility (data.gov, 2017). Armed forces communication systems are not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

Comsearch used the DoD radar screening tool to determine whether potential issues with military systems are anticipated (Appendix 26-C). Based on the geographical coordinates for the center of the Facility Site, no

potential issues with DoD military operations were identified. However, the Applicant will contact military regional coordinators for formal approval and coordination.

(12) GPS

Global Positioning System (GPS) is a U.S.-owned utility that provides users with positioning, navigation, and timing services. This system consists of three segments: the space segment, the control segment, and the user segment. The U.S. Air Force develops, maintains, and operates the space and control segments. The GPS control segment consists of a global network of ground facilities that track the GPS satellites, monitor their transmissions, perform analyses, and send commands and data to the constellation. The GPS ground facility located closest to the proposed Facility is the Air Force Satellite Control Network remote tracking station located in New Hampshire. Due to the large distance between the proposed Facility and the nearest GPS ground facility, and the ELF and low EMFs of solar facilities, impacts on GPS are not anticipated.

(13) LORAN

LORAN was a long-range navigation system developed during World War II that has since been deemed obsolete. Radio signals were sent through a series of towers across long distances as an aid to keep ships and aircraft on course. In accordance with the 2010 Department of Homeland Security Appropriations Act, the U.S. Coast Guard terminated the transmission of all U.S. LORAN signals in 2010. Therefore, no further discussion of LORAN is provided in this Application.

(14) Amateur Radio Licenses

Amateur radio users are not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

(15) New York State Mesonet System

The New York State Mesonet System is a statewide network of weather stations developed and run by the University at Albany. This system collects data on mesoscale meteorological phenomena and is used to supplement data gathered by traditional automated surface observing systems (ASOS), supporting decision-making in agriculture, emergency management, energy, ground transportation, and aviation. The closest station within the New York State Mesonet System is the Sprakers Station, located 4.9 miles to the east of the proposed Facility. Therefore, the New York State Mesonet System is not anticipated to be affected by the construction and operation of the Facility and will not be addressed further in this Application.

(b) Existing Underground Cable and Fiberoptic Lines within Two Miles

GeoTel provided data on locations of underground fiber optic cable. One fiber optic cable, owned and operated by Spectrum, was identified. It traverses the center of the Facility Site, and runs along Clinton Road. Buried collection lines will cross this cable. The Applicant will construct the Facility to avoid interference with this fiber optic cable and all other existing utility systems. See Exhibit 12 for a full discussion of the measures the Applicant will take to avoid interference with existing utility systems.

(c) Anticipated Effects on Communication Systems

Section (a) above provides a description of the communication systems in and around the Facility and any expected impacts to those systems. The subsections below discuss the anticipated effects of the proposed Facility and the electric interconnection on the communication systems identified above in Sections (a) and (b).

(1) Potential Structure Interference with Broadcast Patterns

As noted above, no interference with broadcasting patterns is anticipated to result from construction or operation of the Facility.

(2) Potential for Structures to Block Lines-of-Sight

Microwave telecommunication systems are wireless point-to-point links that require clear line-of-sight conditions. To assure an uninterrupted line of communication, a microwave link should be clear, not only along the axis between the center point of each microwave dish, but also within a formulaically calculated distance around the center axis of the radio beam, known as the Fresnel Zone. Given the low-profile of PV panels, the Facility is not anticipated to disturb or block any lines-of-sight for microwave telecommunication systems or any other line-of-sight communication systems.

(3) Physical Disturbance by Construction Activities

Physical disturbance to communication infrastructure (e.g., towers, buried cables, etc.) during construction is not anticipated. The proposed Facility will consist of PV panel arrays installed on a low-profile racking system that is anchored to the ground via small posts and concrete foundations for medium voltage transformers and the main step up transformer at the POI. However, as located, these foundations are not anticipated to impact communication infrastructure.

The location of any communications infrastructure adjacent to the Facility will be indicated in the Preliminary Design Drawings (see Appendix 11-A) and reviewed by the contractor prior to construction. The Applicant will

coordinate with Dig Safely New York, Inc. prior to commencing any construction activities. All Facility construction and maintenance work that requires excavation will follow the One Call process with Dig Safely New York. This process helps prevent damage by alerting the excavator to the locations of underground utilities, including electric, gas, oil, steam, water, sewer, and communications lines. The excavator flags the area to be excavated and then provides information to Dig Safely New York about the company performing the excavation, the duration of the job, the locations of digging, the depth of the excavation, and other information. Dig Safely New York members, who are utility operators, respond to the request either by noting that the area is clear, or by providing the locations of their facilities. These facilities are then marked above ground, and either avoided or protected during the excavation. If an underground facility cannot be avoided and needs to be exposed, the excavator will provide proper support and protection so that the facility is not damaged. Upon completion of work, the excavator backfills around any exposed utilities.

(4) Adverse Impacts to Co-Located Lines due to Unintended Bonding

Considering the separation and protection measures discussed in Section (c)(3) and the measures to avoid impacts to existing utilities discussed in Exhibit 12(c), the Applicant does not believe that there is significant potential for the proposed Facility and electrical interconnection to adversely impact co-located or adjacent lines due to unintended bonding.

(5) Other Potential for Interference

As discussed in Section (a), interference with radio broadcast coverage is not anticipated. PV panels have a low profile and any frequencies produced by the Facility will likely dissipate quickly over short distances. Further, no AM stations are found within two miles of the Facility (Appendix 26-A), and FM stations operating in the VHF frequency band have signals that can propagate over large distances, despite partial obstructions between the broadcast station and the FM receiver (Comsearch, 2018).

As discussed in Section (a)(4), Section (a)(6), Section (a)(7), and Section (a)(8), interference with first responder services, municipal/school district services, industrial/business land mobile sites, area-wide public safety, and mobile telephone communications is not anticipated. These communication sources are typically unaffected by the presence of large structures (e.g., wind turbines or buildings), much less the low-profile PV panels proposed in this Application. Further, land mobile systems operate in a non-line-of-sight environment and are designed with overlap between base transmitter stations to maintain reception even when the signal to one station is impeded (see Appendix 26-B).

(d) Evaluation of Design Configuration

The Facility is not anticipated to affect communication systems. In the unlikely event that the Facility impacts the communications systems discussed in Section (a), the Applicant will take appropriate steps to review and respond to the complaint as set forth in Section (e) below.

(e) Post-construction Activities to Identify and Mitigate Adverse Effects on Communication Systems

The Applicant takes seriously any complaints that it receives from members of the public concerning potential Facility impacts. The Applicant has developed a Complaint Resolution Plan (Appendix 12-C) through which members of the public can issue formal complaints, should any issues arise as a result of Facility construction or operation. Complaints can be made in person at the Facility's construction or operations building, via phone, or in writing. Following receipt of the complaint, the Applicant will contact the complainant within 72 hours. The Applicant will implement a multi-step complaint response for all registered complaints, which may include: (1) community engagement; (2) gathering information; (3) responding to the complaint; (4) following up after the response has been issued; and (5) taking further action if the complainant believes that the issue has not been resolved.

(f) Potential Interference with Radar

As detailed in Section (a), radar is not anticipated to be affected by the construction and operation of the Facility (Plante et al., 2010).

REFERENCES

AirNav. 2018. *Schenectady County Airport*. Available at:

http://www.airnav.com/airport/KSCH/MURRAY_AVIONICS,%20Murray%20Avionics.

Comseach, 2018. Communications Tower Study, Mohawk Solar Project. Prepared on behalf of Avangrid Renewables. August 30, 2018.

Data.gov. 2017. *Military Installations, Ranges, and Training Areas* [GIS dataset]. Metadata updated January 18, 2017. Available at: <https://catalog.data.gov/dataset/military-installations-ranges-and-training-areas>

Massachusetts Clean Energy Center. 2012. *Study of Acoustic and EMF Levels from Solar Photovoltaic Projects*. December 2012, p. iv.

Massachusetts Department of Energy Resources, et al. (MDER). 2015. *Clean Energy Results: Questions and Answers, Ground-Mounted Solar Photovoltaic Systems* June 2015. "MDER Q&A," p. 10.

Plante, J., S. Barrett, P. DeVita, and R. Miller. 2010. *Technical Guidance for Evaluating Selected Solar Technologies at Airports*. Federal Aviation Administration. Washington, DC.