Hoffman Falls Wind Project

Matter No. 23-00038

900-2.23 Exhibit 22

Electric and Magnetic Fields

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EXHIBIT 22 ELECTRIC AND MAGNETIC FIELDS

The information presented in this Exhibit is derived from an Electric and Magnetic Field (EMF) Study prepared for the Hoffman Falls Wind Project (the Facility) by Westwood Surveying and Engineering, PC. The study is included as Appendix 22-A and addresses the requirements of §900-2.23 (see Appendix 22-A).

a) Every Right-of-way Segment Having Unique Electric and Magnetic Field Characteristics

The Facility includes a 115-kilovolt (kV) Point of Interconnection (POI) switchyard, 115 kV/34.5 kV collection substation, and 34.5 kV collection system. None of the electrical collection lines from the wind turbines to the collection substation will exceed 34.5 kV; therefore, the EMF study did not examine collection line rights-of-way (ROWs) for the 34.5 kV collection lines. However, the Facility will include 115 kV overhead generation tie (gen-tie) and cut-in/out lines with a total length of less than 500 feet, which will connect the collection substation to the POI switchyard and the POI switchyard to the National Grid transmission system, allowing power to be delivered from the Facility to the grid. The EMF study covers the 115 kV line sections from the 115 kV line gantry located inside the collection station to the existing 115 kV National Grid line. In the study, various cases were identified constituting unique EMF characteristics for the 115 kV lines in terms of clearance of phase conductor from ground at lowest sag point, maximum current flow, and operating voltage. A total of four cases were identified, details of which can be found in the EMF Study report (Appendix 22-A).

As per National Grid standard, the minimum ROW width for 115 kV level transmission line is 75 feet from the centerline of any line in each direction. For two parallel lines constructed in the same ROW, the ROW width may be larger than 150 feet to account for the distance between the two lines. Modeling calculations were used to identify the potential unique EMF characteristics that could result from construction and operation of the transmission line span associated with the Facility. The EMF Study in Appendix 22-A provides analysis assumptions, design scenarios, calculation tables and field strength graphs for the transmission ROW as described above. The results of the EMF Study conclude that all electric and magnetic field levels for the overhead interconnection cables at the edge of the Transmission ROW are within the Interim Standard values of 1.6 kilovolts per meter (kV/m) for electric fields and 200 milligauss (mG) for magnetic fields set forth by the New York State Public Service Commission's Statement of Interim Policy on Magnetic Fields for Major Electric Transmission Facilities.[1]

b) For Each Right-of-way Segment, Base Case and Proposed Cross Sections

For the cases identified in Exhibit 22(a), the EMF Study provides base case and proposed cross sections that show, to scale, the following features:

- Any known overhead electric transmission, sub-transmission, and distribution facilities showing structural details and dimensions and identifying phase spacing, phasing, and any other characteristics affecting EMF emissions

[1] Issued and effective September 11, 1990, New York State Public Service Commission, Cases 26529 and 26559 available at: https://www3.dps.ny.gov/pscweb/WebFileRoom.nsf/0/9C381C482723BE6285256FA1005BF743/$File/26529.pdf?OpenElement.

- ROW boundaries.

Structural details and dimensions for all structures (dimensions, phase spacing, phasing, and similar categories) are provided in Appendix 5-C. The Applicant is not aware of any underground gas transmission facilities or underground electric transmission, sub-transmission, or distribution facilities within the ROW segments.

c) Enhanced Aerial Photos/Drawings Showing Exact Locations of Each

The EMF Study in this Application includes a drawing presented on an aerial photo background showing the exact location of each unique ROW segment and each cross-section and the measurement of the distance between the edge of the ROW segment and the nearest residence or occupied building (Appendix 22-A).

d) Electric and Magnetic Field Study

The results of the EMF Study (Appendix 22-A) are described in the following sections.

(1) Licensed Professional Engineer

The EMF study included in this Application was signed and stamped/sealed by Brandon Farrell, a licensed professional engineer registered and in good standing in the State of New York.

(2) Computer Software Program

The EMF Study used the 3D EMF calculator within PLS-CADD, based on Electric Power Research Institute and IEEE methods.

(3) Electric Field Calculation Tables and Field Strength Graphs

The EMF Study modeled the strength and locations of electric fields to be generated by the overhead transmission lines. Modeling was conducted at rated voltage. The measurement location was assumed to be 1 meter, and the measurement interval was 5 feet. The EMF Study includes electric field strength graphs depicting electric fields along the width of the entire ROW out to 500 feet from the edge of the ROW on both sides. Software model calculation output tables are included as Appendix A in the EMF Report.

(4) Magnetic Field Calculation Tables and Field Strength Graphs

The EMF Study modeled the strength and locations of magnetic fields to be generated by the overhead transmission lines. Modeling was conducted for the conditions where maximum projected power flow through the transmission lines will take place. Modeling was conducted at rated voltage. The measurement location was assumed to be 1 meter above grade, and the measurement interval was 5 feet. The currents used in the EMF Study are the largest possible current that would ever flow in the Facility components. The actual current flows during the maximum generation scenario are expected to be lower than the currents used in the EMF Study. Therefore, the magnetic field modeling that was performed is applicable to any of the following conditions: summer normal, summer short-term

emergency, winter normal, and winter short-term emergency. Magnetic field strength graphs depicting magnetic fields along the width of the entire ROW and out to the 500 feet from the edge of the ROW are included in the EMF study (see Appendix 22-A).

(5) Magnetic Field Calculation Tables and Field Strength Graphs for Maximum Annual Load within 10 Years

Calculations conducted in the EMF Study were done for the maximum current expected to flow in the conductors regardless of load growth in the future. Therefore, the modeling of magnetic fields described in Section 22(d)(4) (including both the graphs and tables included in the EMF Study) is applicable to both initial operation and operation after 10 years.

(6) Base Case Magnetic Field Calculation Tables and Field Strength Graphs

The calculations considered the maximum loading of the system based on the maximum potential generating capacity. Therefore, the modeling of magnetic fields described in Section 22(d)(4) (including both the graphs and tables included in the EMF Study) is applicable as base case.

(7) Conformance with Public Service Commission Interim Policy Standard

The EMF study shows that the maximum electric and magnetic field strengths are within the maximum allowable limits set by Public Service Commission's Interim Policy Standard for Electromagnetic Field levels at the proposed ROW edges. For the electric field, the maximum value on the ROW was 0.579 kV/m and at the edge of the ROW, the maximum value was 0.127 kV/m, which both fall below the conservative limits established by the Public Service Commission of 4,167 V/m on ROW and 1,600 V/m at the edge of the ROW. For the magnetic field, the maximum value on the ROW was 77.736 mG and at the edge of the ROW, the maximum value was 20.289 mG, which are both well under the conservative limits established by the Public Service Commission of 2,010.62 mG on ROW and 200 mG at the edge of the ROW. Thus, the project does not exceed the required thresholds for any location within the ROW and meets the standards put forth by the Public Service Commission. The electric and magnetic fields beyond 500 feet are asymptotically approaching zero.