



# **EXCELSIOR ENERGY CENTER**

**Case No. 19-F-0299**

**1001.35 Exhibit 35**

**Electric and Magnetic Fields**

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## **Exhibit 35: Electric and Magnetic Fields**

This Exhibit will track the requirements of Stipulation 35, dated July 6, 2020, and therefore, the requirements of 16 New York Codes, Rules and Regulations (NYCRR) § 1001.35.

The New York State Public Service Commission (NYPSC) set forth in *Opinion and Order Determining Health and Safety Issues, Imposing Operating Conditions, and Authorizing* (Case 26520); *Operation Pursuant to those Conditions No. 78-13*; and *Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities* (NYPSC Cases 26529 and 26559) guidance for electric and magnetic fields (NYPSC Interim Guidelines). These opinions and cases set forth the guidelines addressing electric and magnetic fields at the edge of the right of way (ROW). For electric fields, 1.6 kV/m measured one meter (3.28 feet) above ground level, with the line at the rated voltage, is the limit at the edge of the ROW. The magnetic field strength guideline is 200 milligauss (mG), measured at one meter (3.28 feet) above grade, at the edge of ROW. The Project will comply with these guidelines.

### **35(a) ROW Segments with Unique Characteristics**

The Applicant has identified the approximately 160 feet of double circuit 345 kV transmission line connection to the existing NYPA #DH2 transmission line as the only overhead ROW segments with unique characteristics within the Project Area. The proposed ROW width is 250 feet. The Applicant has provided the electrical and magnetic field (EMF) for the four 34.5 kV underground cables within a 150-ft underground ROW. An evaluation of the EMF on this segment is included in the EMF Calculation Report in Appendix 35-1.

### **35(b) Cross Sections**

The EMF Calculation Report (Appendix 35-1) includes structural details and dimensions and identifies phase spacing, phasing, and other characteristics affecting the EMF calculations performed. Structural details and dimensions for the transmission line interconnection, including a cross-section of the proposed line, are included in the Preliminary Design Drawings in Appendix 11-1.

As part of the EMF Calculation Report, the Applicant analyzed the potential for cumulative EMF impacts related to the Project by evaluating EMF along the proposed transmission line connection from the POI switchyard to the existing NYPA 345 kV #DH2 transmission line. Appendix 35-1 provides proposed cross sections, to scale, showing:

- All overhead electric transmission, sub-transmission and distribution facilities, including the proposed Project showing structural details and dimensions and identifying phase spacing, phasing, and any other characteristics affecting EMF calculations;
- All underground electric transmission, sub-transmission, and distribution facilities;
- All underground gas transmission facilities;
- All ROW boundaries; and,
- Structural details and dimensions for all structures (dimensions, phase spacing, phasing, and similar categories) and includes a station number identifying the locations.

Details related to the underground collection system for the Project are also shown in Appendix 11-1.

### **35(c) Aerial Photographs/Drawings**

The proposed overhead transmission line interconnection is shown on aerial photography as part of the Preliminary Design Drawings (Appendix 11-1, see Sheet C.305) as well as a cross-section in the Electric and Magnetic Field Calculation Report included as Appendix 35-1 and Electrical drawings included as Appendix 11-3. In addition to the locations of these features, the design drawings and figure identify the locations of the nearest residence. The distance between the transmission interconnection and the nearest residence is approximately 1,000 feet and has been evaluated in the EMF Calculation Report (Appendix 35-1).

### **35(d) Electric and Magnetic Field (EMF) Calculation Report**

An EMF Calculation Report (Appendix 35-1) has been prepared, signed and stamped by a licensed professional engineer registered and in good standing in the State of New York for each identified segment cross-section for the proposed Project. The EMF Calculation Report includes:

- EMF modeling and calculations performed using the Bonneville Power Authority (BPA) Program.
- Electric field modeling of the circuits at rated voltage and electric field calculation tables and field strength graphs calculated at one meter (3.28 ft) above ground level with 5-foot measurement intervals depicting the width of the entire ROW and out to 500 feet from the edge of the ROW on both sides including digital copies of all input assumptions and outputs for the calculations.

- Magnetic field modeling of the circuit phase currents equal to the summer-normal, summer short-term emergency (STE Sum), winter-normal, and winter short-term emergency (STE Win), loading conditions and magnetic field calculation tables and field strength graphs calculated at one meter (3.28 ft) above ground level with 5-foot measurement intervals depicting the width of the entire ROW and out to 500 feet from the edge of the ROW on both sides including digital copies of all input assumptions and outputs for the calculations.
- Magnetic field modeling of the circuit phase currents equal to the maximum average annual load estimated to be occurring on the power lines within ten years after the proposed Project is put in operation and magnetic field calculation tables and field strength graphs calculated at one meter above ground level with 5-foot measurement intervals depicting the width of the entire ROW and out to 500 feet from the edge of the ROW on both sides, including digital copies of all input assumptions and outputs for the calculation;
- Magnetic field modeling of a “base case” with the circuit phase currents equal to the maximum average annual load currently estimated to be occurring on the existing power lines within the ROW (without construction or operation of the proposed Project) and magnetic field calculation tables and field strength graphs calculated at one meter above ground level with 5-foot measurement intervals depicting the width of the entire ROW and out to 500 feet from the edge of the ROW on both sides, including digital copies of all input assumptions and outputs for the calculations.
- Magnetic field modeling for the portion of underground collection circuit where maximum current flow results from co-located collection lines during peak load conditions.

Minimal EMF are generated by the operation of solar facility Components such as the electrical collection lines and transformers. EMF strength decreases with the square of the distance from the source (the electric charges or currents) for power lines and the cube of the distance from point sources such as substations. The solar panels will be a minimum of 200 feet from Project Area boundaries, and individual panels represent outputs consistent with household EMF levels. Additionally, the location of underground 34.5 kV collection cables, and the location of the collection substation transformers and other electrical equipment inside a restricted area, will provide separation of these components from the general public. As a result, EMF levels from solar panel arrays and collection lines are expected to be limited or non-existent.

Table 35-1, below, details the EMF levels calculated from the EMF Calculation Report. Refer to Appendix 35-1 for additional information.

**Table 35-1. NYPSC EMF Level Interim Guidelines**

<b>Field Type</b>	<b>Guidelines Limit</b>	<b>Maximum Value at Property/Right-of-Way Edge Proposed</b>
Electric Field	1.6 kV/m	0.223 kV/m (transmission line)
Magnetic Field	200 mG	72.63 mG (transmission line)

The EMF Calculation Report indicates that the calculated EMF levels for the transmission line interconnection are less than the 1.6 kV/m maximum and 200 mG field level permitted at the edge of a transmission ROW in New York occupied by a major transmission line as per the NYPSC Interim Guidelines. The report demonstrates that the EMF levels associated with the transmission line interconnection are well within guidelines.

**35(e) Potential Induced Voltages on Project Components**

The substation perimeter fence will be grounded in accordance to Institute of Electrical and Electronic Engineers (IEEE) standards and the design drawings to eliminate the risk of induced voltage. Additional adjacent fencing is not proposed at this time. Should fencing outside of the substation perimeter fence be required, applicable codes and standards associated with induced voltage and the transmission line will be adhered to.