



NORTH SIDE ENERGY CENTER

Case No. 17-F-0598

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 February 10, 2021, 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 (EMF) (NYPSC Interim Guidelines). These documents provide guidelines for addressing electric and magnetic fields at the edge of the right-of-way (ROW). The limit for electric field strength one meter (3.28 feet) above ground level is 1.6 kilovolts per meter (kV/m) with the line at the rated voltage as the limit at the edge of the ROW. The limit for magnetic field strength measured one meter above ground level is 200 milligauss (mG) at the edge of the ROW. The Project complies with these guidelines.

35(a) ROW Segments with Unique Characteristics

The Applicant has identified that the 230-kilovolt (kV) interconnection line connecting the Project's point of interconnection (POI) switchyard to the double circuit 230 kV existing NYPA Massena - Moses transmission line as the only overhead ROW segments with unique characteristics within the Project Area.

An evaluation of the EMF on this segment is included in the EMF Calculation Report in Appendix 35-1. Cross Section 3 shows the proposed ROW for the 230kV transmission line spans into the new POI switchyard at 250 feet wide with 66 feet between the centerline of the structures to the edge of the ROW. Cross Section 4 shows the eight (8) 34.5-kV underground cables for the collection system with a proposed ROW width of 150 feet wide.

35(b) Cross Sections

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 Massena - Mosses 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 other characteristics affecting EMF

calculations;

- All underground electric transmission, sub-transmission, and distribution facilities;
- All underground gas transmission facilities; and
- All ROW boundaries;

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

35(c) Aerial Photographs/Drawings

The Preliminary Design Drawings provided in Appendix 11-1, as well as Figure 35-1, detail the proposed overhead interconnections with aerial photography. The drawings and figure detail the location of the Project in relation to the nearest residences.

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 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 distance, which is to be determined, 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.

The Applicant evaluated the potential cumulative EMF impacts related to the Project, as detailed within the EMF Calculation Report. The evaluation analyzed the EMF of the Project's transmission line connection from the POI switchyard to the existing Massena-Mosses 230-kV transmission line, as well as the underground electric collection circuits. Overhead electric collection lines are not proposed as part of this Project.

The proposed cross sections, to scale, are detailed in Appendix 35-1. The cross sections show the following information:

- The proposed structural details and dimensions, and other characteristics affecting EMF calculations;
- All underground electric transmission, sub-transmission, and distribution facilities; and
- All ROW boundaries;

The EMF levels calculated in the EMF Calculation Report are provided in Table 35-1 below. Refer to Appendix 35-1 for additional information regarding the EMF levels.

Table 35-1. EMF Calculation Report Results		
Field Type	Guidelines Limit	Maximum Value at Proposed Property/ Right-of-Way Edge
Electric Field	1.6 kV/m	0.289 kV/m
Magnetic Field	200 mG	142.79 mG

The calculation report reveals that the calculated EMF levels for the interconnection line and 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 are well within guidelines.

In regards to the underground collection feeders, shielding does not impact the magnetic field results (mG). Magnetic fields for underground feeders are impacted primarily by current, arrangement of phases within circuit, depth of cables, and location of the magnetic field measurement. The EMF calculations considered the maximum current for each of the 1250 kcmil cables in order to be conservative. In addition, the compact arrangement of the cables results in a reduction in the magnitude of the magnetic fields. The EMF calculations also assumed the feeder to be buried four feet below grade while the magnetic field was measured to be at 3.28 feet above grade across the ROW. Lastly, the maximum magnetic field is about 16 mG maximum within the ROW. Therefore, even if the ROW is less than 150 feet, there is not a concern of exceeding the NYPSC threshold of 200 mG.

35(e) Potential Induced Voltages

Substation perimeter fencing will be grounded in accordance with the Institute of Electrical and Electronic Engineers (IEEE) standards and specifications to eliminate the risk of induced voltage. Additional adjacent fencing and other Project Components are not proposed outside or immediately adjacent to the substation. Should Project Components be proposed outside the substation, the potential induced voltage will be evaluated per the applicable standards.