



GARNET ENERGY CENTER

Case No. 20-F-0043

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 Final Stipulation 35, dated March 5, 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 (EMFs) (NYPSC Interim Guidelines). These documents provide guidelines for addressing EMFs 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 kilovolt (kV)/meter (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 the proposed line connecting the Project's collection substation to the point of interconnection (POI) 345 kV switchyard and the proposed tap to the existing New York Power Authority (NYPA) 345 kV Clay-Pannell transmission line as the only overhead ROW segments with unique characteristics within the Project Area. Note that there are two electrical transmission lines and an existing gas pipeline that traverse the northern portion of the Project Area in a northeast-southwest direction.

The proposed ROW for the transmission line is approximately 200 feet wide in total and approximately 100 feet wide from the centerline between the transmission line to the edge of the ROW. An evaluation of the EMF on these segments is included in the EMF Study in Appendix 35-1. The EMF Study shows proposed structure types and average widths, ROWs, and co-location of other facilities in the proposed ROW, where applicable.

35(b) Cross Sections

As part of the EMF Study, 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 Clay-Pannell transmission line. Appendix 35-1 provides the "base case" and "proposed" cross-sections to scale of each onsite transmission ROW segment, showing:

- All proposed 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 proposed underground electric transmission, sub-transmission and distribution facilities;
- All underground gas transmission facilities;
- All ROW boundaries; and
- Structural details and dimensions for all proposed structures (dimensions, phase spacing, phasing, and similar categories) including a Station number identifying the location.

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 drawing and figure detail the location of the Project in relation to the nearest residences or occupied non-residential buildings. The EMF Study, provided as Appendix 35-1, evaluates the distance between the interconnection line and transmission interconnection and the nearest residences.

35(d) Electric and Magnetic Field Study

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 feet) above ground level with 5-foot measurement intervals depicting the width of the entire ROW 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 feet) above ground level with 5-foot measurement intervals depicting the width of the entire ROW 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 EMFs 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 confirmed 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. The proposed collection lines will have a grounded shield, and thus will not emit an electric field outside of the cable shield. The collection lines will be installed in three phases and in direct contact with each other which will result in a canceling effect on magnetic fields. Any magnetic fields that are produced will diminish due to the distance from the centerline of the circuit. 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 Study. The evaluation analyzed the EMF of the Project's transmission line connection from the POI switchyard to the existing Clay-Pannell 345 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 identifying phasing, phase spacing, and other characteristics affecting EMF calculations;
- All underground electric transmission, sub-transmission, and distribution facilities;
- All ROW boundaries; and,

- Structural details and dimensions for all structures (dimensions, spacing, phasing, and similar categories) and includes a station number identifying the locations.

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

Table 35-1. EMF Study Results

Field Type	Limit	Maximum Value at Property/ Right-of-Way Edge
Electric Field	1.6 kV/m	1.246 kV/m
Magnetic Field	200 mG	132.282 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 State occupied by a major transmission line as per the NYPSC Interim Guidelines. The report demonstrates that the EMF levels are well within guidelines. With respect to collection lines, values in the EMF Study ranged from approximately 14 mG to 18 mG, which are also well within guidelines.

35(e) Potential Induced Voltages

The potential induced voltages on the Project Components such as the perimeter fencing and solar arrays located in proximity to high-voltage electrical transmission facilities could not be evaluated at this time. Substation perimeter fencing will be grounded in accordance with the Institute of Electrical and Electronic Engineers (IEEE) standards and specifications. 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.