Hecate Energy
Cider Solar Farm

Exhibit 22: Electric and Magnetic Fields

Cider Solar Farm
Towns of Oakfield and Elba
Genesee County, New York

Matter No. 21-01108

EXHIBIT 22: ELECTRIC AND MAGNETIC FIELDS

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Abbreviations

EMF	electric and magnetic field
kV	kilovolt
NYPSC	New York Public Service Commission
NYPA	New York Power Authority
ROW	Right-of-Way
STE sum	summer short term emergency
STE win	winter short term emergency

Glossary of Terms

Applicant	Hecate Energy Cider Solar LLC
Project	Refers to the proposed Cider Solar Farm, an up to 500-megawatt utility scale solar project that will be comprised of photovoltaic panels, inverters, access driveways, electrical collection lines, point of interconnection/substation, construction staging areas, fencing and plantings, located on private land in the towns of Elba and Oakfield, Genesee County, New York.
Project Area	Refers to the Project Site and surrounding/adjacent land totaling approximately 7,518 acres.
Project Footprint	Refers to the limit of temporary and permanent disturbance within the Project Site caused by the construction and operation of all components of the Project totaling approximately 2,452 acres.
Project Site	Refers to those privately owned parcels under option to lease, purchase, easement or other real property interests with the Applicant in which all Project components will be sited totaling approximately 4,650 acres.

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The content of Exhibit 22 is provided in conformance with Chapter XVIII, Title 19 of the New York Codes, Rules, and Regulations § 900-2.23, as follows.

Electric and magnetic fields (EMF) are produced by any source that generates, transmits or uses electricity. New York State has a policy limiting EMF from new transmission lines to levels produced by existing transmission lines or maintaining the current levels (NYPSC 1990). The policy sets forth guidelines addressing EMF at the edge of the right of way (ROW). For magnetic field strength, the guideline is 200 milligauss, measured 1 meter above ground level at the edge of the ROW.

a) Strength and Locations of EMFs

The proposed underground collector system for the Project is anticipated to be a total of 163,680 linear feet (31 miles), designed to be rated at 34.5 kilovolt (kV), and is assumed to have a maximum of 10 collection lines routed in parallel trenches, each measuring 10 feet apart. The ROW will range in width from 10 to 100 feet depending upon the number of parallel trenches. The collector system will connect the solar array to the Project substation. An EMF study was conducted to estimate the EMF strength created by the collector system and is provided as Appendix 22-A: *Underground EMF Study*. There is minimum of 50 feet from any collector circuit to any residence or structure.

The Underground EMF Study (Appendix 22-A) was prepared using CYMCAP modeling software. The study provides analysis assumptions, design scenarios, and calculation tables and field strength graphs for each identified ROW segment cross-section of the proposed Project's underground collector system. Ten different scenarios were considered based on the number of parallel collection lines in the ROW. The results of the EMF study show that EMF levels at the edge of the ROW will be same or less than EMF from the centerline and EMF limits will be substantively below 200 mG9 in accordance with the New York Public Service Commission (NYPSC) 1990 guidelines, as detailed in Section 5.1 of Appendix 22-A.

b) EMF Study Cross Sections

The Underground EMF Study in Appendix 22-A shows cross sections of the cumulative EMF for evaluated conditions for the underground collection system.

1) Known Overhead Electric Facilities

There is an existing overhead New York Power Authority (NYPA) Dysinger to New Rochester 345-kV transmission line running east-west through the Project Site north of Lockport Road and west of Graham Road. The Project will interconnect to this facility, which has a ROW width of 300 feet. The proposed substation will be located immediately adjacent to the north of the existing NYPA transmission line.

2) Known Underground Electric Facilities

No known underground electric transmission, sub-transmission and distribution facilities are located on the Project Site.

3) Known Underground Gas Facilities

There is an existing gas pipeline, Empire Pipeline, that runs east-west through the Project Site, just south of the existing NYPA 345-kV line. The Empire Pipeline ROW has a 50-foot width.

4) Right-of-Way Boundaries

The edge of the ROW for the underground cable scenarios is assumed to be 5 feet beyond the outermost cable. Multiple collection lines would be spaced 10 feet apart. The collection line ROWs would range in width from 10 to 100 feet, depending on the number of co-located lines.

5) Structural Dimensions

No structures are intended to be used as part of the underground cable routing; therefore, there are no station numbers.

c) Aerial Drawings

1) Identified Right-of-Way Segments

Appendix 22-A includes set of drawings showing the exact location of the underground collection routing for each identified ROW segment (*see* pages 57-61).

2) Cross-Sections

Appendix 22-A includes a set of drawings showing each cross-section (*see* page 63).

3) Residences and Non-Residential Buildings

Appendix 22-A includes a set of drawings enhanced to show the nearest residence or occupied non-residential building in each identified ROW segment. The drawings include measurements for the distance between the edge of ROW and the nearest edge of the residence or building (*see* pages 65-76).

d) EMF Study

1) Credentials

The EMF study (Appendix 22-A) was performed by a licensed Professional Engineer in New York using custom Microsoft Excel spreadsheets to model the facilities. All of the magnetic field calculations were conducted using CYMCAP 7.3 Rev 2, due to the underground collector system of the Project.

2) EMF Modeling Software

The EMF study (Appendix 22-A) conducted for the underground collector system used CYMCAP 7.3 software. Assumed underground cable orientations were used to perform the study, as described in the EMF study.

3) Electric Field Modeling

The EMF study (Appendix 22-A) modeled electric field circuits at a voltage rating of 34.5 kV. The EMF study also provides electric field calculation tables and field strength graphs calculated at 1 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.

4) Magnetic Field Short-Term Emergency Load

The EMF study (Appendix 22-A) modeled magnetic field 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. The EMF study provides magnetic field calculation tables and field strength graphs calculated at 1 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.

5) Proposed Magnetic Field Average Annual Load

The EMF study (Appendix 22-A) modeled magnetic field circuit phase currents equal to the maximum average annual load estimated to be occurring on the power lines within 10 years after the proposed facility is put in operation. The EMF study provides magnetic field calculation tables and field strength graphs calculated at 1 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.

6) Existing Magnetic Field Average Annual Load

The EMF study (Appendix 22-A) modeled 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 facility). The EMF study provides magnetic field calculation tables and field strength graphs calculated at 1 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.

7) Conformance with Public Service Commission’s Interim Policy Standard for Electromagnetic Field Levels

The facilities and interconnection transmission lines will conform with NYPSC Interim Policy Standard for Electromagnetic Field Levels (issued September 11, 1990), because the EMF study concluded that the magnetic field measured 1 meter (approximately 3.28 feet) above grade at the edge of ROW in each scenario of underground cables was below 200 milligauss. Details are further described in the EMF study (Appendix 22-A).

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References

New York Public Service Commission (NYPSC). 1990. Statement of Interim Policy on Magnetic Fields of Major Transmission Facilities. Cases 26529 and 26559 Proceeding on Motion of the Commission. Issued and Effective: September 11, 1990.