SOMERSET SOLAR, LLC

MATTER NO. 22-00026

§900-2.23 Exhibit 22 Revised

Electric and Magnetic Fields

CONTENTS

LIST OF TABLES

APPENDICES

ACRONYM LIST

§	Section
AC	alternating current
DC	direct current
EMF	electric and magnetic field
Facility Substation	Somerset Collector Substation
IEEE	Institute of Electrical and Electronics Engineers
kV	kilovolt
kVAC	kilovolts alternating current
kV/m	kilovolts per meter
mG	milligauss
MV	medium voltage
NYCRR	New York Codes, Rules and Regulations
ORES	Office of Renewable Energy Siting
PV	photovoltaic
ROW	right-of-way
VAC	volts of alternating current

GLOSSARY TERMS

Applicant	Somerset Solar, LLC, a subsidiary of The AES Corporation, Inc. (AES), the entity seeking a siting permit for the Facility Site from the Office of Renewable Energy Siting (ORES) under Section (§) 94-c of the New York State Executive Law.
Application	Application under §94-c of the New York State Executive Law for review by the Office of Renewable Energy Siting (ORES) for a Siting Permit.
Facility	The proposed components to be constructed for the collection and distribution of energy for the Somerset Solar Facility, which includes solar arrays, inverters, electric collection lines, and the collection substation.
Facility Site	The limit of disturbance (LOD) that will be utilized for construction and operation of the Facility, which totals about 700 acres on the Project Parcels in the Town of Somerset, Niagara County, New York (Figure 2-1).
Project Parcels	The parcels that are currently under agreement with the Applicant and Landowner, totaling about 1,784 acres in the Town of Somerset, Niagara County, New York, on which the Facility Site will be sited (Figure 3-1).
Project Site	The acreage of the Project Parcels under agreement between the Applicant and the Landowner, consisting of approximately 1,396 acres, in which the Applicant has performed diligence, surveys and assessments in support of Facility design and layout.

EXHIBIT 22 Electric and Magnetic Fields

This exhibit addresses the requirements specified in 19 New York Codes, Rules and Regulations (NYCRR) Section (§) 900-2.23 regarding electric and magnetic field (EMF).

An EMF study was performed on the 345 kilovolt (kV) gen-tie transmission line interconnection between the Somerset Collector Substation (Facility Substation) and the existing Kintigh Substation. It details the proposed cross-sections for the overhead electric interconnection, and provides structural details and dimensions, cross sections, and phase spacing, and other characteristics that affect EMF. The peak electric field was determined to be 2.3 kilovolts per meter (kV/m) offset from the centerline of the right-of-way (ROW) by ±35 feet, which reduces to 1.6 kV/m at ±60 feet from centerline of the ROW, which meets the acceptance criteria. The peak magnetic field was determined to be 22.5 milligauss (mG) located with no offset from the centerline of the ROW, which is well below the allowable limit.

The Facility has been designed to comply with 19 NYCRR §900-2.23 and the Uniform Standards and Conditions and impacts related to EMF have been avoided and minimized to the maximum extent practicable.

22(a) Right-of-Way (ROW) Segments with Unique Characteristics

The Facility's photovoltaic (PV) array generates power at a relatively low direct current (DC) voltage. To effectively collect, carry, and connect the power to grid it is necessary to convert the low voltage DC power to high voltage alternating current (AC) power. This is done by connecting groups of PV panels to DC/AC inverters, which takes the low voltage DC and converts it to 630 volts of alternating current (VAC). This power is then sent to a medium voltage (MV) transformer which converts the 630 VAC to 34.5 kilovolts AC (kVAC). Groups of MV transformers are connected to the main collector at the Facility Substation where the sum of the Facility's power is converted from 34.5 kVAC to 345 kVAC, then sent to the existing Kintigh Substation over the gen-tie transmission line. Kintigh Substation is the Facility point of interconnection.

The 34.5 kV collector network is primarily underground; however, some sections are required to be installed aboveground on sleeper cable trays (Figure 3-2). The EMF study did not evaluate the effects from the 34.5 kV collection lines associated with the Facility since the proposed line rating is less than the required 69 kV rating requirement. The Applicant has identified the proposed 345 kV overhead gen-tie transmission line for the Somerset Solar Project (Facility) as the only ROW segment with unique EMF characteristics. The 345 kV line will connect the Facility to the existing Kintigh Substation (point of interconnection), which is located adjacent to the approximately 700-

acre Facility Site (limit of disturbance) and within the approximately 1,396-acre Project Site. The Kintigh Substation connects to the 345-kV line owned by New York State Electric and Gas Corporation for connection to the grid. An EMF study (Appendix 22-A), with calculations, tables, and field strength graphs, was performed on the 345-kV gen-tie transmission line between the Facility Substation and the existing Kintigh Substation. The gen-tie interconnection line will be approximately 159 feet in length. The proposed ROW for the interconnection line is 120 feet wide, or 60 feet from the centerline to the edge of the ROW on both sides. Additional information on the EMF evaluation for these components is included in the EMF study in Appendix 22-A.

22(b) Cross Sections

The EMF study (Appendix 22-A) details the proposed cross-sections for the transmission gen-tie line. No base case to represent existing conditions prior to construction is included in the EMF study. Although the Kintigh Substation and its associated lines will certainly have EMF affects, they will not interact significantly with the proposed gen-tie. For this reason, the base case has not been considered for the proposed ROW.

The EMF Study, as well as the Design Drawings (Appendix 5-B), provide structural details and dimensions, cross sections, phase spacing, and other characteristics that may affect EMF. Phasing is not included as no multiple parallel circuits (as on double-circuit structures) or crowded transmission corridors with multiple parallel 345-500 kV lines are proposed for the Facility.

The EMF study includes an analysis of the potential EMF impacts related to the Facility along the interconnection between the proposed Facility Substation and the existing Kintigh Substation. No EMF calculations were performed on the 34.5 kV collection system. Cross-sections provided in Appendix 22-A and the Design Drawings (Appendix 5-B) include the following, as applicable:

1. The transmission gen-tie facilities including the proposed Facility showing structural details and dimensions and identifying phase spacing, and any other characteristics affecting EMF emissions;
2. All underground electric transmission, sub-transmission, and distribution facilities;
3. All underground gas transmission facilities;
4. All ROW boundaries; and
5. Structural details and dimensions for all structures (dimensions, phase spacing, and similar categories).

Information regarding the underground collection system for the Facility are shown in the Design Drawings provided as Appendix 5-B. As none of the transmission gen-tie line is proposed to be

underground; and the Facility is not proposing sub-transmission or distribution facilities, this information is not provided in Appendix 22-A or Appendix 5-B. As such, item #2 in the above list is not applicable. As no underground gas transmission facilities are located in the Project Site, this information is not provided in Appendix 22-A or Appendix 5-B. As such, item #3 is not applicable.

22(c) Aerial Photographs/Drawings

The proposed transmission line is depicted on aerial photography in the Design Drawings provided in Appendix 5-B (Sheet CL-E.01.01), as well as on 345 kV Transmission Line Tie-In Route Map figure provided in the EMF study (Appendix 22-A). The figure, elevation view, and H-Frame framing drawings (also included in Appendix 22-A) detail ROW segment, cross-sections, and the location of the Facility components in relation to the nearest residence or occupied non-residential building (1,183 feet away to the south). The EMF study provides an evaluation of the distance from the transmission line to the nearest residence, in terms of identifying drops to negligible levels past 500 feet from the gen-tie centerline.

22(d) Electric and Magnetic Field (EMF) Calculation Report

The EMF study (Appendix 22-A) evaluates the EMFs for each identified segment cross-section for the proposed Facility. The EMF study includes the following:

1. Signed, and stamped by a licensed professional engineer registered and in good standing with the State of New York.
2. EMF modeling and calculations performed using:
    a. Institute of Electrical and Electronics Engineers (IEEE) 644 – 2019, IEEE standard for measurement of power frequency EMF from AC power lines
    b. Calculations based on the Electric Power Research Institute Red Book methods (3rd Edition, 2005 -7.4 Calculation of Magnetic Fields and Appendices 7.1 Calculation of Field Ellipse Parameters and 7.6 Electric Field Calculations for 3D Geometry)
    c. New York State Public Service Commission, Cases 26529 and 26559
    d. Office of Renewable Energy Siting (ORES) regulations
    e. National Electrical Safety Code (2017).
3. The EMF study modeled the electric field circuits at rated voltage and provides calculation tables and field strength graphs calculated at 1 meter (3.28 feet) above ground level with 5-foot measurement intervals, depicting the width of the entire 120-foot ROW out to 500

feet from the gen-tie transmission line centerline on both sides. The EMF study includes digital copies of input assumptions and outputs for the calculations.

4. The EMF study also provided the magnetic field calculation tables and field strength graphs calculated at 1 meter (3.28 feet) above ground level with 5-foot measurement intervals, depicting the width of the entire 120-foot ROW out to 500 feet from the gen-tie transmission line centerline on both sides. The EMF study includes digital copies of input assumptions and outputs for the calculations.
5. Magnetic field calculation tables and field strength graphs calculated at 1 meter (3.28 feet) above ground level with 5-foot measurement intervals, depicting the width of the entire 120-foot ROW out to 500 feet from the gen-tie transmission line centerline on both sides have been provided in the EMF study, along with digital copies of input assumptions and outputs for the calculations.
6. Magnetic field calculation tables and field strength graphs calculated at 1 meter (3.28 feet) above ground level with 5-foot measurement intervals, depicting the width of the entire ROW out to 500 feet from the gen-tie transmission line centerline on both sides have been provided in the EMF study, along with digital copies of input assumptions and outputs for the calculations.
7. The EMF study demonstrates that the proposed Facility and associated components, including the transmission lines, conform to the Public Service Commission's Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities at the proposed ROW edges. Table 22-1 below, details the maximum EMF levels calculated in the analysis.

Table 22-1. New York Public Service Commission EMF Level Interim Guidelines.

Field Type	Guidelines Limit	Maximum Value at Proposed Right-of-Way Edge
Electric Field	1.6 kV/m	1.6 kV/m (at +/- 60 feet from centerline of right-of-way)
Magnetic Field	200 mG	22.5 mG (with no offset from right-of-way)

The levels of EMF were determined to be less than the 1.6 kV/m maximum and 200 mG field level permitted at the edge of the proposed ROW. The EMF study demonstrates that the EMF levels are well within the guidelines. Refer to Appendix 22-A for additional information.

As supported by the requirements established in §900-2.23, an EMF study is not warranted for the Facility collector network due to the voltage being below 34.5 kV.