SOMERSET SOLAR, LLC

MATTER NO. 22-00026

§900-2.5 Exhibit 10

Geology, Seismology, & Soils

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYM LIST

%	percent
§	Section
ASTM	American Society for Testing Materials
bgs	below ground surface
CmB	Claverack loamy fine sand, 2–6% slopes
CnA	Collamer silt loam, 0–2% slopes
CnB	Collamer silt loam, 2–6% slopes
DuB	Dunkirk silt loam, 2–6% slopes
HDD	horizontal directional drilling
HsB	Hudson silt loam, 2–6% slopes
Ma	Madalin silt loam, 0–3% slopes
NaA	Niagara silt loam, 0–2% slopes
NaB	Niagara silt loam, 2–6% slopes
NYCRR	New York Codes, Rules and Regulations
PV	photovoltaic
RbA	Rhinebeck silt loam, 0–2% slopes
SWDA	Solid Waste Disposal Area
USDA NRCS	United States Department of Agriculture Natural Resources Conservation Service
USGS	United States Geological Survey

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 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 696 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 10 Geology, Seismology, and Soils

This exhibit addresses the requirements specified in 19 New York Codes, Rules and Regulations (NYCRR) Section (§) 900-2.11. It contains the results of a study of the potential geology, seismology, and soils impacts of the Somerset Solar Facility (Facility) including the identification and mapping of existing conditions within the approximate 1,396-acre site on which the Facility is proposed (Project Site), and proposed impact avoidance and mitigation measures.

The Project Site ranges from flat to mildly sloped. Portions of the approximately 696-acre Facility Site (limit of disturbance) will require re-grading to achieve proposed finished grades, including some of the proposed gravel access roads and within panel arrays where required to meet racking tolerances. Existing drainage patterns have been maintained where feasible, to minimize impacts to recharge/infiltration of stormwater. In areas where grading will result in changes to the existing drainage patterns, stormwater filter strips and additional erosion and sediment control measures have been included in the design plans and accommodated in the Preliminary Stormwater Pollution Prevention Plan prepared for the Facility (Appendix 13-C). Approximately 282 acres will require grading, and approximately 82 acres of forest clearing (tree/brush clearing and grubbing) are anticipated within the Facility Site.

The potential for sinkhole formation or significant seismic activity is anticipated to be low. Results of the 42 borings completed for the Project Site as part of the geotechnical investigation is provided in Appendix 10-A. Based on the number of test pile locations distributed across the site, occasional refusals (cobbles and/or boulders) is anticipated to be encountered at 10–20 percent (%) of locations where foundation posts (i.e., for racking and inverters) will be installed (ANS Geo 2021). The potential presence of limited shallow bedrock can require rock removal techniques such as ripping, hammering, or pre-drilling. Although some pre-drilling may be required, blasting is not anticipated. Ground-borne vibrations will be minimal and will not create any risk with respect to surrounding properties and structures. At locations where an electrical collection line crosses sensitive natural resources, trenchless technology such as horizontal directional drilling (HDD) will be used. No impacts to karst geology are expected as no signs of karst geology or surficial depressions were identified on site. The Facility has been designed to comply with 19 NYCRR §900-2.11 and the Uniform Standards and Conditions and impacts related to geology, seismology, and soils have been avoided and minimized to the maximum extent practicable.

10(a) Study of Geology, Seismology, and Soil Impacts of the Facility

(1) Existing Slopes Map

Based on the topography survey completed for the Project Site, the layout has sited Facility components outside of any slopes present on the site that are greater than 15% (Figure 10-1). With respect to the erodibility of natural soils, or impacts to sensitive environmental, agricultural, and human health or safety receptors, the topographic relief and nature of the Project Site ranges from flat to mildly-sloped and is well-vegetated. These conditions should minimize the potential for appreciable erosion. There are no slopes greater than 15% within the drainage area potentially influenced by the Facility Site and interconnections. Accordingly, all Facility construction will occur on slopes less than 15%.

Figure 10-1 includes a map delineating existing slopes (0–3%, 3–8%, 8–15%, 15–25%, 25–35%, greater than 35%) within the drainage area potentially influenced by the Facility and interconnections.

(2) Proposed Site Plan

Preliminary design drawings for the Facility are included as part of Exhibit 5 to this Application and include the existing and proposed contours, at a minimum 2-foot interval, within the Facility Site (Appendix 5-A, Sheets PV-C.03.01–PV-C.03.10).

(3) Construction Methodology and Excavation Techniques

It is anticipated that the site development activities will consist of installation of posts for solar module racking, foundation slabs for ancillary structures (i.e., equipment pads, ballasts for areas requiring above-ground racking, sleeper trays for cables required to be above-ground), and limited, narrow excavations for installation of cables.

Solar racking will be installed using both pile-driven posts and ballasted foundations (Appendix 5-B, Sheets PV-E.05.11 and PV-E.05.12). Ballasted foundations will be required in the coal storage pile and landfill (Solid Waste Disposal Area [SWDA] II) areas, where soil penetration cannot occur to protect the liners that are installed in these areas for protection of groundwater.

Underground trenching will be utilized to install a majority of the electrical collection cables, except in the coal storage pile and SWDA II areas, where electrical collection lines will be installed above-ground on sleeper trays (Appendix 5-B, Sheets PV-E.05.21 and PV-E.05.22). It is anticipated that the construction of the proposed Facility will be completed in several stages, and include the main elements listed below:

- *Photovoltaic (PV) Arrays.* In the PV solar arrays located outside the coal storage pile and SWDA II areas, support posts will be driven to a depth of between 8 and 12 feet below ground surface (bgs). Based on the test pile locations completed across the site, occasional refusals (cobbles and/or boulders) is anticipated to be encountered at 10–20% of locations where foundation posts (i.e., for racking and inverters) will be installed (ANS Geo 2021). Limited bedrock refusal is also anticipated during construction. In areas where refusal is encountered shallower than the design embedment depth, it is anticipated that the location will be pre-drilled and the support posts will be installed in place. Any spoils generated by drilling activities will be re-placed into the hole as backfill, or spread within the Facility Site to maintain site grade and minimize off-site disposal. In areas where ballasted foundations are required for racking, excavation will not be required. Within the coal storage pile and landfill areas, racking will be ballasted and no driven piles or pre-drilling will occur in these areas.
- *Equipment Foundations.* Equipment foundations (i.e., inverters) within the solar array will generally be steel skid on 10- to 12-foot deep piles or placed on slab-on-grade foundations on 12 inches of aggregate overlaid on crushed stone to create a level base and to serve as free-draining granular fill. Limited bedrock refusal is anticipated during construction. In areas where refusal is encountered shallower than the design embedment depth, it is anticipated that the location will be pre-drilled and the support posts will be installed in place. Any spoils generated by drilling activities will be re-placed into the hole as backfill, or spread within the Facility Site to maintain site grade and minimize off-site disposal. Foundation sizes will be apportioned based on the allowable bearing capacities recommended within the Geotechnical Report (Appendix 10-A). Excavation of slab on grade foundations can be performed with traditional excavation equipment, such as backhoes or tracked excavators. Pile-driven foundations will only be installed in areas of the Facility Site located outside the coal storage pile and SWDA-II. Where ballasted foundations are required in the coal storage pile and SWDA-II areas, no pile-driving will occur.
- *Trenching*. Direct burial methods utilizing appropriate industry equipment including, but not limited to, a cable plow, rock saw, rock wheel and/or trencher will be used during the installation of underground electrical collection system whenever possible. Direct

burial involves the installation of bundled cable (electrical and fiber optic bundles) directly into a narrow cut or "rip" in the ground. The narrow cut disturbs an area approximately 2-3 feet wide with bundled cable installed to a minimum depth of about 24-48 inches in most areas. In the area of the coal storage pile and SWDA-II, cable installation will not require ground excavation as sleeper cable trays will be required in these areas.

  - Where underground installation of electrical cables is proposed (Figure 3-2), burial of cabling will include excavation of an open trench approximately 2-3 feet wide. Using this installation technique, topsoil and subsoil are excavated, segregated, and stockpiled adjacent to the trench. Where necessary, clean sand bedding will be place in the trench bottom before installing cables. Following cable installation, the trench is backfilled with suitable fill material and any additional spoils are spread out or otherwise spread on site. Following installation of the buried collection line, areas will be returned to pre-construction grades. One or more soil screening areas may be established on site to screen excavated material to the required specification for trench backfill. It is anticipated that the excavated material can be screened to provide sufficient quantities of backfill material.

- *HDD*. At locations where an electrical collection line crosses sensitive resources (i.e., wetlands) internal or public roads, railroad lines or easements, a trenchless technology such as HDD will be used. A total of 21 HDD areas are proposed, and are associated with stream and wetland crossings, ditch crossings, interior road crossings, a railroad crossing and crossings of NYS Route 18/Lake Road (Appendix 5-A, PV-C.02.00–PV-C.02.10; Appendix 5-B Sheets PV-E.01.09 and PV-E.08.03). This technique involves installing the conduit underground using boring equipment set up on either side of the crossing. No surface disturbance is required between the bore pits, and existing vegetation may remain in place. As HDD techniques will depend on the installation contractor, it is anticipated that, an Inadvertent Return Plan will be prepared as a compliance filing, per subpart §900-10.2(f)(5), prior to construction.

  - Area 1 (Appendix 5-A, Sheet PV-C.02.01) – this portion of the Facility Site contains one HDD location under an internal Facility Site access road and existing Verizon communications line easement. According to the boring log B-

SS2 from the Geotechnical Report, soils in the area of this HDD consisted of silt, clay, and silty sand. Groundwater was encountered at approximately 17 feet bgs. Dominant soil unit types within this area include Dunkirk silt loam, 2–6% slopes (DuB), and Collamer silt loam, 2–6% slopes (CnB).

- Area 2 (Appendix 5-A, Sheet PV-C.02.02) – this portion of the Facility Site contains two HDD locations; one under NYS Route 18/Lake Road and one under a wetland (WB-25). According to boring log B-21, soils in the area of this HDD consisted of clayey sands, clay, and clayey gravel. Groundwater was not encountered. The dominant soil unit type within this area is CnB.
- Area 3 (Appendix 5-A, Sheet PV-C.02.03) – this portion of the Facility Site contains three HDD locations; one under NYS Route 18/Lake Road, one under a wetland (WB-18) and one under Fish Creek (Stream SB-3). According to boring log B-14, soils in the area of the NYS Route 18/Lake Road HDD consisted of clay and weathered rock material and groundwater was encountered at approximately 9 feet bgs. The dominant soil unit type within this area includes CnB. According to boring log B-30, soils in the area of wetland WB-18 consisted of silt and clay and groundwater was not encountered. The dominant soil unit types within this area includes the Claverack loamy fine sand, 2–6% slopes (CmB) and Rhinebeck silt loam, 0–2% slopes (RbA). According to boring log B-11, soils in the area of stream SB-3 consisted of silt, clay, and clayey sand. Groundwater was not encountered. The dominant soil unit types within this area includes the Hudson silt loam, 2–6% slopes (HsB), and RbA.
- Area 4 (Appendix 5-A, Sheet PV-C.02.04) – this portion of the Facility Site contains four HDD locations; one under NYS Route 18/Lake Road, one under a wetland (WB-20A), one under Fish Creek (Stream SB-3), and one under an internal gravel access road. No soil borings were completed in the vicinity of the NYS Route 18/Lake Road, Stream SB-3 or internal gravel access road HDDs. The dominant soil unit type within this area includes CnB. According to boring log B-09, soils in the area of the wetland WB-20A HDD consisted of clay and clayey sand. Groundwater was not encountered. The dominant soil unit type within this area is RbA.
- Area 5 (Appendix 5-A, Sheet PV-C.02.05) – this portion of the Facility Site contains one HDD location under NYS Route 18/Lake Road. No soil borings

were completed in the vicinity of this HDD location. The dominant soil unit type within this area is the Niagara silt loam, 0–2% slopes (NaA).

- Area 6 (Appendix 5-A, Sheet PV-C.02.06) – this portion of the Facility Site contains two HDD locations; one under NYS Route 18/Lake Road and one under a ditch. According to boring log B-06, soils in the area of these two HDD locations consisted of clay, silt, and silty sand. Groundwater was measured at approximately 9.4 feet bgs at groundwater monitoring well SA02-01S (Figure 13-1, Sheet 4). The dominant soil unit types within this area include the Collamer silt loam (CnA) 0–2% slopes, and RbA.
- Area 7 (Appendix 5-A, Sheet PV-C.02.07) – this portion of the Facility Site does not contain any HDD locations.
- Area 8 (Appendix 5-A, Sheet PV-C.02.08) – this portion of the Facility Site contains five HDD locations; one under the former railroad line bed, and four that cross under ditches. Dominant soil unit types within the area of the ditches located in the western area of the loop track includes CnA and Niagara silt loam, 2–6% slopes (NaB). Groundwater in this area was measured at approximately 7.7 feet bgs from groundwater monitoring well SO88-24 (Figure 13-1, Sheet 3). The dominant soil unit types within the area of the railroad line and the ditch crossing to the east includes CnB and Madalin silt loam, 0–3% slopes (Ma). In this area of the railroad and ditch crossing, soil boring B-SS-1 encountered groundwater at approximately 9 feet bgs.
- Area 9 (Appendix 5-A, Sheet PV-C.02.09) – this portion of the Facility Site contains one HDD location under Fish Creek (Stream SB-3). No soil borings were completed in the area of this location. Dominant soil unit types within this HDD location include CnA and RbA.
- Area 10 (Appendix 5-A, Sheet PV-C.02.10) – this portion of the Facility Site contains two HDD locations, which cross under two ditches. The dominant soil unit type in the area of the road HDD is HsB. Groundwater data was not available for this area. The dominant soil unit type for the two ditch HDDs is RbA. Groundwater in this area was measured at approximately 7.8 feet bgs from groundwater monitoring well SA02-05S (Figure 13-1, Sheet 4).

Descriptions of the soil unit types discussed above can be found in section 10(a)(12) of this exhibit, with more information of the associated wetlands included in Exhibit 14.

Further information regarding subsurface conditions within the Facility Site are included within the Geotechnical Report.

- *Collector Substation (Facility Substation)*. Two borings were completed at the proposed location for the Somerset Collector Substation (Facility Substation) location(Appendix 10-A). Excavations for the Facility Substation will generally consist of foundation and underground electrical installations. Concrete foundations for major equipment and structural supports will be placed, followed by the installation of various conduits, cable trenches, and grounding grid conductors. It is anticipated that spread footings will be utilized for the Facility Substation equipment. Therefore most, if not all, of the excavations within the Facility Substation area can be performed by traditional excavation equipment. However, drilled or driven piers may prove to be a more economical solution for some structures at the Facility Substation, such as dead-end / takeoff structures. Drilled piers are constructed by drilling a hole in the ground, installing a steel reinforcing cage, and backfilling with concrete.
- *Culverts*. Culverts will be installed or upsized if field data collected prior to construction determines upgrades are necessary to maintain natural drainage patterns. Where the access road in Area 6 crosses wetland WA-5 with flowing water, there will be permanent fill required to install the culvert and the access road (Appendix 5-A, Sheet PV-C.02.06). Appropriate sediment and erosion control measures will be installed and maintained according to the Facility-specific Stormwater Pollution Prevention Plan.
- *Grading*. The construction of access roads across the site will including grading activities, and placement of cut and fill. Although the areas planned for the solar related facilities are relatively flat and open, due to the manufacturers racking tolerance specifications, grading throughout the arrays areas is necessary. Where possible, the existing topography has been accommodated for in the design to minimize the impact of grading and site disturbance, as well as the need for removal and disturbance of vegetation. During design stages, topographic survey data collected using aerial methods was utilized to maintain existing drainage patterns in areas of cut and fill. Significant cut and fill is not anticipated to be needed within the PV solar array areas due to the relatively flat existing topography. Further information on proposed grading is located in Appendix 5-A, Sheets PV-C.03.01–PV-C.03.10.
- *Subsurface Conditions.* A geotechnical investigation was completed at the Project Site to evaluate the expected surface profile (Appendix 10-A). Based on the test pile locations conducted across the site, occasional refusals (cobbles and/or boulders) is

anticipated to be encountered at 10–20% of locations where foundation posts (i.e., for racking and inverters) will be installed (ANS Geo 2021). Limited bedrock refusal is anticipated during construction. In areas where refusal is encountered shallower than the design embedment depth, it is anticipated that the location will be pre-drilled and the support posts will be installed in place. The potential presence of limited shallow bedrock can require rock removal techniques such as ripping, hammering, or pre-drilling. Although some pre-drilling may be required, blasting or mass excavation of rock is not anticipated. Where cut-and-fill activities are required, any material which is moved/removed is anticipated to be re-used on-site to the extent possible. It is not anticipated that a significant amount of fill will be transported to the Facility from offsite; however, fill material needed for gravel road surfacing, sand for trench bedding, and preparing the Facility Substation footprint is anticipated to be required. Grading and stripping of topsoil in agricultural areas will be stockpiled and re-used only in agricultural areas per New York State Agricultural and Markets Solar Guidelines (Exhibit 15).

(4) Characteristics and Suitability for Material Excavated for Construction

A geotechnical investigation was conducted to evaluate the surface and subsurface soils, bedrock, and groundwater conditions on and in the vicinity of the Project Site. The Geotechnical Report is included as Appendix 10-A. As part of this evaluation the following items were reviewed, and reported as part of the Geotechnical Report:

- Subsurface Soils – Section 3 of the Geotechnical Report
- Bedrock Conditions – Section 3 of the Geotechnical Report
- Groundwater and Hydrogeologic Conditions – Section 3.1 of the Geotechnical Report
- Drainage Characteristics - Section 3 of the Geotechnical Report, Item (12) of this exhibit
- Karst Features – Item (9) of this exhibit
- Chemical Properties (corrosivity) – Section 4.3 of the Geotechnical Report
- Engineering Properties – Section 7.4 of the Geotechnical Report
- Frost Risk – Section 7.2 of the Geotechnical Report
- Laboratory Testing – Section 4 of the Geotechnical Report
- Seismic Considerations – Section 6 of the Geotechnical Report

- Construction Suitability Analysis and Recommendations – Section 8 of the Geotechnical Report

It was generally observed that the subsurface conditions encountered across the Project Site consisted of approximately 2–10 inches of topsoil, followed by an approximately 4-foot layer of medium stiff clay and silt, underlain by dense glacial till. As indicated in Section 7 of the Geotechnical Report (Appendix 10-A), the results of site-specific soil samples collected for corrosivity evaluation indicated a general moderate risk of soil-related corrosion to steel elements. Additional soil corrosivity testing is recommended for the northern-most locations of the Facility Site to confirm the limited findings of corrosivity testing performed on the Project Site, and to determine if additional coating and/or sacrificial steel thickness is required for Facility infrastructure (i.e., foundations) that will be located underground in this area of the Facility Site. Frost considerations and mitigation measures to be implemented during final engineering design and construction-phase measures to accommodate frost and adfreeze (i.e., frost heave) stress are identified in Section 7.2 of the Geotechnical Report provided in Appendix 10-A.

As part of the decommissioning plan for the former coal plant (Appendix 6-C), SWDA II is to be graded to meet the requirements of the operating permit for the plant (Appendix 6-D). After the top of the ash/solid waste surface of SWDA II is constructed to design elevations, the final cover system components will include:

- Construction of a low permeability soil barrier to a minimum 18-inch thickness and maximum coefficient of permeability of 1 x 10^{-5} centimeter per second. The majority of the soil is expected to originate from an on-site borrow pile located at the former coal plant site that has previously been used for final cover low permeability soil barrier construction. Any additional soil needed will be imported from a permitted off-site borrow source.
- A vegetated topsoil layer that will have a nominal thickness of 6 inches, will include topsoil consisting of a combination of on-site soil and imported material.
- Perimeter grass or riprap-lined drainage swales will be contained within the SWDA II area to drain to the existing perimeter drainage channels that flow to the sedimentation basin northeast of SWDA II. Interior swales also will be incorporated along channelized toes of slope (Appendix 6-D, Drawing No. 56921-C-004). The riprap lined swales will be underlain with separation geotextile.

The final grading plan and cover system proposed for SWDA II has been included as the basis for site conditions anticipated to be present prior to initiating construction of the Facility.

Based on the findings of the geotechnical investigation, the area is suitable for the proposed Facility.

(5) Preliminary Plan for Blasting Operations

Blasting is not anticipated to be required for construction of the Facility. In general, very limited shallow rock is expected to be encountered within the depth of planned foundation post installation (approximately 8–12 feet) across the Facility Site. In the event that rock is encountered, it is anticipated that rock removal techniques such as ripping, hammering, or pre-drilling can be completed to accommodate construction of the proposed Facility.

(6) Assessment of Potential Impacts from Blasting

Blasting is not anticipated for the Facility as noted above. Rock removal techniques such as ripping, hammering, or pre-drilling can be used to allow for construction activities, if rock is encountered.

(7) Identification and Evaluation of Reasonable Mitigation Measures Regarding Blasting Impacts

Blasting is not anticipated for the Facility, therefore, mitigation related to blasting-related impacts will not be required for the Facility. If rock is encountered, rock removal techniques such as ripping, hammering, or pre-drilling can be completed to allow for construction activities

(8) Description of Regional Geology, Tectonic Setting, and Seismology

A desktop review of surficial and bedrock geology maps and reports made available by the New York State Geological Survey and the New York State Education Department was conducted as part of the Geotechnical Report (Appendix 10-A) and project planning. Available mapping indicates that the native surficial soils are predominantly classified as “lacustrine silt and clay” which are described as laminated, calcareous, silts and clays. A small portion (approximately 5%) of the Project Site resides within soils classified as “till moraine” which are described as variable textured material. Figure 10-2 provides a

Surficial Geology Map which identifies the surficial geology expected across the Project Site.

Bedrock geological mapping indicates the Project Site is underlain entirely by the Queenston formation which predominantly consists of shale, sandstone, and siltstone bedrock (Figure 10-4).

The site-specific geologic field investigation conducted revealed that the surficial geology and bedrock geology were in general conformance with this publicly available mapping.

From a tectonic and seismic setting, the Project Site is located in a "tectonically passive" region of New York State (Isachsen et. al., 1990). Bedrock in the Project Site was deposited in shallow seas on the stable North American craton, with geologic setting in the Interior Lowlands adjacent to Lake Ontario. Figure 10-5 identifies seismic hazard potential, known, prior epicenters, and distances from the Project Site based on the 2018 United States Geological Survey (USGS) Long-term National Seismic Hazard Mode (Petersen et. al., 2019). Mapping reveals a low hazard for seismic hazard. The USGS Model defines the potential for earthquake ground shaking for various probability levels across the conterminous United States and is applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. According to the USGS, the model represents an assessment of the best-available science in earthquake hazards and incorporates new findings on earthquake ground shaking, seismicity, and long-period amplification over deep sedimentary basins.

A full description of the regional geology and seismology of the Project Site has been provided in Sections 3 and 6 of the Geotechnical Report (Appendix 10-A). In addition, data obtained from the geotechnical investigation, including soil boring explorations and test piles, was utilized to determine the Seismic Site Class for the Project Site.

Based on the Standard Penetration Test average N-value method, as prescribed in Chapter 20 of the American Society of Civil Engineers Standard 7-16 design manual[1] and based on field observations made during the geotechnical investigation Site Class D "stiff soil" conditions are assumed as the average condition across the Project Site. The following seismic ground motion values were also obtained from the USGS Seismic Hazard Maps for this portion of the Project Site (Site Class D):

[1] Source: American Society of Civil Engineers no date

- 0.2 second spectral response acceleration, S_S[2]= 0.167 g[3]
- 1 second spectral response acceleration, S_1[4]= 0.046 g
- Maximum spectral acceleration for short periods, S_{MS}[5]= 0.267 g
- Maximum spectral acceleration for a 1-second period, S_{M1}[6]= 0.111 g
- 5% damped design spectral acceleration at short periods, S_{DS}[7]= 0.178 g
- 5% damped design spectral acceleration at 1-second period, S_{D1}[8]= 0.074 g

(9) Facility Construction and Operation Impacts to Regional Geology

Based on review of publicly available USGS Digital Karst Map Compilation and Database, as well as the "Geologic Map of New York, Niagara Sheet" prepared by New York State Education Department (Isachsen and Fisher 1970), the bedrock formation beneath the Facility consists of shale, sandstone, and siltstone bedrock. In addition to publicly available mapping, no signs of karst geology or surficial depressions were identified on site. The development is expected to include shallow concrete and/or post foundations for panels; therefore, based on review of publicly available data and the results of the geotechnical investigation, it is expected that there will be no karst impacts during construction and operation of the Facility.

(10) Seismic Activity Impacts on the Facility Location and Operation

The USGS Earthquake Hazards Program did not identify any young faults within the vicinity of the Project Site and, therefore, the Project Site is at a low risk of impact from seismic activity.

(11) Soil Types Map

Maps depicting soil units within the Project Site are included in Attachment G of the Geotechnical Report (Appendix 10-A) and shown on Figure 10-3. Soils also are summarized for the Facility Site and 5-mile study area in Exhibit 15 and shown in more detail on Figure 15-8 and Figure 15-9. In addition, Figure 10-3 has been prepared to

---

[2] Risk-Targeted Maximum Considered Earthquake (MCE_R) ground motion (0.2 second).
[3] The unit "g" represents the acceleration due to gravity.
[4] MCE_R ground motion (1.0 second).
[5] Site-modified spectral acceleration value (0.2 second).
[6] Site-modified spectral acceleration value (1.0 second).
[7] Numeric seismic design value (0.2 second).
[8] Numeric seismic design value (1.0 second).

highlight each of the United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS) soil types across the Facility Site, including the Facility Substation area.

(12) Soil Type Characteristics and Suitability for Construction and Dewatering

Surficial soil mapping within the USDA NRCS' Web Soil Survey application was reviewed, which identified the Project Site to be primarily comprised of a number of silt load soil type. A summary of predominant soil unit properties has been provided in Table 10-1. A complete list of soil types mapped in the Facility Site is provided in Exhibit 15, Table 15-5).

Table 10-1. United States Department of Agriculture Natural Resources Conservation Service Soil Properties Summary

Map Unit Symbol	Map Unit Name	Drainage Class	Available Water Storage
ApA	Appleton silt loam, 0–3% slopes	Somewhat poorly drained	Moderate (about 8.4 inches)
ArB	Arkport very fine sandy loam, 0–6% slopes	Well drained	Low (about 5.4 inches)
CmA	Claverack loamy fine sand, 0–2% slopes	Moderately well drained	Very low (about 2.1 inches)
CmB	Claverack loamy fine sand, 2–6% slopes	Moderately well drained	Very low (about 2.1 inches)
can	Collamer silt loam, 0–2% slopes	Moderately well drained	High (about 10.0 inches)
CnB	Collamer silt loam, 2–6% slopes	Moderately well drained	High (about 10.0 inches)
DuB	Dunkirk silt loam, 2–6% slopes	Well drained	High (about 10.3 inches)
DuC3	Dunkirk silt loam, 6–12% slopes, eroded	Well drained	High (about 10.3 inches)
Ha	Hamlin silt loam	Well drained	High (about 10.9 inches)
HlA	Hilton silt loam, 0–3% slopes	Well drained	Moderate (about 7.7 inches)
HlB	Hilton silt loam, 3–8% slopes	Well drained	Moderate (about 7.7 inches)
HsB	Hudson silt loam, 2–6% slopes	Moderately well drained	High (about 9.7 inches)
NaA	Niagara silt loam, 0–2% slopes	Somewhat poorly drained	High (about 10.4 inches)
NaB	Niagara silt loam, 2–6% slopes	Somewhat poorly drained	High (about 10.4 inches)

Map Unit Symbol	Map Unit Name	Drainage Class	Available Water Storage
RbA	Rhinebeck silt loam, 0–2% slopes	Somewhat poorly drained	Low (about 3.6 inches)
RbB	Rhinebeck silt loam, 2–6% slopes	Somewhat poorly drained	Low (about 3.6 inches)
Wa	Wayland soils complex, 0–3% slopes, frequently flooded	Poorly drained	Very high (about 12.6 inches)

Individual soil map units that occur within the Project Site, as well as their respective hydrologic soil group rating, acreage within the Project Site, % of the Project Site, and USDA NRCS soil properties are included in Attachment G of the Geotechnical Report (Appendix 10-A).

Based on desktop study, the surficial geology of the Project Site soils is generally mapped as lacustrine silt and clay, with a minor amount of outwash sand and gravel located in the southern-most section of the site (Figure 10-2). The field investigations undertaken for the geotechnical investigation identifies generalized subsurface conditions as topsoil within the first 0.5 feet, underlain by medium stiff clay and silt between 0.5 and 4 feet bgs, and glacial till from 4 feet to 10+ feet bgs (Table 1 in Appendix 10-A).

Representative soil samples collected during the geotechnical investigation were submitted to an accredited geotechnical laboratory for testing of material index properties for engineering design in accordance with applicable American Society for Testing Materials International standards. A summary of laboratory testing data is provided as Section 4 of the Geotechnical Report (Appendix 10-A).

Groundwater was encountered within a small portion (20%) of the soil boring locations between 3 feet and 20 feet below grade at the time of the field investigation program. Groundwater depth for groundwater monitoring wells sampled in October 2021 as part of the ongoing groundwater monitoring program in place for the former coal plant (Somerset Station) and that are located within the Facility Site ranged from approximately 8.8 feet to 15.5 feet (Appendix 13-D and Figure 13-1). Since the Project Site is underlain by glacial till, primarily between 4 feet and 10 feet bgs, comprised of a matrix of cobbles, boulders, gravel, sand, silt, and clay which collectively have a low permeability; it is likely that these water levels represent perched water conditions rather than static groundwater. Perched water, as shallow as 3 feet below grade was encountered during the geotechnical investigation completed for the Project Site. Groundwater, perched water, and/or infiltrated stormwater will need to be managed as needed during construction using localized pump-and-sump or similar techniques to allow for concrete foundation construction in-the-dry. Any water required to be discharged will be managed in accordance with the approved SWPPP and in compliance with any applicable state and local regulations. Surfaces will be graded to divert stormwater away from open excavation to the extent possible.

If excavations are affected by groundwater or stormwater, the selected contractor during construction will be prepared to manage groundwater or infiltrated stormwater using pump-and-sump or similar techniques to allow for foundation construction in-the-dry, if necessary. The contractor(s) will grade the surface, as necessary, to direct stormwater away from open excavation to the extent possible. Additional information on the results of groundwater elevations and data obtained for the former coal plant's groundwater monitoring program is described in Exhibit 13 and detailed in Appendix 13-D.

Based on the geotechnical investigation results, the Project Site is considered suitable for construction and operation of the Facility.

(13) Bedrock and Underlying Bedrock Maps, Figures and Analyses

Bedrock geological mapping indicates the Project Site is underlain entirely by the Queenston formation which predominantly consists of shale, sandstone, and siltstone bedrock (Figure 10-4) (Appendix 10-A). Based on the test pile locations completed across the site, occasional refusals (cobbles and/or boulders) are anticipated to be encountered at 10–20% of locations where foundation posts (i.e., racking and inverters) will be installed (ANS Geo 2021) (Appendix 10-A). Limited bedrock refusal is anticipated during construction. In areas where refusal is encountered shallower than the design embedment depth, it is anticipated that the location will be pre-drilled and the support posts will be installed in place.

In addition to bedrock analyses, Section 3 of the Geotechnical Report (Appendix 10-A) portrays the subsurface cross section of soil and bedrock across the Project Site. The subsurface cross section was developed using site-specific technical studies, soil borings, and observations made during the geotechnical investigation.

10(b) Evaluation of Suitable Building and Equipment Foundations

(1) Preliminary Engineering Assessment

As is typical with solar farm construction, driven and/or drilled and driven embedded steel piles are proposed to be implemented to support the proposed PV racks. Although installation depths of shallow foundations will likely be limited to within 5 feet of grade, and up to 12 feet for driven piles, actual foundations sizes and embedment depths will be apportioned based on recommended capacities provided in the Geotechnical Report (Appendix 10-A) and specifications identified by the solar racking manufacturers.

Conventional shallow foundations, such as slab on grade (depending on soil conditions and equipment), are proposed to be utilized to support the proposed equipment pads (e.g., inverter skids, medium voltage transformers) within the solar arrays as well as the Facility Substation transformers and equipment and in the PV arrays located on the coal storage pile area and SWDA II. Inverters will likely arrive on site as a single package on steel skids which may be similarly supported by concrete footings, sonotubes, or driven steel piles. These foundation elements, as well as drilled piers, are also anticipated to support equipment within the Facility Substation area.

A preliminary engineering assessment was performed as part of the geotechnical evaluation for the Project Site. The results of the engineering assessment are provided as Section 7 of the Geotechnical Report (Appendix 10-A).

(2) Pile Driving Impact Assessment

The coal storage pile area and SWDA II will utilize ballasted racking and pile driving of racking posts will not occur in these areas. As is typical with solar farm construction, solar panels located outside the coal storage pile area and SWDA II will be supported by steel piles (e.g., w-beams) driven to a depth of approximately 8 to 12 feet below grade. The parameters provided in Section 7.4 of the Geotechnical Report (Appendix 10-A) have been used to preliminarily size 6 x 9 H-piles; however, other pile types such as w-beams or c-beams could be utilized. Final pile depths will be determined by the racking manufacturer in the detailed design stage.

The number of installed piles for solar racking located outside the coal storage pile area and SWDA II is estimated to be approximately 33,451 posts. The final number of racking posts will be dependent upon the final configuration of the racking system, module layout, and panel configuration (two in-portrait or one in-portrait). It is anticipated that the piles can be installed in 90 days utilizing six pile installation crews working 10 hours per day. The final number of racking posts will be dependent upon the final configuration of the racking system, module layout, and panel configuration (two in-portrait or one in-portrait). It is anticipated that the piles￼90 days utilizing ￼￼ pile installation crews working 10 hours per day.

Installation of piles is typically completed using a small, specialized excavator-sized pile driving hammer such as a Vermeer PD10 or Gayk HRE4000. It is not anticipated that a traditional, large crane-operated pile driving hammer used for heavily-loaded structures will be employed. Should pre-drilling be required, it will likely be completed by the same pile driving hammer which is outfitted with an auger or drill attachment, or rock drill such as Ingersoll-Rand ECM-350 or similar machine. Based on the relatively small pile cross-section and the anticipated installation methods, ground-borne vibrations will be minimal and will not create any risk with respect to surrounding properties and structures.

(3) Pile Driving Mitigation

Solar tracker pile installation is commonly performed using vibrating pile drivers with no off-site vibration effects. The expected pile driver type is the Vermeer PD10 vibratory hammer, Gayk HRE4000, or similar, which will exert a maximum driving energy between 750 and 850 pound-feet using a hammer weight of 8,000 pounds while driving the pile to depth of 8-12 feet. The pile driver that may be required for the inverter skids and Facility Substation equipment, if required, will have similar specifications. Pile driving activities will not pose risk with respect to surrounding properties or structures. Because no impacts to surrounding properties from pile driving are anticipated, mitigation measures and a compensation plan are not applicable.

(4) Evaluation of Earthquake and Tsunami Event Vulnerability at the Facility Site

Based on observation of subsurface conditions, computed Site Class ratings, and review of USGS’s 2014 National Seismic Hazard Map, there is a low risk of significant seismic activity within the Project Site that could cause damage to the Facility.

Figure 10-5 identifies seismic hazard potential, known, prior epicenters, and distances from the Project Site based on the 2018 USGS Long-term National Seismic Hazard Model (Petersen et. al., 2019). Mapping reveals a low hazard for seismic hazard. The USGS

Model defines the potential for earthquake ground shaking for various probability levels across the conterminous United States and is applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. According to the USGS, the model represents an assessment of the best-available science in earthquake hazards and incorporates new findings on earthquake ground shaking, seismicity, and long-period amplification over deep sedimentary basins.

Based on its geographic location, the Project Site is not subject to risk of a tsunami event.

References

American Society of Civil Engineers. No date. ASCE7-16 Web Service Documentation. Available online at: ASCE7-16 Web Service Documentation (usgs.gov). Accessed January 23, 2023.

ANS Geo. 2021. Geotechnical Report (Rev. 1). AES Somerset Solar Project. November 21, 2021. 311 pp.

Isachsen, Y.W., and D.W. Fisher. 1970. Geologic Map of New York; Niagara Sheet, 1:250,000, New York State Education Department.

Isachsen, Y.W., T.D. Mock, R.E. Nyahay, and W.B. Rogers. 1990. New York State Geological Highway Map. Educational Leaflet No. 33. 1:1,000,000, four-plate color sheet.

Petersen, M. D., A.M. Shumway, P. M. Powers, C. S. Mueller, M. P. Moschetti, A. D. Frankel, and Y. Zeng. 2019. The 2018 update of the US National Seismic Hazard Model: Overview of model and implications. Earthquake Spectra.