ConnectGen Montgomery County LLC

Mill Point Solar I Project

Matter No. 23-00034

§ 900-2.11 Exhibit 10

Geology, Seismology, and Soils

Revised August 2024

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Glossary Terms

Applicant:	ConnectGen Montgomery County LLC (ConnectGen), a direct subsidiary of ConnectGen LLC, is the entity seeking a siting permit for the Facility from the Office of Renewable Energy Siting (ORES) under Section 94-c of the New York State (NYS) Executive Law.
Facility:	The proposed components to be constructed for the generation, collection and distribution of energy for the Project will include: photovoltaic (PV) solar modules and their rack/support systems; direct current (DC) and communications cables connecting the panels to inverters; the inverters, with their support platforms, control electronics, and step-up transformers; buried alternate current (AC) medium voltage collector circuits; fencing and gates around each array of modules; access roads; temporary laydown/construction support areas; a medium voltage-to-transmission voltage substation with associated equipment and fenced areas; a new 3-breaker ring bus point of interconnection switchyard (POI switchyard); two adjacent approximately 305 foot-long 345 kV transmission line segments to interconnect the new POI switchyard to the existing National Grid Marcy – New Scotland 345-kilovolt transmission line; and an operations and maintenance (O&M) building with parking/storage areas as well as any other improvements subject to ORES jurisdiction.
Facility Site:	The tax parcels proposed to host the Facility, which collectively totals 2,665.59 acres.
Point of Interconnection (POI) or POI Switchyard:	A new 3-breaker ring bus point of interconnection switchyard will be constructed adjacent to the existing National Grid Marcy – New Scotland 345-kilovolt transmission line; the substation will tie into the new POI switchyard via an overhead span and deliver power produced from the Facility onto the electric grid through two overhead spans tapping the National Grid-owned Marcy – New Scotland 345-kV transmission line. The POI switchyard is located off Ingersoll Road in the northeastern portion of the Facility Site.

Limits of Disturbance (LOD):	The proposed limits of clearing and disturbance for construction of all Facility components and ancillary features are mapped as the LOD. The LOD encompasses the outer bounds of where construction may occur for the Facility, including all areas of clearing, grading, and temporary or permanent ground disturbance. This boundary includes the footprint of all major Facility components, defined work corridors, security fencing, and proposed planting modules, and incorporates areas utilized by construction vehicles and/or personnel to construct the Facility.
Project or Mill Point Solar I	Collectively refers to permitting, construction, and operation of the Facility, as well as proposed environmental protection measures and other efforts proposed by the Applicant.
Study Area:	In accordance with the Section 94-c Regulations, the Study Area for the Facility includes a radius of five miles around the Facility Site boundary, unless otherwise noted for a specific resource study or Exhibit. The 5-mile Study Area encompasses 96,784.84 acres, inclusive of the 2,665.59-acre Facility Site.

Acronym List

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating current
bgs	Below ground surface
°C-cm/W	Celsius centimeter per watt
CBR	California Bearing Ratio
cm	Centimeter
DC	Direct current
ft	Foot
HDD	Horizontal directional drilling
kV	Kilovolt
LOD	Limit of Disturbance
mg/kg	milligrams per kilogram
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Conservation
NRCS	Natural Resource Conservation Service
O&M	Operations and Maintenance
ORES	Office of Renewable Energy Siting
OSHA	Occupational Safety and Health Administration
pcf	per cubic foot
POI	Point of Interconnection
POI switchyard	Point of Interconnection switchyard
psf	Pounds per square foot
PPV	Peak particle velocity
PV	Photovoltaic
ROW	Right of way
SPT	Soil pit test
SWPPP	Stormwater Pollution Prevention Plan
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
WSS	Web Soil Survey

EXHIBIT 10 GEOLOGY, SEISMOLOGY AND SOILS

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

The following sections discuss the geology, seismology, and soil impacts of the Facility in accordance with the requirements of 19 New York Codes, Rules and Regulations (NYCRR) Section 900-2.11. Existing conditions within and surrounding the Facility Site are mapped and described. Impacts of the Facility are evaluated and proposed avoidance and mitigation measures are introduced.

(1) Existing Slopes Map

Figure 10-1 depicts the existing slopes (0-3 percent, 3-8 percent, 8-15 percent, 15-25 percent, 25-35 percent, and greater than 35 percent) on and within the drainage area potentially influenced by the Facility Site. Slopes within the Facility Site generally range from 0 to 8 percent, though some areas of higher slopes are present. Within the Facility Site, steeper slopes are generally found within the central and eastern portions of the site, concentrated along the banks of the Auries Creek. Additional areas of steep slope are located sporadically throughout the Facility Site, associated with general landform and topography variation. Siting of Facility components and associated construction areas generally avoid steeper slopes. According to Section 5(5)(a) of the Town of Glen Solar Law (Town of Glen 2022), which is included in Revised Exhibit 24, Appendix 24-3 of this Application, Large Scale (Utility) solar energy systems are prohibited in land that has slope greater than 15 percent. The Facility has been designed to comply with this requirement to the maximum extent practicable, however there are areas of the design which need to be in areas with slopes greater than 15 percent, therefore there are limited areas were the Applicant is seeking a waiver. For further explanation of this waiver request see Revised Exhibit 24, Appendix 24-5.

(2) Proposed Site Plan

A site plan has been developed depicting existing conditions and proposed Facility development, included in Revised Exhibit 5, Appendix 5-1. The site plan has been presented at a scale sufficient to show all proposed buildings, structures, paved areas, vegetative areas, and construction areas, with existing and proposed contours drawn at two-foot intervals. See Revised Exhibit 5, Design Drawings, for further details.

(3) Excavation Techniques

Excavation will be utilized to facilitate construction of several Facility components including underground collection lines, access roads, swales, detention basins, a substation, a Point of Interconnection (POI) switchyard, horizontal directional drilling (HDD) bore pits, laydown yards, and panel areas. Excavation activities include, but are not limited to, vegetation clearing, grubbing, topsoil stripping, grading, and trenching. Excavation will be completed using conventional construction equipment, including but not limited to, bulldozers, track hoes, pan excavators, cable plows, rock saws, rock wheels, and trenchers. Excavation techniques may vary by Facility component as described below.

Facility construction will be initiated with the preparation of the Facility Site for widespread construction activities. Low growing brush and tree stands will be cleared (and grubbed where appropriate) in areas of proposed Facility components, access roads, temporary laydown yards, and electrical collection line routes, except those areas in which underground boring (HDD) is proposed. Preparation of the Facility Site will also include cut and fill to achieve final grade suitable for construction activities, equipment siting, and stormwater management. Cut and fill activities will include constructing access roads, flattening high slope areas, and reducing side slopes. The Applicant developed the grading plan using a maximum slope goal of 15 percent in array areas and for access roads. This limit was selected to minimize risk associated with construction in high slope areas and to ensure all construction equipment could safely traverse the entire site. Excavation techniques for specific Facility equipment/infrastructure are described below.

(i) Temporary Laydown Yards

Laydown yards will be constructed by first stripping and stockpiling the topsoil and grading and compacting the subsoil. Geotextile fabric and gravel will then be installed to create a level working area. At the end of construction, gravel and geotextile fabric will be removed, topsoil will be returned and regraded to closely replicate pre-construction contours, and the disturbed area will be re-seeded in accordance with the Facility Vegetation Management Plan. Per Section 900-10.2(e)(4), the Facility Vegetation Management Plan will be submitted under separate cover as a pre-construction compliance filing.

(ii) Access Roads

20 foot wide Facility access road construction will involve grubbing of stumps as needed, topsoil stripping, and grading, as necessary. Any grubbed stumps will be removed from the site, chipped, or buried in suitable upland areas within the Facility Site. Stripped topsoil will be

stockpiled (and segregated from subsoil) for re-use. Following removal of topsoil, subsoil will be graded, compacted, and surfaced with gravel or crushed stone. Geotextile fabric or grid may be installed beneath the road surface for additional support, if necessary.

(iii) Photovoltaic (PV) Arrays and Fixed Racking

It is not anticipated that excavation will be required for the installation of PV array rack foundation piles. Piles will be driven to a minimum depth between 6.5 and 12 feet, with the final depth to be determined during the detailed design. In locations with shallow bedrock or refusal, pile locations will be pre-drilled, and the foundation piles may be grouted in place. Driven piles will also be utilized for support of the inverter and MV transformer skids.

(iv) Underground Electrical Collection Lines

Excavations required for underground electrical collection lines include, but are not limited to, cable trenching and cable plowing. These direct burial methods utilize common industry equipment (e.g., trenchers, rock saws, cable plows, etc.) to open and prepare trenches for the installation of underground electrical and communication lines. Cables may be installed via direct burial or conduit and topsoil and subsoil will be segregated and stockpiled adjacent to the trench excavations for use in site restoration.

As underground collection line trenches can provide a conduit for groundwater flow, trenches will be backfilled with materials of similar permeability characteristics of the surrounding native soil. If higher permeability fill is used in trenches, consideration will be given to installing seepage collars and/or check dams to reduce the likelihood of migration of water through the trenches to maintain the flow of water to pre-construction conditions in accordance with the Stormwater Pollution Prevention Plan (SWPPP) (Revised Exhibit 13, Appendix 13-1) and industry best practices.

At limited locations where the underground electrical collection lines cross streams, wetlands, or public roadways, trenchless technologies (e.g., HDD, jack-and-bore, etc.) may be used to comply with regulatory and/or owner requirements.

Trenchless crossings use boring/drilling equipment to set up bore pits on either side of the crossing route, outside of sensitive or restricted areas such that no surface disturbance is required between the bore pits. Existing vegetation and facilities within the crossing route (including mature trees) can remain in place. Trenchless conduit installation methods may impact the site due to a potential surface release of lubricant drilling mud, or an "inadvertent return." Such inadvertent returns are rare and the drilling contractor will develop an Inadvertent

Return Plan that will be submitted as a pre-construction compliance filing pursuant to Section 900-10.2(f)(5) and implemented during construction. This plan will include a description of inadvertent return mitigation and response measures. For more information on proposed avoidance and mitigation of stream and wetland impacts, please refer to Revised Exhibits 13 and 14.

(v) Overhead Electrical Generation Tie Line

It is not anticipated that the construction of the overhead generation tie line will require significant grading or topsoil excavation. The Project will perform vegetation clearing within the generation tie line right-of-way (ROW) but will limit grubbing and permanent soil disturbance to areas required for access and the siting of collection line pole footings. Final pole foundation details, including foundation depth and backfill material, will be finalized during final detail design.

(vi) Project Substation

Construction of built facilities, such as the substation, will begin with stripping and temporarily stockpiling topsoil for later use during landscaping (as appropriate), grading, and preparation of laydown areas for construction equipment, materials, and parking. Concrete foundations for major equipment and structural supports will be placed, followed by the installation of various conduits, cable trenches, and grounding grid conductors. The area will then undergo aggregate surfacing.

In areas of backfill placement and/or construction of shallow foundations, all topsoil and organic or otherwise deleterious material should be removed before foundation construction or new fill placement. Any obstructions that would interfere with new foundation construction must be removed in their entirety from a foundation location. After stripping residual topsoil and excavation to the proposed bearing elevations for shallow mat foundations, the exposed subgrade areas should be vigorously densified with as large a compactor as is practical. Loose or unstable areas identified during the course of excavation should be densified in-place or excavated and replaced with compacted load bearing fill.

Temporary excavations will be shored, sloped, or braced, as required by Occupational Safety and Health Administration (OSHA) regulations, to provide stability and safe working conditions. All excavations will comply with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards. Erosion and sedimentation control measures will be installed and maintained in accordance with the Project's SWPPP to ensure drainage conditions during and after construction of the Facility are consistent with pre-construction conditions. An environmental monitor will ensure compliance with all applicable environmental regulations and guidelines, in accordance with Section 900-6.4(b).

Drying of onsite soils should be anticipated before reuse in compacted backfills, particularly during wet seasons. Once a subgrade has been prepared, construction traffic should be controlled in such a fashion as to minimize subgrade disturbance.

All backfills should be placed in layers not exceeding eight inches loose thickness. This criterion may be modified depending on the conditions present at the time of construction and the compaction equipment used. Fills and backfills will be compacted to varying densities as appropriate.

If site grading will include cuts, especially at depths near dense soil or bedrock, then heavy-duty excavators or dozers with ripper attachments may be required to remove the decomposed rock materials. Cobbles or other refusal material may be encountered during excavation of trenches. Heavy duty excavators and/or hydraulic ram attachments may need to be considered if such conditions are encountered.

(4) Characteristics and Suitability of Material Excavated for Construction

A Geotechnical Engineering Report (Appendix 10-1) was completed by TRC Engineers to investigate the characteristics and suitability of subsurface conditions on an approximately 3,000 area survey area (Survey Area), inclusive of the 2,665.59-acre Mill Point Solar I Facility Site. The geotechnical survey was conducted prior to the final Facility Site being established for this Application. A total of 32 test borings were drilled within the Survey Area; 30 test borings were drilled to a target depth of 15 feet, while two test borings were drilled to a target depth of 35 feet. Of the total 32 test borings drilled, 22 borings are located within the currently proposed Mill Point Solar I Facility Site. The remaining 10 test borings that were drilled fall outside of the Facility Site. Soil samples were collected at each boring location to produce several representative soil samples and five composite bulk soil samples for laboratory analysis. Field resistivity tests were conducted at 10 locations throughout the Survey Area. Based on the results of the geotechnical survey, subsurface conditions within the Facility Site are compatible with Facility construction given the current excavation and construction methods proposed. Blasting is not currently proposed. A summary of subsurface characteristics and suitability is provided below.

Further information regarding subsurface conditions within the Facility Site is included within the Geotechnical Engineering Report (Appendix 10-1) and summarized below.

(i) Subsurface Conditions

Within the Surveyed Area, a surficial topsoil layer was encountered with approximately three inches of thickness.

Below the topsoil layer, a layer of brown to dark brown clays and silts was encountered, with varying quantities of sand, gravel, or gravel-sized rock fragments. Penetration soil pit test (SPT) N-values indicate that the consistency of this layer ranges from “medium” to “stiff” in the upper two to four feet below ground surface (bgs) and increases to “very stiff” to “hard” with depth. Laboratory analysis of representative samples indicates plastic limits ranging from 13 percent to 28 percent, liquid limits ranging from 18 percent to 52 percent, and plasticity indices ranging from 4 percent to 25 percent. Natural moisture contents range from approximately 10 percent to 40 percent and dry unit weights range from approximately 93.9 to 124.8 pounds per cubic foot (pcf). Maximum laboratory-compacted dry density ranged from 96.2 to 119 pcf at optimum moisture contents, which ranged from 11.8 percent to 18.4 percent.

Layers of cobbles and boulders were occasionally encountered throughout the Surveyed Area in various test borings. These layers were encountered between three feet bgs and fifteen feet bgs. The SPT N-values for these strata indicate a consistency of “very dense” to refusal. The presence of these cobble and boulder layers may result in difficult driving conditions for driven post foundation installation.

Auger refusal, which typically represents the presence of weathered rock or bedrock, was encountered in ten of the 32 test borings. Depths of refusal ranged from 6.5 feet bgs to 9.5 feet bgs. Difficult driving conditions, which typically indicate very dense soil and/or weathered rock, were encountered in 21 of the 32 test borings.

A summary of subsurface conditions encountered at each test boring location within the Facility Site is provided in Table 10-1 below. Additional details regarding subsurface conditions are provided in Appendix 10-1.

Table 10-1. Subsurface Conditions at Bore Locations

Test Boring Location	Depth of Bore (ft)	Depth to Groundwater (ft)	Depth to Difficult Drilling Conditions (ft)	Depth to Auger Refusal (ft)	Subsurface Condition
B-01	6.9	N/A	6.5	6.9	Topsoil from 0' – 0.2'; brown silty clay (trace to some fine/medium sand, some orange staining) from 0.2' – 6.9'.
B-02	15	N/A	8	>15	Topsoil from 0' – 0.2'; dark brown, moist, silty clay (trace gravel, some orange staining on gravel) from 0.2' – 10'; dark brown to black silty clay (some gravel) from 10' to 15'.
B-03	15	N/A	8	>15	Topsoil from 0' – 0.3'; brown, moist, clayey silt (trace to some fine/medium sand) from 0.3' – 6.3'; brown clay (trace to some gravel) from 6.3' – 8.5' with probable cobbles from 7.8' – 8.5'; brown to dark grey, moist silt (trace to some gravel) from 8.5' to 15'.
B-04	15	N/A	7	>15	Topsoil from 0' – 0.2'; dark brown sand and clayey silt (trace to some fine/coarse gravel) from 0.2' – 7'; cobbles from 7' – 8'; dark gray silt (some fine/ medium sand, trace to some gravel) from 8' to 15'.
B-05	15	N/A	7	>15	Topsoil from 0' – 0.2'; dark brown to brown clayey silt (trace to some fine/medium/coarse sand, trace gravel) from 0.2' – 7' with some clay from 4' – 5'; brown and dark gray silty clay (some fine/medium/ coarse sand, trace to some gravel) from 7' – 15' with probable cobbles from 7' – 10'.
B-06	7.7	N/A	7	7.7	Dark brown, moist, silty clay (trace to some fine/ medium sand) from 0' – 2'; gravel-sized rock fragments (some silt, some fine/medium/coarse sand) from 2' – 7.7' with a probable boulder at 3.5'.

Test Boring Location	Depth of Bore (ft)	Depth to Groundwater (ft)	Depth to Difficult Drilling Conditions (ft)	Depth to Auger Refusal (ft)	Subsurface Condition
B-07	15	N/A	8	>15	Brown silty clay (trace fine sand) with roots (organics) from 0' – 2'; brown, moist, silty clay (trace to some fine sand) from 2' – 6' (glacial till); dark gray, moist, fine/medium/coarse sand (trace to some gravel) from 6' – 15'.
B-08	15	12.5	>15	>15	Dark brown clayey silt (trace to some fine sand, trace fine gravel) from 0' – 6'; brown fine/medium/coarse sand (some fine gravel, some silt), wet, from 6' – 8'; brown fine/medium/coarse sand and clayey silt (trace to some gravel), wet, from 8' – 10'; dark grey silty clay (some fine sand), wet, from 10' – 15'.
B-09	13.9	10.3	10	13.9	Topsoil from 0' – 0.2'; dark brown fine/medium/ coarse sand and silt (trace to some gravel, some orange staining) from 0.2' – 12'; gravel-sized rock fragments from 12' – 13.9'.
B-10	15	N/A	7.8	>15	Topsoil from 0' – 0.2'; brown silt (some gravel, some orange staining) from 0.2' – 7.5'; dark gray to black silt (some gravel) from 7.5' – 15' with probable cobbles from 7.5'.
B-12	15	N/A	5	>15	Topsoil from 0' – 0.2'; brown fine/medium/coarse sandy silt (trace to some gravel) from 0.2' – 15' with possible cobbles from 5'.
B-13	15	N/A	>15	>15	Topsoil from 0' – 0.2'; brown, dark brown, and dark grey clayey silt (trace to some fine/medium sand, trace gravel, some orange staining) from 0.2' – 15' with possible cobbles encountered from 8.7' – 10'.
B-14	15	N/A	13.5	>15	Topsoil from 0' – 0.2'; brown, dark brown, and dark grey silty clay (trace to some fine/medium sand, trace to some gravel) from 0.2' – 15'. Possible cobbles encountered throughout boring.

Test Boring Location	Depth of Bore (ft)	Depth to Groundwater (ft)	Depth to Difficult Drilling Conditions (ft)	Depth to Auger Refusal (ft)	Subsurface Condition
B-16	15	N/A	>15	>15	Dark grey clayey silt (trace gravel), moist, from 0' – 4'; dark grey clayey silt (trace to some gravel, trace to some fine/medium/coarse sand), moist, from 4' – 8'; dark grey fine/medium/coarse sand and silt (some fine/coarse gravel), moist, from 8' – 13'; dark grey clayey silt (trace to some fine/coarse gravel) from 13' – 15'.
B-17	15	6	9	10.5, offset and completed to 15	Brown silt (trace to some fine/medium/coarse sand, trace gravel) with organics (roots), moist, from 0' – 4'; dark grey clay (some fine/medium/coarse sand, trace to some gravel-sized rock fragments), moist to wet, from 4' – 9'; shale cobbles from 9' – 13.5'; dark grey silty clay (trace fine/medium/coarse sand, trace gravel), wet, from 13.5' – 15'.
B-18	8	N/A	6	8	Brown clay (trace to some fine/medium sand, trace fine/coarse gravel), moist, from 0' – 6'; gravel-sized shale fragments from 6' – 8'.
B-19	7.5	N/A	6	7.5	Brown silty clay (trace fine/medium/coarse sand) with roots (organics), moist, from 0 – 2'; brown silt (trace fine/medium/coarse sand), moist, from 2' – 6'; decomposed shale from 6' – 7.5'.
B-20	15	N/A	>15	>15	Brown to dark gray silty clay (trace to some fine/ medium/coarse sand, trace gravel) from 0' – 15' with possible cobbles encountered at 5'.
B-21	15	N/A	>15	>15	Brown silt (some fine sand, some roots/organics), moist, from 0' – 2'; grayish brown and brown fine/ medium/coarse sand and silt (trace to some gravel), moist, from 2' – 6'; gray silty clay (trace fine/medium /coarse sand, trace gravel), moist, from 6' – 15'.

Test Boring Location	Depth of Bore (ft)	Depth to Groundwater (ft)	Depth to Difficult Drilling Conditions (ft)	Depth to Auger Refusal (ft)	Subsurface Condition
B-30	6.5	2.5*	5.5	6.5	Brown silt (trace to some fine/medium/coarse sand, trace gravel) from 0' – 4'; dark brown silty gravel (trace to some fine/medium/coarse sand), wet, from 4' – 6'; decomposed shale from 6' – 6.5'.
SS-01	35	18	7	>35	Brown clay (some fine/medium/coarse sand, trace to some gravel), moist, from 0' – 13'; dark gray fine/medium/coarse sandy silt (trace fine gravel), moist to wet, from 13' – 23'; dark gray silty clay (trace to some fine/medium/coarse sand, trace fine gravel), wet, from 23' – 35'. Wet conditions observed from 18' – 35'.
SS-02	35	8.2	9	>35	Brown silty clay and fine/medium/coarse sand (trace to some fine/coarse gravel), moist, from 0' – 2'; brown silt (some fine/medium/coarse sand, trace gravel), moist, from 2' – 6'; brown fine/medium/coarse sandy silt (trace gravel), moist, from 6' – 13' with probable cobbles from 8' – 11'; dark gray clay (trace to some fine/medium/coarse sand, trace to some fine/coarse gravel), moist to wet, from 13' – 23'; dark gray silty clay (trace to some fine/medium sand) from 23' – 35'.
*Possible perched water conditions.					

(ii) Soil Corrosivity, Thermal Resistivity, Frost Risk, and Shrink/Swell Potential

Five composite bulk soil samples were analyzed for chloride content, soluble sulfate content, pH, and resistivity. Chloride content ranged from 38 to 78 milligrams per kilogram (mg/kg), sulfate content ranged from 55 to 235 mg/kg, pH ranged from 7.7 to 8.4, and resistivity ranged from 1,176 to 2,940 ohm-centimeters (ohm-cm). Additionally, ten field resistivity tests were performed throughout the Survey Area. Field resistivity values ranged from 3,275 to 69,132 ohm-cm. Based on the field and laboratory resistivity results, the material within the Facility Site can be characterized as moderately to severely corrosive to buried metallic infrastructure. Design of the metallic steel tracker foundations (piles) will incorporate the corrosivity of the soils. Mitigation for potential corrosion can include, but is not limited to, sizing post material thickness with "sacrificial steel" or galvanizing the posts. Based on the analyzed sulfate content, corrosivity to Portland cement concrete via sulfate exposure may be considered negligible.

Thermal resistivity testing was performed on five composite bulk soil samples. It was found that the thermal resistivity decreases with increasing moisture content. Resistivity values varied from 100 to 565 degrees Celsius-centimeter per watt (°C-cm/W) when fully dry and from 46.8 to 111.5 °C-cm/W at optimum moisture.

Representative soil samples from varying borings and depths were analyzed for parameters such as grain size, plasticity, liquidity, and moisture content. The soil samples investigated had generally low shrink/swell potential. Only one sample tested (B-21) had medium shrink/swell potential; however, this sample was sourced from a depth between eight to ten feet bgs, which is deep enough to be of minimal concern.

Due to the presence of silt and clay sediments, soils within the Facility Site may have high to very high frost susceptibility. To mitigate and minimize frost risk, foundation subgrades for supporting electrical equipment or other ancillary structures subjected to freezing temperatures during construction and/or the life of the structure should be established at least four feet below adjacent grades or otherwise protected against frost action. Additional mitigation measures for specific foundation and earthwork techniques are described in the Geotechnical Engineering Report (Appendix 10-1) where applicable.

Refer to Sections 10(a)(11) and 10(a)(12) below for additional details regarding soil characteristics.

(iii) Bedrock Competence

As described above, auger refusal, which typically represents the presence of weathered rock or bedrock, was encountered in ten borings located throughout the Survey Area. Depths of refusal ranged from 6.5 feet bgs to 9.5 feet bgs. Due to this shallow refusal, standard driven pile foundations may not be feasible without pre-drilling or other modifications. Alternative foundation types or modifications may be more suitable for the subsurface conditions encountered. Refer to Section 10(b)(1) below for a discussion of preferred and alternative building and equipment foundations. Refer to Section 10(a)(13) below for additional details regarding bedrock characteristics.

(iv) Hydrologic and Groundwater Conditions

Groundwater was encountered in nine of the 32 test borings (see the Test Boring Logs attachment to Revised Appendix 6-1). Where encountered, depth to groundwater ranged from 2.5 feet bgs to 18.0 feet bgs. The two shallowest groundwater encounters may have been indicative of perched water conditions.

Groundwater and/or the development of perched water conditions may be encountered within standard excavation depths for foundations or utilities during wet periods. Depth to groundwater may fluctuate due to daily, seasonal, or long-term fluctuations, development of perched conditions, or ponding of water in low lying areas during wet periods.

(v) Subsurface Conditions at Proposed Trenchless Construction Locations

As described in Section 10(a)(3) below, trenchless crossing technology, such as HDD, will be employed to avoid and/or minimize impacts to wetlands, streams, and roadways at select locations within the Facility Site. Specifically, HDD will be used to minimize impacts associated with connecting the Facility Site underneath the following:

- Wetlands: W-NSD-69, W-NSD-72, W-NSD-77, W-JMP-45 (four crossing locations), W-KCF-16, W-MLM-7, W-KCF-13, W-NSD-55, and W-NSD-4 (one crossing location which also crosses stream S-NSD-5);
- Streams: S-MLM-12, S-NSD-7, S-NSD-44, S-NSD-46, S-CIW-2 (one crossing location which also crosses State Highway 30A), S-NSD-5 (one crossing location which also crosses wetland W-NSD-4), and Auries Creek (two crossing locations, including one that encompasses an overhead transmission ROW); and

- Roadways: Van Epps Road (three crossing locations), Ingersoll Road (three crossing locations), State Highway 30A (two crossing locations, including one that also crosses stream S-CIW-2), Auriesville Road, Lusso Road, and Scott Road.

Preliminary locations for use of HDD are depicted in Revised Exhibit 5, Appendix 5-1, Sheets MPS-E-401-1 through MPS-E-401-19 and on Figure 10-6. Dominant soil unit types within these areas are outlined in Table 10-2 below (USDA NRCS 2023). Refer to Section 10(a)(12) and Table 10-4 below for additional information regarding these soil unit types.

Table 10-2. Soil Types at HDD Locations

Map Unit Symbol	Map Unit Name
ApB	Appleton silt loam, 3 to 8 percent slopes
ChA	Churchville silty clay loam, 0 to 3 percent slopes
ChB	Churchville silty clay loam, 3 to 8 percent slopes
DaB	Darien silt loam, 3 to 8 percent slopes
FL	Fluvaquents, loamy
Fo	Fonda mucky silty clay loam
Ha	Hamlin silt loam
HrB	Howard gravelly silt loam, 3 to 8 percent slopes
HuB	Hudson silty clay loam, 3 to 8 percent slopes
IlA	Ilion silt loam, 0 to 3 percent slopes
LaB	Lansing silt loam, 3 to 8 percent slopes
LaC	Lansing silt loam, 8 to 15 percent slopes
LMF	Lansing and Mohawk soils, 25 to 60 percent slopes
Ma	Madalin silty clay loam, 0 to 3 percent slopes
MmB	Manheim silt loam, 3 to 8 percent slopes
RhA	Rhinebeck silty clay loam, 0 to 3 percent slopes
Data sourced from the USDA NRCS Web Soil Survey (USDA NRCS 2023).	

Table 10-3 and Figure 10-6 outline the expected locations of HDD and the relative risk of frac out based on the results of the Geotechnical Engineering Report (see Appendix 10-1). There is a low to medium frac out risk at proposed HDD locations. An Inadvertent Return Plan will be submitted as part of the Pre-Construction Compliance Filings (Section 900-10.2(f)(5)) and the potential for inadvertent returns would be further mitigated through onsite monitoring during HDD activities.

Table 10-3 HDD Locations and Relative Risk of Frac Out

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
1	S-NSD-5	SS-02	702	0.0-2.0 ft bgs – Medium Stiff Silty Clay and Sand 2.0-6.0 ft bgs – Stiff to Hard Silt 6.0-13.0 ft bgs – Hard Sandy Silt 13.0-23.0 ft bgs – Hard Clay 23.0-35.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 8-11 ft bgs.	Low to Medium
2	S-NSD-7	SS-02	456	0.0-2.0 ft bgs – Medium Stiff Silty Clay and Sand 2.0-6.0 ft bgs – Stiff to Hard Silt 6.0-13.0 ft bgs – Hard Sandy Silt 13.0-23.0 ft bgs – Hard Clay 23.0-35.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 8-11 ft bgs.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
3	Ingersoll Road	SS-02	119	0.0-2.0 ft bgs – Medium Stiff Silty Clay and Sand 2.0-6.0 ft bgs – Stiff to Hard Silt 6.0-13.0 ft bgs – Hard Sandy Silt 13.0-23.0 ft bgs – Hard Clay 23.0-35.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 8-11 ft bgs.	Low to Medium
4	S-NSD-1	SS-02	792	0.0-2.0 ft bgs – Medium Stiff Silty Clay and Sand 2.0-6.0 ft bgs – Stiff to Hard Silt 6.0-13.0 ft bgs – Hard Sandy Silt 13.0-23.0 ft bgs – Hard Clay 23.0-35.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 8-11 ft bgs.	Low to Medium
5	Ingersoll Road	B-21	845	0.0-2.0 ft bgs – Medium Stiff Silt 2.0-6.0 ft bgs – Medium Stiff to Stiff Silt and Sand 6.0-15.0 ft bgs – Medium Stiff to Stiff Silty Clay No bedrock was encountered in this boring.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
6	Auriesville Road	B-20	683	0.0-15.0 ft bgs – Soft to Hard Silty Clay No bedrock was encountered in this boring, however, possibles cobbles at 5 ft bgs.	Low to Medium
7	S-MLM-12	B-17	652	0.0-4.0 ft bgs – Medium Stiff to Stiff Silt 4.0-9.0 ft bgs – Stiff to Hard Clay 9.0-13.5 ft bgs – Shale Cobbles 13.5-15.0 ft bgs – Hard Silty Clay No bedrock was encountered in this boring, boring was offset due to shale cobbles.	Low to Medium
8	State Highway 30A	B-17	1,578	0.0-4.0 ft bgs – Medium Stiff to Stiff Silt 4.0-9.0 ft bgs – Stiff to Hard Clay 9.0-13.5 ft bgs – Shale Cobbles 13.5-15.0 ft bgs – Hard Silty Clay No bedrock was encountered in this boring, boring was offset due to shale cobbles.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
9	S-CIW-2	B-16	957	0.0-4.0 ft bgs – Medium Stiff to Very Stiff Clayey Silt 4.0-8.0 ft bgs – Very Stiff to Hard Clayey Silt 8.0-13.0 ft bgs – Dense Sand and Silt 13.0-15.0 ft bgs – Very Stiff Clayey Silt No bedrock was encountered in this boring.	Low to Medium
10	S-CIW-3	B-14	1,574	0.0-0.2 ft bgs – Topsoil 0.2-15.0 ft bgs – Medium Stiff to Hard Silty Clay No bedrock was encountered in this boring, however, possible cobbles throughout.	Low to Medium
11	S-NSD-46	B-12	517	0.0-0.2 ft bgs – Topsoil 0.2-15.0 ft bgs – Stiff to Hard Sandy Silt No bedrock was encountered in this boring, however, possible cobbles at 5 ft bgs.	Low to Medium
12	W-NSD-58	B-12	1,164	0.0-0.2 ft bgs – Topsoil 0.2-15.0 ft bgs – Stiff to Hard Sandy Silt No bedrock was encountered in this boring, however, possible cobbles at 5 ft bgs.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
13	Van Epps Road	B-13	534	0.0-0.2 ft bgs – Topsoil 0.0-15.0 ft bgs – Soft to Hard Clayey Silt No bedrock was encountered in this boring, however, possible cobbles from 8.7-10 ft bgs.	Low to Medium
14	Ingerson Road	B-12	1,432	0.0-0.2 ft bgs – Topsoil 0.2-15.0 ft bgs – Stiff to Hard Sandy Silt No bedrock was encountered in this boring, however, possible cobbles at 5 ft bgs.	Low to Medium
15	W-NSD-55	B-10	1,708	0.0-0.2 ft bgs – Topsoil 0.2-7.5 ft bgs – Medium Stiff to Hard Silt 7.5-15.0 ft bgs – Hard Silt No bedrock was encountered in this boring, however, possible cobbles at 7.5 ft bgs.	Low to Medium
16	W-KCF-13	B-10	170	0.0-0.2 ft bgs – Topsoil 0.2-7.5 ft bgs – Medium Stiff to Hard Silt 7.5-15.0 ft bgs – Hard Silt No bedrock was encountered in this boring, however, possible cobbles at 7.5 ft bgs.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
17	S-MLM-2	B-09	2,013	0.0-0.2 ft bgs – Topsoil 0.2-12.0 ft bgs – Loose to Very Dense Sand and Silt 12.0-13.9 ft bgs – Very Dense Gravel (Rock Fragments) Bedrock was encountered at 13.9 ft bgs.	Low
18	Van Epps Road	B-09	1,391	0.0-0.2 ft bgs – Topsoil 0.2-12.0 ft bgs – Loose to Very Dense Sand and Silt 12.0-13.9 ft bgs – Very Dense Gravel (Rock Fragments) Bedrock was encountered at 13.9 ft bgs.	Low
19	Maple Avenue	B-09	2,745	0.0-0.2 ft bgs – Topsoil 0.2-12.0 ft bgs – Loose to Very Dense Sand and Silt 12.0-13.9 ft bgs – Very Dense Gravel (Rock Fragments) Bedrock was encountered at 13.9 ft bgs.	Low
20	W-KCF-16	B-09	3,048	0.0-0.2 ft bgs – Topsoil 0.2-12.0 ft bgs – Loose to Very Dense Sand and Silt 12.0-13.9 ft bgs – Very Dense Gravel (Rock Fragments) Bedrock was encountered at 13.9 ft bgs.	Low

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
21	Van Epps Road	B-09	3,988	0.0-0.2 ft bgs – Topsoil 0.2-12.0 ft bgs – Loose to Very Dense Sand and Silt 12.0-13.9 ft bgs – Very Dense Gravel (Rock Fragments) Bedrock was encountered at 13.9 ft bgs.	Low
22	W-JMP-45	B-09	4,045	0.0-0.2 ft bgs – Topsoil 0.2-12.0 ft bgs – Loose to Very Dense Sand and Silt 12.0-13.9 ft bgs – Very Dense Gravel (Rock Fragments) Bedrock was encountered at 13.9 ft bgs.	Low
23	W-JMP-45	B-05	3,440	0.0-0.2 ft bgs – Topsoil 0.2-7.0 ft bgs – Soft to Very Stiff Clayey Silt 7.0-15.0 ft bgs – Very Stiff to Hard Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 7-10 ft bgs.	Low to Medium
24	W-JMP-45	B-05	3,409	0.0-0.2 ft bgs – Topsoil 0.2-7.0 ft bgs – Soft to Very Stiff Clayey Silt 7.0-15.0 ft bgs – Very Stiff to Hard Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 7-10 ft bgs.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
25	W-JMP-25	B-05	3,646	0.0-0.2 ft bgs – Topsoil 0.2-7.0 ft bgs – Soft to Very Stiff Clayey Silt 7.0-15.0 ft bgs – Very Stiff to Hard Silty Clay No bedrock was encountered in this boring, however, possible cobbles from 7-10 ft bgs.	Low to Medium
26	Lusso Road	B-02	2,774	0.0-0.2 ft bgs – Topsoil 0.2-10.0 ft bgs – Medium Stiff to Hard Silty Clay 10.0-15.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring.	Low to Medium
27	W-NSD-77	B-02	1,948	0.0-0.2 ft bgs – Topsoil 0.2-10.0 ft bgs – Medium Stiff to Hard Silty Clay 10.0-15.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring.	Low to Medium
28	W-NDS-72	B-02	1,550	0.0-0.2 ft bgs – Topsoil 0.2-10.0 ft bgs – Medium Stiff to Hard Silty Clay 10.0-15.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring.	Low to Medium

HDD Locations[1]	Protected Resource	Nearest Bore Test Location	Distance between HDD and Test Bore Location (ft)	Boring Details	Relative Risk of Frac Out[2]
29	W-NSD-69	B-02	318	0.0-0.2 ft bgs – Topsoil 0.2-10.0 ft bgs – Medium Stiff to Hard Silty Clay 10.0-15.0 ft bgs – Very Stiff Silty Clay No bedrock was encountered in this boring.	Low to Medium

[1] HDD Location Numbers correspond to the HDD Location on Figure 10-6.

[2] Once the plan and profile of the HDD crossings have been finalized, horizontal fracture analysis will be performed based on the anticipated subsurface conditions at each HDD crossing location to establish maximum and minimum pressures required to maintain a stable borehole during HDD operations and to prevent inadvertent returns.

Further information regarding wetland and stream impacts can be found in Revised Exhibit 14, Wetlands, and Revised Exhibit 13, Water Resources and Aquatic Ecology, respectively. Further information regarding roadway impacts can be found in Revised Exhibit 16, Effect on Transportation.

(5) Preliminary Plan for Blasting Operations

Blasting operations are not currently proposed in the construction of the Facility. Therefore, a Preliminary Plan for Blasting Operations has not been provided.

(6) Assessment of Potential Impacts from Blasting

Blasting operations are not currently proposed; therefore, no impacts from blasting are anticipated.

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

Blasting operations are not currently proposed; therefore, no mitigation measures regarding blasting impacts are currently proposed.

(8) Regional Geology, Tectonic Setting, and Seismology

New York State (NYS) is located on the North American continental plate, significantly distant from any active tectonic plate boundary (USGS n.d.a). Seismic activity across NYS is generally low, with the greatest seismic hazard located in the northern portion of the state (FEMA 2020; USGS 2018).

NYS can be divided into several physiographic provinces based on similarities in topography and geology (NYSM n.d.a). The Facility Site is located within both the Hudson-Mohawk Lowlands physiographic province and the Alleghany Plateau physiographic province.

The Mohawk Lowlands, also known as the Mohawk River Valley, is an area of regionally low elevations surrounding the Mohawk River. The region is dominated by sedimentary rocks of the Paleozoic Era, which overly Precambrian basement rock (USGS n.d.b). Erosional and depositional landforms are common throughout the region, created by extensive glaciation during the Pleistocene (Tewksbury and Allers 1992).

The Alleghany Plateau is a large region of uplifted terrain associated with the Appalachian Mountains, stretching from central New York to West Virginia (Britannica 2013; NPS 2018). In New York, the region is dominated by sedimentary rocks of the Paleozoic Era, particularly from the Devonian Period (USGS n.d.b). Rock strata are generally near-horizontal, with incision and dissection from rivers and streams. Similar to the Mohawk Lowlands, glacial landforms are common throughout the region (Britannica 2013; NPS 2018).

The Facility Site is located within the vicinity of one Unique Geological Feature, as identified by the New York State Department of Environmental Conservation (NYSDEC n.d.). This Unique Geological Feature, named “Ingersoll Road (Route 117) – Auriesville,” is a roadside feature with the following description: “Auriesville Exposure; Diamicts, gravel & sand” and is located in the northeast portion of Parcel ID 52.-2-17.111. This Unique Geological Feature is not located within the Facility’s limits of disturbance (LOD), and there are no Facility components proposed at its location.

(9) Facility Construction and Operation Impacts to Regional Geology

Significant impacts to regional geology are not currently anticipated as a result of Facility construction or operation.

Facility components will be designed, sited, and constructed in a manner that avoids or minimizes temporary and permanent impacts to regional geology to the extent practicable. Blasting is not currently proposed in the construction of the Facility. Although pre-drilling may be required in areas of shallow bedrock, impacts due to pre-drilling will be localized and are not anticipated to have significant regional impacts. Although pile driving may be required, impacts due to pile driving will be localized and are not anticipated to have significant regional impacts, as described in below Section 10(b)(2). Based on the results of the geotechnical survey, subsurface conditions within the Facility Site are compatible with Facility construction given the current excavation and construction methods proposed. The Geotechnical Engineering Report (Appendix 10-1) has not identified any concerns regarding adverse impacts to existing local or regional geologic conditions.

As noted above in Section 10(a)(8), a Unique Geological Feature is located in close proximity to the Facility Site. This Unique Geological Feature will be avoided as no Facility components are proposed to be sited in this area; therefore, impacts to this Unique Geological Feature are not currently anticipated.

Carbonate rocks have the potential to produce karst topography and features, such as sink holes and caves. As noted below in Section 10(a)(13), carbonate rocks are present within a small area of the Facility Site towards the northwestern-most boundary of the Site. A portion of this area, located between State Route 5S and Mary’s Lane, has been identified by the United States Geological Survey (USGS) as a potential karst area (Weary & Doctor 2014).

Although this area of the Facility Site has the potential to produce karst features, no evidence of karst has been observed onsite. Based on the site reconnaissance performed at the time of the test boring stakeout and drilling for the geotechnical survey, no karst features such as surface depressions or other signs of potential on-going sinkhole development were visually observed at the Facility Site that signified possible sinkhole activity. During the geotechnical survey, no evidence of active solutioning, typically identified by voids, varying depths of rock, and/or very soft or loose soil zones immediately overlying intact rock or refusal conditions, were encountered at the test boring locations. However, based on the agricultural use of the property, it is assumed that surface features will vary based on seasonal site activities related to the tilling, planting, and harvesting of crops. Measures will be implemented to minimize and mitigate risks from construction in potential karst areas, including, but not limited to, backfilling of surface voids and filling or grading of observed surface depressions to direct surface water flow away from potential low areas underlain by carbonate limestone formations within the proposed array fields. Mitigation measures for pile-driving and pre-drilling, if utilized in potential karst areas, will also be employed.

(10) Seismic Activity Impacts on Project Location and Operation

As discussed above in Section 10(a)(8), seismic hazard is generally low across New York State, with the greatest seismic hazard located in the northern portions of the state (FEMA 2020; USGS 2018). Seismic hazard within and surrounding the Facility Site is considered low (FEMA 2020; USGS 2018).

Figure 10-5, Seismic Hazards, displays brittle structures and seismic hazard within the Facility Site. Seven brittle structures are identified within the Facility Site, one inferred normal fault, one fault trace, and four topographic linear features (NYSM n.d.b). No young faults were identified within the Facility Site and no faults within or immediately surrounding the Facility Site have experienced seismic displacement in the Quaternary Period.

The Facility Site has been determined to be within "Site Class C." The maximum considered earthquake ground motions in this area for 0.2 sec. and 1.0 sec. spectral responses are approximately 21.4 percent g and 6.2 percent g, respectively. For Site Class C, the corresponding 0.2 and 1.0 sec. design spectral response acceleration parameters SDS and SD1 are 18.5 percent g and 6.2 percent g, respectively.

Although the Facility Site is not significantly vulnerable to seismic events, the Facility will be designed and constructed to minimize potential impacts from seismic activity. The Facility will be designed to resist the effects of earthquake motions in accordance with Section 1613 of the 2020 Building Code of New York State or ASCE 7. Facility components will be equipped with emergency electrical shut offs to be utilized in the event of an emergency, such as a seismic event. Revised Exhibit 6, Public Health, Safety, and Security, details emergency preparedness and emergency response procedures to be implemented during Facility construction and operation.

(11) Soil Types Map

Figure 10-2 depicts soil types within the Facility Site. A list of all soils present within the Facility Site is provided in Table 10-4 in Section 10(a)(12) below.

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

The United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Web Soil Survey (WSS) was referenced to provide information on soil types and characteristics within the Facility Site (USDA NRCS 2023). A total of 34 soil units were identified within the Facility Site. A summary of all soils and their characteristics are provided in Table 10-4 below.

The Geotechnical Engineering Report in Appendix 10-1 evaluates and assesses onsite soils, as described in Section 10(a)(4) above. The results of the geotechnical survey generally agree with the soil characteristics provided by the NRCS and provide more precise analytical data regarding onsite conditions. Additional details regarding geotechnical investigation of onsite soils can be found in Sections 2.0 and 3.0 of Appendix 10-1.

Table 10-4. Soil Types and Characteristics within the Facility Site

Map Unit Symbol	Soil Unit	Slopes (%)	Texture	Organic Matter (%)	Hydrologic Soil Group*	Depth to Water Table (cm)	Frost Action	Depth to Bedrock (cm)	Steel Corrosion Risk	Concrete Corrosion Risk	Acres in Facility Site
AnB	Angola	3 to 8	Silt loam	2.94	D	23	High	61	High	Low	16.0
ApA	Appleton	0 to 3	Silt loam	1.23	B/D	20	High	>200	High	Low	2.6
ApB	Appleton	3 to 8	Silt loam	1.23	B/D	20	High	>200	High	Low	338.4
AZF	Arnot-Rock outcrop association	35 to 60	Channery silt loam	2.54	D	>200	Moderate	41	Moderate	High	8.0
CFL	Cut and fill land	0 to 15	Gravelly Loam	0.23	A	137	Moderate	>200	High	Moderate	0.0
ChA	Churchville	0 to 3	Silty clay loam	1.09	C/D	18	High	>200	High	Low	77.9
ChB	Churchville	3 to 8	Silty clay loam	1.09	C/D	18	High	>200	High	Low	391.1
DaB	Darien	3 to 8	Silt loam	1.32	C/D	18	High	>200	High	Low	333.3
FL	Fluvaquents	0 to 2	Gravelly silt loam	1.11	B/D	15	High	>200	High	Moderate	73.7
Fo	Fonda	0 to 3	Mucky silty clay loam	6.22	C/D	0	High	>200	High	Low	25.3
Ha	Hamlin	0 to 3	Silt loam	1.39	B	137	High	>200	High	Low	21.8
HrB	Howard	3 to 8	Gravelly silt loam	1.05	A	>200	Moderate	>200	High	Moderate	38.6
HrC	Howard	8 to 15	Gravelly silt loam	1.05	A	>200	Moderate	>200	High	Moderate	6.7
HuB	Hudson	3 to 8	Silty clay loam	1.11	C/D	48	High	>200	High	Low	9.2
Ila	Ilion	0 to 3	Silt loam	1.59	C/D	0	High	>200	High	Low	29.5

Map Unit Symbol	Soil Unit	Slopes (%)	Texture	Organic Matter (%)	Hydrologic Soil Group*	Depth to Water Table (cm)	Frost Action	Depth to Bedrock (cm)	Steel Corrosion Risk	Concrete Corrosion Risk	Acres in Facility Site
IlB	Ilion	3 to 8	Silt loam	1.59	C/D	0	High	>200	High	Low	22.3
LaB	Lansing	3 to 8	Silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	120.1
LaC	Lansing	8 to 15	Silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	351.4
LaD	Lansing	15 to 25	Silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	81.8
LMF	Lansing and Mohawk soils	25 to 60	Gravelly silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	157.8
Ma	Madalin	0 to 3	Silty clay loam	1.40	C/D	0	High	>200	Moderate	Low	120.6
MmB	Manheim	3 to 8	Silt loam	1.60	C/D	23	High	>200	High	Low	12.3
MsB	Mohawk	3 to 8	Silt loam	1.36	B	183	Moderate	>200	High	Low	63.5
MsC	Mohawk	8 to 15	Silt loam	1.36	B	183	Moderate	>200	High	Low	143.0
MsD	Mohawk	15 to 25	Silt loam	1.36	B	183	Moderate	>200	High	Low	11.8
PaB	Palatine	3 to 8	Silt loam	2.80	C	>200	Moderate	71	Low	Low	59.0
PaC	Palatine	8 to 15	Silt loam	2.80	C	>200	Moderate	71	Low	Low	44.1
PaD	Palatine	15 to 25	Silt loam	2.80	C	>200	Moderate	71	Low	Low	45.9
PmC	Palmyra	8 to 15	Gravelly silt loam	1.12	A	>200	Moderate	>200	High	Moderate	7.8
PpB	Phelps	3 to 8	Gravelly loam	1.07	B/D	54	High	>200	High	Moderate	12.2
Pr	Phelps, fan	0 to 8	Gravelly loam	1.07	C	76	Moderate	>200	High	Moderate	0.3
RhA	Rhinebeck	0 to 3	Silty clay loam	1.55	C/D	18	High	>200	High	Low	33.5
RhB	Rhinebeck	3 to 8	Silty clay loam	1.55	C/D	18	High	>200	High	Low	2.8

Map Unit Symbol	Soil Unit	Slopes (%)	Texture	Organic Matter (%)	Hydrologic Soil Group*	Depth to Water Table (cm)	Frost Action	Depth to Bedrock (cm)	Steel Corrosion Risk	Concrete Corrosion Risk	Acres in Facility Site
Te	Teel silt loam	0 to 3	Silt loam	1.68	B/D	48	High	>200	High	Low	4.7

*Hydrologic Group Classes are defined as the following:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Data sourced from the USDA NRCS Web Soil Survey (USDA NRCS 2023).

As described in Section 10(a)(4) above, groundwater was encountered in nine of the 32 test borings during the geotechnical survey within the Survey Area. Where encountered, depth to groundwater ranged from 2.5 feet bgs to 18.0 feet bgs. The two shallowest groundwater encounters may have been indicative of perched water conditions. Groundwater and/or the development of perched water conditions may be encountered within standard excavation depths for foundations or utilities during wet periods. Depth to groundwater may fluctuate due to daily, seasonal, or long-term fluctuations, development of perched conditions, or ponding of water in low lying areas during wet periods. Based on observations of the Facility Site, shallow excavations for foundation slabs and construction of utilities are not expected to encounter static groundwater. However, perched groundwater conditions are anticipated to impact excavations in low lying areas or during wet periods. If perched groundwater or surface runoff are encountered, sumps and pumps should be sufficient to control groundwater and provide stable working conditions.

To investigate the suitability of on-site soils for construction of the typical gravel access roads, vegetated turnarounds, and stabilized pervious access road segments, a supporting analysis was completed by a qualified professional using proprietary design tools (Appendix 10-2). Conservative California Bearing Ratio (CBR) values were assumed for the existing site soils. Analysis was performed for a range of CBR values to account for varying subgrade strengths across the site. Results of the analysis indicate that, where geogrid alone will not provide adequate support, the addition of Geoweb meets or exceeds design criteria. Refer to Appendix 10-2 for results of this supporting analysis. The typical gravel access roads, vegetated turnarounds, and stabilized pervious access road segments have been designed to support the weight of emergency response vehicles required by the New York State 2020 Fire Code.

Design of the vegetated turnarounds has been revised to include geogrid and Geoweb. The use of both materials will provide adequate support for emergency vehicle loads. The Geoweb will also protect the vegetation and soil from compaction due to traffic. The Geoweb will be filled with a blend of crushed stone and topsoil and capped with two to three inches of additional topsoil.

The stabilized pervious access road segments also include both geogrid and Geoweb. The notes on Revised Exhibit 5, Appendix 5-1, Sheet MPS-C-106-01 describe three scenarios, or applications, where these stabilized pervious access road segments are required. Application one is a low water crossing where runoff will be allowed to flow over the road. In addition to providing additional strength, the Geoweb will hold the stone in place during wash-overs. Application two applies where the road slope exceeds 8%. In addition to providing additional strength, the Geoweb will hold the stone in place to improve traction on the steeper road segments. Application three applies to areas with very weak soils. The addition of the Geoweb complements the geogrid providing additional support of the anticipated loads.

Based on the information provided by the USDA NRCS WSS and Geotechnical Engineering Report, on-site soils are suitable for Project construction given the current methods and infrastructure currently proposed.

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

Figure 10-3 depicts the surficial geology within the Facility Site, while Figure 10-4 depicts the bedrock geology present within the Facility Site. The surficial geology of the Facility Site is dominated by glacial deposits, including till, lacustrine sand, lacustrine delta deposits, and lacustrine silt and clay. Recent alluvium and near-surface bedrock is also present within the Facility Site (Caldwell et al 1987). The bedrock geology of the Facility Site is dominated by Canajoharie Shale, a fissile, calcareous, black shale of the Middle Ordovician period (Fisher et al 1970). Also present within the northwest corner of the Facility Site are the undivided Trenton and Back River Groups and the Beekmantown Group Formation. The Beekmantown Group consists of limestone and dolostone, with minor siltstone and chert of the Lower Ordovician period (Fisher et al 1970). The Trenton and Black River Groups consist of carbonate limestone. Based on information provided by the NRCS, estimated depth to bedrock within the Facility Site ranges from 41 centimeters to greater than 200 centimeters. Depth to the groundwater table is estimated to range from zero centimeters to greater than 200 centimeters (USDA NRCS 2023).

The Geotechnical Engineering Report in Appendix 10-1 evaluates and assesses onsite geologic conditions, as described in Section 10(a)(4) above. Vertical profiles showing soils, bedrock, water table, and other subsurface features are provided in the Test Boring Logs attached to the rear of Appendix 10-1.

During the geotechnical survey, a three-inch topsoil layer was encountered, underlain by a layer of brown to dark brown clays and silts with varying quantities of sand, gravel, or gravel-sized rock fragments. Strata of cobbles and boulders were occasionally encountered throughout the layer of clays and silts. Auger refusal, which typically represents the presence of weathered rock or bedrock, was encountered in ten borings located throughout the Survey

Area at depths ranging from 6.5 feet bgs to 9.5 feet bgs. The remaining test borings did not encounter auger refusal prior to their termination at depths ranging from 15 feet bgs to 35 feet bgs.

Additional details regarding geotechnical investigation of surficial and bedrock geology can be found in Section 2.0 of Appendix 10-1.

10(b) Evaluation of Suitable Building and Equipment Foundations

The following sections describe and evaluate proposed building and equipment foundations.

(1) Preliminary Engineering Assessment

A preliminary engineering assessment has been performed to determine the types of foundations suitable for Facility construction. Foundations will be built in association with the substation, POI switchyard, solar array, equipment pads, O&M building, and perimeter security fence. Locations of foundations to be constructed within the Facility Site are specified in the Site Plans included in Revised Exhibit 5, Appendix 5-1, Design Drawings. A foundation system consisting of driven posts is typically preferred for the support of ground-mounted PV arrays. However, due to the very dense soil conditions and shallow refusal observed during the geotechnical survey, driven posts may not be feasible in all portions of the Facility Site. Shallow refusal conditions may be encountered when attempting to drive posts, resulting in insufficient installation depth. Therefore, alternate installation methods and foundation support systems have been evaluated and recommended (i.e., helical piles, drilled piles). All construction techniques shall conform to applicable building codes and industry standards. Each proposed or alternative foundation method is described below.

(i) Driven Post Support System

As mentioned above, pre-drilling will likely become necessary to achieve sufficient post depth to resist the required lateral and uplift loads wherever shallow refusal conditions are encountered. To increase post embedment for vertical and lateral support, predrilling or spudding with a heavy steel beam can be implemented to break up the dense, highly decomposed rock or other obstructions. Alternatively, the use of larger sized, heavier grade posts that allow for harder driving could provide increased embedment, sufficient lateral capacity, and uplift resistance. All posts should be driven to sufficient depths to provide adequate axial, uplift, and lateral resistances.

(ii) Helical Screw Support System

A helical pile system having a minimum 3-inch diameter or low-displacement ground screws could be considered as an alternative to driven posts for support of the arrays. These systems would be most appropriate in areas where overburden depths are less than 8 feet. Installation of helical piles below the auger refusal depths, where encountered, will not be feasible. Embedment into the very dense/difficult auguring material may be possible but will be dependent on the ability of the central shaft to withstand installation torque required to advance helices. Alternative to a conventional small shaft diameter helical pile, the use of a continuous flight helical pile or low-displacement ground screw could be considered as it generally can be drilled deeper into very dense soil conditions compared to a conventional helical pile with larger diameter helices. The design parameters in Table 6d of Section 4.2.2 of Appendix 10-1, can be used as preliminary design parameters for a helical screw support system for the O&M building. The design parameters of allowable bearing capacity (2,000 psf) and vertical subgrade modulus (100 pci) of Section 4.2.3 of Appendix 10-1, can be used as preliminary design parameters for a shallow foundation design for the O&M building. Based on the subsurface conditions observed within the test borings drilled closest to the O&M building, it is anticipated that a lightly loaded O&M building will have low risk associated with construction and the foundation soils' ability to support a building. The Applicant will conduct additional test boring(s) for final design of the O&M building for confirmation. If subsurface obstructions are encountered during installation, pre-drilling or pre-excavation will be required. Additional design recommendations and specifications are provided in Section 4.2.2 of the Geotechnical Engineering Report.

(iii) Shallow Foundations

Shallow foundation systems such as rigid mats can be considered for support of electrical equipment. Mats supporting electrical equipment can be designed for an allowable bearing capacity of 2,000 pounds per square foot (psf). Foundation subgrades for supporting electrical equipment or other ancillary structures subjected to freezing temperatures during construction and/or the life of the structure should be established at least four feet below adjacent grades or otherwise protected against frost action. Alternatively, to resist frost heave, light loaded mat slabs constructed at grade should be provided a coarse aggregate below the slab that extends to frost depth. To guard against a punching type shear failure, minimum widths of continuous footings should be 24 inches.

(2) Pile Driving Impact Assessment

Potential impacts resulting from pile driving activities have been assessed. The Project will utilize a total of 101,905 driven steel H-piles to facilitate Facility construction. Each pile will be 13 to 17 feet long. However, prior to construction, a detailed geotechnical investigation and pile load testing will be conducted by the contractor to confirm pile capacity and the drivability of the posts. It is currently anticipated that pile driving activities will span 106 days, with approximately 8 hours of pile driving occurring each day. A total of approximately 848 hours of pile driving is anticipated.

Vibrations generated by high-speed hammers are typically low and confined to the immediate work area and should not affect structures on neighboring parcels given property line and residence setbacks. The American Association of State Highway and Transportation Officials (AASHTO) has set maximum recommended vibration limits, set in units of inches per second for peak particle velocity (PPV), for preventing damage to existing structures from construction or maintenance activities. The recommended limits near a residential structure are between 0.2 and 0.5 PPV (inches/second), and 0.1 PPV (inches/second) near historic sites or other critical locations. Vibrational impacts due to pile driving during construction of the Facility are expected to be negligible, and not exceed the recommended limits by following the following setback requirements:

- Residential Structures (max PPV = 0.2): minimum distance from pile drivers of 16 feet.
- Historic sites or other critical locations (max PPV = 0.1): minimum distance from pile drivers of 24 feet.

Given the nature of the vibrations associated with pile driving, and the temporary and relatively short timeframe for the activity, no impacts due to pile-driving vibrations are anticipated for neighboring properties.

(3) Pile Driving Mitigation

As discussed above in Exhibit 10(b)(2), vibrations generated from high-speed impact hammers are relatively low and coupled with the limited timeframe of pile driving activities and implementation of Facility setbacks from neighboring properties, allowing for greater attenuation, there are no anticipated impacts to surrounding properties from vibrations associated with pile driving for the construction of the Facility. Therefore, no mitigation as a result of pile driving vibration impacts is anticipated. Although vibrations from pile driving are anticipated to adhere to standards at neighboring structures, vibrational monitoring will be conducted for all pile driving that occurs within 100 feet of wells and utilities and will continue until monitoring results indicate that peak particle velocity is within acceptable limits. Please see Exhibit 7 for more detail regarding noise and vibration during construction. In addition, the Applicant's Complaint Management Plan, which will be prepared and provided to the public prior to construction in accordance with Section 900-10.2(e)(7), will detail methods to register vibration or noise complaints and the Applicant's commitment to responding to and resolving complaints. While not anticipated, should structural damages occur due to pile driving as a result of Facility construction, the Applicant will work with the property owner to provide compensation to address the damages.

(4) Evaluation of Earthquake and Tsunami Event Vulnerability at the Project Area

As described in Section 10(a)(10) above, the Facility Site is not significantly vulnerable to seismic activity. Based on regional seismic hazards, local seismic hazards, and computed Site Class ratings, there is a low risk of seismic activity within the Facility Site that could cause damage to the Facility.

The Facility Site is not vulnerable to tsunami events, as it is significantly distant from major bodies of water.

10(c) References

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