CORDELIO POWER

FLAT CREEK SOLAR

Permit Application No. 23-00054

§ 1100-2.11 Exhibit 10

Geology, Seismology, and Soils

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Acronym List

bgs	Below ground surface
°C-cm/W	Degrees Celsius-centimeter per watt
FEMA	Federal Emergency Management Agency
HDD	Horizontal directional drilling
LOD	Limit of disturbance
MV	Medium voltage
NPS	United States National Park Service
NRCS	National Resources Conservation Service
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSM	New York State Museum
ORES	Office of Renewable Energy Siting and Electric Transmission
OSHA	Occupational Safety and Health Administration
POI	Point of interconnection
psf	Pounds per square foot
PV	Photovoltaic
ROW	Right-of-way
SWPPP	Stormwater Pollution Prevention Plan
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WSS	Web Soil Survey

Glossary Terms

Applicant	Flat Creek Solar NY LLC, a subsidiary of Cordelio Power LP, the entity seeking a siting permit for the Facility from the Office of Renewable Energy Siting and Electric Transmission (ORES) under Article VIII of the New York State Public Service Law.
Facility	Flat Creek Solar, a 300 MW solar generating facility located in the Towns of Root and Canajoharie, NY. The proposed Facility components to be constructed for the generation, collection, and distribution of energy for Flat Creek Solar include solar panel modules, electrical collection system, collection substation, point of interconnection (POI) switchyard, access roads, laydown/staging areas, and other ancillary facilities.
Facility Site	The participating parcels encompassing Facility components, which totals approximately 3,794 acres in the Towns of Canajoharie and Root, Montgomery County, New York (Figure 2-1).
Study Area	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 approximately 108,667 acres, inclusive of the approximately 3,794-acre Facility Site.
Limit of Disturbance (LOD)	The area to which temporary construction impacts will occur, totaling approximately 1,637 acres.

Exhibit 10: Geology, Seismology and Soils

This Exhibit provides information required in accordance with the requirements of §1100-2.11 of the Article VIII Regulations.

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

The following sections provide an assessment of the geology, seismology, and soil impacts of the Facility. Existing conditions within the Facility Site are mapped and described, potential impacts of the Facility are evaluated, and proposed avoidance and mitigation measures are discussed.

(1) Existing Slopes Map

A map delineating the existing slopes (0-3 percent, 3-8 percent, 8-15 percent, 15-25 percent, 25-35 percent, and greater than 35 percent) within the drainage area potentially influenced by the Facility Site is provided as Figure 10-1. As seen in Figure 10-1, slopes within the Facility Site generally range from 0 to 8 percent. Some areas of higher slopes are present sporadically throughout the Facility Site, predominantly associated with erosional water features, such as Flat Creek.

Facility components and associated construction areas have been sited to avoid areas of steep slopes (greater than 15%) to the maximum extent practicable. Approximately 12.1 acres of Facility components and associated construction areas will be located within areas of slopes ranging from 15 to 25 percent; of which, 0.04 acres will consist of PV panels. Approximately 2.2 acres of Facility components and associated construction areas will be located within areas of slopes ranging from 25 to 35 percent; of which, less than 0.01 acres will consist of PV panels. Approximately 0.6 acres of Facility components and associated construction areas will be located within areas of slopes greater than 35 percent. No PV panels will be located in areas of slopes greater than 35 percent.

Section 7.2(j) of the Town of Root Solar Energy Law (2024) prohibits the placement of solar panels on slopes 15% or greater as averaged over 50 horizontal feet. The Applicant is seeking a waiver of this provision as discussed in Exhibit 24 (Local Laws and Ordinances).

(2) Proposed Site Plan

A site plan depicting existing conditions and proposed Facility development is included as Appendix 5-1 to Exhibit 5. In accordance with New York Codes, Rules and Regulations (NYCRR) Section 1100-2.11(a)(2), the site plan has been presented at a scale sufficient to show all proposed structures, paved areas, vegetative areas, and construction areas, with existing and proposed contours drawn at two-foot intervals. No buildings are proposed. For additional information regarding proposed Facility components, refer to Exhibit 5, Design Drawings.

(3) Excavation Techniques

Excavation techniques will be utilized to construct several Facility components, including underground collection lines, access roads, stormwater infrastructure, a collection substation, and a point of interconnection (POI) switchyard. Excavation will also be utilized to construct the bore pits in areas of horizontal directional drilling (HDD). Minor grading will also occur for placement of panels and inverter pads in certain areas. Excavation activities include, but are not limited to, vegetation clearing and grubbing, topsoil stripping, grading, and trenching. Excavation will be completed using conventional construction equipment, including but not limited to, bulldozers, trackhoes, excavators, cable plows, rock saws, and trenchers. Excavation techniques may vary by Facility component, as described below.

Based on the results of the Preliminary Geotechnical Engineering Report (Appendix 10-1), Geotechnical Engineering Report (Appendix 10-2), Supplemental Geotechnical Engineering Report (Appendix 10-3), and Supplemental Geotechnical Engineering Report for the Collection Substation and POI Switchyard (Appendix 10-4), difficult excavation conditions are not anticipated to be encountered during construction. However, areas of very dense soils, large cobbles, and/or boulders may be encountered during excavations, which may require the use of larger equipment, including but not limited to large heavy-duty excavators, hydraulic rams, or bulldozers with ripper blade attachments. Difficult drilling or driving conditions may be encountered during construction, which may require the use of pre-drilling where applicable. Additionally, on-site fine-grained surficial soils may be sensitive to moisture and may be difficult to work during cold or wet weather; thus, to the extent practical, earthwork should be performed during warmer and drier periods of weather to reduce the amount of necessary remedial measures for soft and unsuitable conditions. Refer to Section 10(a)(4) for a summary of geotechnical investigation results and for further discussion on the characteristics and suitability of on-site material.

In preparation for Facility construction vegetation 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 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.

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 NYCRR Section 1100-6.4(b).

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 NYCRR Section 1100-10.2(e)(4), the Facility Vegetation Management Plan will be submitted under separate cover as a pre-construction compliance filing.

(ii) Access Roads

Facility access road construction will involve grubbing of stumps, topsoil stripping, and grading, as necessary. Any grubbed stumps will be removed from the site or chipped. 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 of 6 feet bgs, 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 medium voltage (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., excavators, 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) (Exhibit 13, Appendix 13-2) 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 NYCRR Section 1100-10.2(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 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. Vegetation will be cleared within the generation tie line right-of-way (ROW) but grubbing and permanent soil disturbance will be limited 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) Collection Substation

Construction the collection substation will begin with stripping and temporarily stockpiling topsoil for later use during landscaping (as appropriate) and grading. 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.

(4) Characteristics and Suitability of Material Excavated for Construction

To assess the characteristics and suitability of subsurface conditions within the Facility Site, a Preliminary Geotechnical Engineering Report (Appendix 10-1), Geotechnical Engineering Report (Appendix 10-2), Supplemental Geotechnical Engineering Report (Appendix 10-3), and Supplemental Geotechnical Report for the Collection Substation and POI Switchyard (Appendix 10-4) have been prepared. During the preliminary on-site geotechnical investigation (Appendix 10-1), a total of 16 soil borings were drilled to a maximum depth of 20 feet below the ground surface (bgs). Field electrical resistivity testing was performed at eight soil boring locations. Select soil samples were retained for laboratory testing, thermal resistivity testing, and corrosivity testing. During the second on-site geotechnical investigation (Appendix 10-2), 14 soil borings were drilled to a target depth of 15 feet bgs, and one soil boring was drilled to a depth of 35 feet bgs. Field electrical resistivity testing was performed at two soil boring locations. Select soil samples were retained for laboratory testing, thermal resistivity testing, and corrosivity testing. During the third on-site geotechnical investigation (Appendix 10-3), seven soil borings were drilled to a target depth of 15 feet bgs, and one soil boring was drilled to a depth of 30 feet bgs. Field electrical resistivity testing was performed at two soil boring locations. Select soil samples were retained for laboratory testing, thermal resistivity testing, and corrosivity testing. During the fourth on-site geotechnical investigation (Appendix 10-4), eleven soil borings were drilled to varying target depths, with achieved depths ranging from 15 feet bgs to 35.1 feet bgs. Select soil samples were retained for laboratory testing, thermal resistivity testing, and corrosivity testing.

Based on the results of the geotechnical surveys, on-site material and deposits are suitable for Facility construction given the current installation methods proposed. Suitability of HDD, which will be utilized to avoid sensitive resources, is described in Section 10(a)(4)(v) below. Blasting is not currently proposed. A summary of subsurface characteristics and suitability based on the results of the geotechnical surveys is provided below.

(i) Subsurface Conditions

During the geotechnical surveys, a layer of topsoil was encountered, underlain by a mixture of predominantly brown and grey silt and clay, with varying quantities of sand and gravel. Rock fragments, cobbles, and boulders were occasionally encountered throughout the sediment layers. Weathered shale and shale bedrock were encountered in some boring locations.

The Preliminary Geotechnical Engineering Report (Appendix 10-1) divides its study area within the Facility Site into three zones. The borings in Zone 1 generally consisted of silty and clayey soils overlaying hard/dense to very dense soil or bedrock. The borings in Zone 2 generally consisted of silty and sandy soils. The borings in Zone 3 generally consisted of silty and clayey soils overlaying clayey soils.

The subsurface conditions in Zone 1 (FC-1, FC-2, FC-4, FC-6, FC-7, FC-8, FC-10, FC-11, FC-13, FC-15, and FC-16) generally consist of medium stiff to hard (SPT-N values ranging from 5 to 26) silty and clayey soils to depths ranging from about 4 to 10 feet bgs. Below these depths, the borings generally encountered a significant amount of large cobbles and boulders, and the soils are generally stiff to very hard to dense to very dense. Borings FC-6 and FC-7 also encountered highly to moderately weathered shale at depths of 7 and 13 feet bgs, respectively. The borings were generally terminated at depths ranging from about 13 to 19 feet bgs.

The subsurface conditions in Zone 2 (FC-3, FC-5, and FC-9) generally consist of medium stiff to very stiff or medium dense (SPT-N values ranging from 6 to 21) silty and sandy soils to depths of about 6 to 10 feet bgs underlain by hard or dense (SPT-N values ranging from 21 to >50) silty and sandy soils to a depth of approximately 20 feet bgs.

The subsurface conditions in Zone 3 (FC-12 and FC-14) generally consist of medium stiff to hard (SPT-N values ranging from 6 to 41) silty and clayey soils to depths of about 8 to 10 feet bgs underlain by soft to very stiff (SPT-N values ranging from 3 to 17) clayey soils to a depth of approximately 18 to 20 feet bgs. In boring FC-14, hard Sandy Silt with rock fragments was encountered at a depth of about 18 feet bgs.

The Geotechnical Engineering Report (Appendix 10-2) found that, beneath the layer of topsoil, the surficial soils generally consist mostly of lean clay and silty clay with varying quantities of sand and rock fragments extending to depths ranging from approximately 2.5 feet to 22 feet bgs. SPT N-values indicate that the consistency of these soils ranges from “medium stiff” to “hard”.

Below the surficial clayey soil stratum, test borings B-106 and B-116 encountered a stratum consisting of silty, clayey sand with varying quantities of gravel-sized rock fragments. SPT N-values indicate the relative density of this stratum is “medium dense”.

Occasional cobble inclusions were noted in various borings ranging from the depth of 3 feet to 15 feet bgs. The presence of these oversized materials may pose difficult driving conditions for driven post type foundation during installation. Auger refusal, which typically represents the presence of weathered rock or bedrock, was encountered in six out of 15 test boring locations at depths ranging from 4.6 feet bgs to 13.1 feet bgs. Difficult drilling conditions, which are typically indicative of hard or very dense soil conditions, presence of rock fragments, and/or decomposed rock, were also encountered at 12 of the 15 test boring locations.

The Supplemental Geotechnical Engineering Report (Appendix 10-3) found that, beneath the layer of topsoil, the surficial soils generally consist mostly of low to high plastic combination of silt, clay, clayey silt, and silty clay with varying quantities of sand and gravel-sized rock fragments. SPT N-values within this layer indicate that the consistency of these soils ranges from “soft” to “stiff” within the upper 6.0 ft followed by “stiff” to “very stiff” layers for the remaining depths.

Below the surficial clayey soil stratum, each test boring with the exception of one (B-207) encountered a stratum consisting of silty sand and gravel-sized rock fragments with varying quantities of clay, generally extending to the completion depths. SPT N-values indicate the relative density of this stratum ranges from “medium dense” to “very dense”.

Boring B-200, which was drilled to 30 feet bgs, encountered 0.7 feet of topsoil, underlain by 1.3 feet of silty gravel, underlain by 11.0 feet of “stiff” to “very stiff” silty clay, underlain by 5.0 feet of “medium dense” silt, underlain by 12.0 feet of gravel sized rock fragments which extended to the termination depth of the boring.

Occasional difficult drilling was noted in various borings ranging from the depths of 6 feet to 10 feet bgs. The presence of these dense conditions and possible oversized material inclusions (gravel and or possible cobbles) may pose difficult driving conditions for driven post type foundations during installation. Auger refusal was encountered in two out of eight test boring locations at depths of 6.0 feet bgs and 10.5 feet bgs. Difficult drilling conditions were also encountered at six of the eight test boring locations.

The Supplemental Geotechnical Engineering Report for the Collection Substation and POI Switchyard (Appendix 10-4) found that, beneath the layer of topsoil, the surficial soils generally consist mostly of clay and silty clay with varying quantities of sand and gravel. SPT N-values within this layer indicate that the consistency this stratum ranges from “soft” to “medium stiff” within the upper 6 ft bgs followed by “stiff” to “hard” for the remaining depths.

Below the surficial clayey soil stratum, each test boring with the exception of two (B-301 and B-306) encountered a stratum consisting of silty clayey sand and gravel-sized rock fragments, generally extending to the completion depths. SPT N-values indicate the relative density of this stratum ranges from “medium dense” to “very dense”.

Auger refusal, which typically represents the apparent top of weathered rock or bedrock, was encountered in two test borings (B-310 and B-311) at approximate depths 35.1 feet and 33.6 feet bgs, respectively. Difficult drilling conditions, which are typically indicative of hard or very dense soil conditions and/or the potential presence of oversized rock fragments, were also encountered at eight of the eleven test boring locations.

Based on the results of the four Geotechnical Engineering Reports (Appendix 10-1, 10-2, 10-3, and 10-4), difficult excavation conditions are not anticipated to be encountered during construction. However, areas of very dense soils, large cobbles, and/or boulders may be encountered during excavations, which may require the use of larger equipment. Difficult drilling or driving conditions may be encountered during construction, which may require the use of pre-drilling where applicable. Additionally, on-site fine-grained surficial soils may be sensitive to moisture and may be difficult to work during cold or wet weather; thus, to the extent practical, earthwork should be performed during warmer and drier periods of weather to reduce the amount of necessary remedial measures for soft and unsuitable conditions.

Refer to the “Geotechnical Characterization” Section of Appendix 10-1, Section 2.3 “Subsurface Conditions” of Appendix 10-2, Section 2.3 “Subsurface Conditions” of Appendix 10-3, and Section 2.4 “Subsurface Conditions” of Appendix 10-4 for additional information regarding on-site subsurface conditions. Soils are further described in Section 10(a)(11) and 10(a)(12) below, while bedrock is further described in Section 10(a)(13) below.

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

Many factors can affect the corrosion potential of soil including soil moisture content, resistivity, permeability, and pH, as well as chloride and sulfate concentration. To evaluate the corrosion potential of material within the Facility Site, soil samples were analyzed for soil corrosion parameters, including but not limited to pH, chloride content, sulfate content, and resistivity. Field resistivity tests were also conducted. Based on the field and laboratory resistivity results, material within the Facility Site has the potential to be corrosive to buried metallic infrastructure. 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. Refer to Appendix 10-1, Section 3.1 “Corrosion Evaluation” of Appendix 10-2, Section 3.1 “Corrosion Evaluation” of Appendix 10-3, and Section 3.0 “Corrosion Evaluation” of Appendix 10-4 for additional information regarding soil corrosivity.

To evaluate thermal resistivity of material within the Facility Site, laboratory thermal resistivity tests were conducted on representative bulk soil samples. It was found that the thermal resistivities decrease with increasing moisture content. In the Preliminary Geotechnical Engineering Report (Appendix 10-1), resistivity values ranged from 174 to 298 degrees Celsius-centimeter per watt (°C-cm/W) when fully dry and from 58 to 87 °C-cm/W at optimum moisture. In the Geotechnical Engineering Report (Appendix 10-2), resistivity values ranged from 98.8 to 171.2 °C-cm/W when fully dry and from 55.5 to 62.7 °C-cm/W at optimum moisture. In the Supplemental Geotechnical Engineering Report (Appendix 10-3), resistivity values were 127.8 °C-cm/W when fully dry to 46.4 °C-cm/W at optimum moisture. Refer to Appendix 10-1, Section 3.2 “Thermal Resistivity” of Appendix 10-2, and Section 3.2 “Thermal Resistivity” of Appendix 10-3 for additional information regarding thermal resistivity.

Results from the geotechnical surveys indicate that the soils at the Facility Site are frost susceptible. To minimize susceptibility to frost, the Preliminary Geotechnical Engineering Report (Appendix 10-1) recommends, for driven pile foundations, that an adfreeze stress (frost heave) of

1,500 pounds per square foot (psf) acting along the pile perimeter to a depth of 2.5 feet below the ground surface should be considered for calculating the potential frost induced heave force along with a load factor of 1.0. The Geotechnical Engineering Report (Appendix 10-2) and Supplemental Geotechnical Engineering Report (Appendix 10-3) recommend, for driven pile foundations, that lateral and uplift resistance of soils be reduced by 50% above a depth of 4 to 4.5 feet below the ground surface to account for disturbance resulting from construction as well as to account for the negative impacts due to frost and thaw action. Additionally, 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 4 to 4.5 feet below adjacent grades or otherwise protected against frost action. Further design considerations and mitigation measures for frost risk are described throughout Appendix 10-1, 10-2, 10-3, and 10-4.

Representative soil samples from varying borings and depths were analyzed for parameters such as grain size, plasticity, liquidity, and moisture content. Shrink/swell potential was not identified as a concern in any of the four Geotechnical Engineering Reports (Appendix 10-1, 10-2, 10-3, and 10-4).

Refer to Section 10(a)(11) and 10(a)(12) below for additional detail regarding soil conditions.

(iii) Bedrock Competence

During the preliminary geotechnical survey (Appendix 10-1), bedrock was encountered at two out of 16 boring locations at depths of approximately 10 and 13 feet bgs. During the second geotechnical survey (Appendix 10-2), auger refusal, which typically represents the presence of weathered rock or bedrock, was encountered in six out of 15 test boring locations at depths ranging from 4.6 feet bgs to 13.1 feet bgs. Difficult drilling conditions, which are typically indicative of hard or very dense soil conditions, presence of rock fragments, and/or decomposed rock, were also encountered at 12 of the 15 test boring locations during the second geotechnical survey. During the third geotechnical survey (Appendix 10-3), auger refusal was encountered in two out of eight test boring locations at depths of 6.0 feet bgs and 10.5 feet bgs. Difficult drilling conditions were also encountered at six of the eight test boring locations during the third geotechnical survey. During the fourth geotechnical survey (Appendix 10-4), auger refusal was encountered in two out of eleven test boring locations at depths of 33.6 feet bgs and 35.1 feet bgs. Difficult drilling conditions were also encountered at eight of the eleven test boring locations during the fourth geotechnical survey. Refer to Section 10(a)(13) below for additional detail regarding bedrock conditions. Refer to Section 10(b)(1) below for an evaluation of suitable infrastructure foundations.

(iv) Hydrology and Groundwater

During the preliminary geotechnical survey (Appendix 10-1), groundwater was encountered in four out of 16 borings, at depths ranging from 3 to 8 feet bgs. During the second geotechnical survey (Appendix 10-2), groundwater was encountered in five out of 15 borings, at depths ranging from 4 feet to 22.5 feet bgs. During the third geotechnical survey (Appendix 10-3), groundwater was encountered in one out of eight test borings at a depth of 5.8 feet bgs. During the fourth geotechnical survey (Appendix 10-4), groundwater was encountered in five out of eleven borings, at depths ranging from 16.8 feet to 28.0 feet bgs.

These groundwater conditions are representative of the conditions at the date and time of the on-site geotechnical surveys and are not representative of daily, seasonal, or long-term fluctuations, development of perched conditions, or ponding of water in low lying areas during wet periods. The development of perched water conditions may be encountered within standard excavation depths for foundations or utilities during wet periods. If perched groundwater or surface runoff are encountered during construction, sumps and pumps will be sufficient to control groundwater and provide stable working conditions. Refer to Section 10(a)(12) below for additional detail regarding groundwater.

(v) Subsurface Conditions at Proposed Trenchless Construction Locations

As described in Section 10(a)(3) above, 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 underneath the following:

- Wetlands: W-ABL-06, W-DJB-11 (two crossings), W-EES-19, W-EES-13, W-EES-06, W-IBP-01 (two crossings), W-JMP-19, W-JMP-20, W-JMP-28 (two crossings), W-JMP-13, W-NSD-05, W-MLM-10, W-MLM-11, W-IIBP-01

- Streams: S-ABL-07, S-RDS-18, S-RDS-17 (two crossings), S-RDS-15, S-RDS-14, S-DJB-01, S-EES-6, S-EES-12, S-EES-03 (Flat Creek; three crossings), S-JMP-12, S-JMP-16, S-JMP-28, S-JMP-09, S-MLM-03, S-MLM-05

- Roadways: Miller Drive, Carlisle Road (four crossings), Conway Road (two crossings), Mapletown Road, Flat Creek Road (three crossings), Rappa Road (two crossings), Highway 162

- Gas Pipelines: Iroquois Gas (three crossings), UG gas

- Overhead Power Lines: National Grid Overhead Power

- Culverts: Existing 36" diameter culvert

Preliminary locations for use of HDD are depicted Appendix 5-1 (*Design Drawings*). Further information regarding wetland and stream impacts can be found in Exhibit 14, Wetlands, and Exhibit 13, Water Resources and Aquatic Ecology, respectively. Further information regarding roadway impacts can be found in Exhibit 16, Effect on Transportation.

(5) Preliminary Plan for Blasting Operations

Blasting operations are not currently proposed; therefore, a plan for blasting operations has not been provided.

(6) Assessment of Potential Impacts from Blasting

Blasting operations are not currently proposed; therefore, impacts due to blasting will not occur.

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

Blasting operations are not currently proposed; therefore, mitigation measures regarding blasting impacts are not required nor proposed.

(8) Regional Geology, Tectonic Setting, and Seismology

The Facility Site is in the Towns of Canajoharie and Root, Montgomery County, New York. The entirety of New York State is located on the North American continental plate, significantly distant from and not impacted by any active tectonic plate boundary (United States Geological Survey [USGS] n.d.a). Seismic activity across New York State is generally low, with the greatest seismic hazard located in the northern portion of the state (Federal Emergency Management Agency [FEMA 2020]; USGS 2018).

New York State can be divided into several physiographic provinces based on similarities in topography and geology (New York State Museum [NYSM] n.d.a). The Facility Site is located within the Mohawk Lowlands physiographic province and the Allegheny 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 present 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; United States National Park Service [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 not located within or proximal to any Unique Geologic Feature (New York State Department of Environmental Conservation [NYSDEC] n.d.).

(9) Facility Construction and Operation Impacts to Regional Geology

Construction and operation of the Facility is not anticipated to adversely impact regional geology. As described in Appendix 10-1, 10-2, 10-3, and 10-4, the subsurface conditions at the Facility Site are suitable for Facility construction given the installation methodology currently proposed. Blasting is not currently proposed to facilitate Facility construction. As noted above in Section 10(a)(8), the Facility Site is not located within or proximal to any Unique Geologic Feature.

Although portions of the Facility Site are located in areas with the potential to produce karst topography and features, impacts to karst are not currently anticipated as a result of Facility construction or operation. As noted below in Section 10(a)(13), carbonate rocks are present in areas within the northern portions of the Facility Site and have been identified by the USGS as a potential karst area (Weary & Doctor 2014). Karst topography was not identified on-site during any of the four geotechnical surveys (Appendix 10-1, 10-2, 10-3, and 10-4). Minimization and mitigation measures will be implemented in potential karst areas if identified and as appropriate.

(10) Seismic Activity Impacts on Facility Location and Operation

As discussed in Section 10(a)(8), seismic hazard across New York State is generally low, 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). According to the USGS Earthquake Catalog, no recent earthquakes have been recorded within five miles of the Facility Site (USGS n.d.c).

A map of seismic hazards, faults, and brittle structures within and immediately surrounding the Facility Site is provided as Figure 10-2. As shown on Figure 10-2, two brittle structures are identified within the Facility Site, including one normal fault and one inferred normal fault (NYSM n.d.b). There are no young faults (Quaternary faults) located within or immediately surrounding the Facility Site; no faults within or immediately surrounding the Facility Site have experienced seismic displacement or significant seismic activity in recent geologic time (USGS n.d.d).

As described in the "Seismic Considerations" section of Appendix 10-1, Section 4.1 "Site Seismic Coefficients" of Appendix 10-2, Section 4.1 "Site Seismic Coefficients" Appendix 10-3, and Section 4.1 "Site Seismic Coefficients" of Appendix 10-4, the Facility Site has been determined to be within "Site Class C" or "Site Class D". The use of "Site Class D" is recommended for seismic design of critical equipment, such as within the proposed substation.

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. For information regarding emergency preparedness and emergency response, refer to Exhibit 6, Public Health, Safety, and Security.

(11) Soil Types Map

A map delineating soils types within the Facility Site is provided as Figure 10-3. A list of all soils present within the Facility Site is provided in Table 10-1, with characteristics described 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 (NRCS USDA 2023). A total of 46 soil units were identified within the Facility Site. A summary of all soils and their characteristics are provided in Table 10-1 below.

The Preliminary Geotechnical Engineering Report (Appendix 10-1), Geotechnical Engineering Report (Appendix 10-2), Supplemental Geotechnical Engineering Report (Appendix 10-3), and Supplemental Geotechnical Engineering Report for the Collection Substation and POI Switchyard (Appendix 10-4) evaluate and assess on-site soils, as described in Section 10(a)(4) above. The results of the geotechnical surveys generally agree with the soil characteristics provided by the NRCS and provide more precise analytical data regarding on-site conditions. Additional details regarding geotechnical investigation of on-site soils can be found throughout Appendix 10-1, 10-2, 10-3, and 10-4.

Table 10-1. Soil Types and Characteristics within the Facility Site

Soil Unit	Map Unit Symbol	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
Alton	AlB	3 to 8	Gravelly loam	0.65	A	>200	Moderate	>200	High	High	9.8
Angola	AnB	3 to 8	Silt loam	2.94	D	23	High	61	High	Low	79.5
Appleton	ApA	0 to 3	Silt loam	1.23	B/D	20	High	>200	High	Low	38.9
Appleton	ApB	3 to 8	Silt loam	1.23	B/D	20	High	>200	High	Low	292.6
Burdett channery	BuB	3 to 8	Silt loam	1.22	C/D	23	High	>200	High	Low	158.8
Burdett channery	BuC	8 to 15	Silt loam	1.22	C/D	23	High	>200	High	Low	44
Cut and fill land	CFL	0 to 15	Gravelly Loam	0.23	A	137	Moderate	>200	High	Moderate	7.2
Churchville	ChA	0 to 3	Silty clay loam	1.09	C/D	18	High	>200	High	Low	67.5
Churchville	ChB	3 to 8	Silty clay loam	1.09	C/D	18	High	>200	High	Low	196.6

Table 10-1. Soil Types and Characteristics within the Facility Site

Soil Unit	Map Unit Symbol	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
Darien	DaA	0 to 3	Silt loam	1.32	C/D	18	High	>200	High	Low	42.8
Darien	DaB	3 to 8	Silt loam	1.32	C/D	18	High	>200	High	Low	937
Darien	DaC	8 to 15	Silt loam	1.32	C/D	18	High	>200	High	Low	5
Farmington-Rock outcrop association, moderately steep	FBD	0 to 25	Silt loam, bedrock	2.46	N/A	>200	N/A	41	N/A	N/A	3.9
Fluvaquents	FL	0 to 2	Gravelly silt loam	1.11	B/D	15	High	>200	High	Moderate	153.2
Fonda	Fo	0 to 3	Mucky silty clay loam	6.22	C/D	0	High	>200	High	Low	28.4
Fredon	Fr	0 to 3	Silt loam	1.30	B/D	0	High	>200	High	Low	59.7
Howard	HrA	0 to 3	Gravelly silt loam	1.05	A	>200	Moderate	>200	High	Moderate	5

Table 10-1. Soil Types and Characteristics within the Facility Site

Soil Unit	Map Unit Symbol	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
Howard	HrB	3 to 8	Gravelly silt loam	1.05	A	>200	Moderate	>200	High	Moderate	3.3
Howard	HrC	8 to 15	Gravelly silt loam	1.05	A	>200	Moderate	>200	High	Moderate	6.4
Ilion	IlA	0 to 3	Silt loam	1.59	C/D	0	High	>200	High	Low	138.3
Ilion	IlB	3 to 8	Silt loam	1.59	C/D	0	High	>200	High	Low	193
Lansing	LaB	3 to 8	Silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	178.1
Lansing	LaC	8 to 15	Silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	258.4
Lansing	LaD	15 to 25	Silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	111.6
Lansing and Mohawk soils	LMF	25 to 60	Gravelly silt loam	1.15	B	>200	Moderate	>200	Low	Moderate	97.2
Lordstown	LoB	3 to 8	Gravelly silt loam	1.74	C	>200	Moderate	66	Low	Moderate	10.5
Madalin	Ma	0 to 3	Silty clay loam	1.40	C/D	0	High	>200	Moderate	Low	161.5

Table 10-1. Soil Types and Characteristics within the Facility Site

Soil Unit	Map Unit Symbol	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
Madalin, moderately shallow variant	Md	0 to 3	Silty clay loam	3.52	D	0	High	69	High	Low	0.1
Manheim	MmB	3 to 8	Silt loam	1.60	C/D	23	High	>200	High	Low	5.2
Mohawk	MsB	3 to 8	Silt loam	1.36	B	183	Moderate	>200	High	Low	14.4
Mohawk	MsD	15 to 25	Silt loam	1.36	B	183	Moderate	>200	High	Low	10.8
Nunda channery	NuB	3 to 8	Silt loam	1.34	C/D	38	High	>200	High	Low	7.1
Nunda channery	NuC	8 to 15	Silt loam	1.34	C/D	38	High	>200	High	Low	23.2
Nunda channery	NuD	15 to 25	Silt loam	1.34	C/D	38	High	>200	High	Low	12.7
Palatine	PaB	3 to 8	Silt loam	2.80	C	>200	Moderate	71	Low	Low	126.3
Palatine	PaC	8 to 15	Silt loam	2.80	C	>200	Moderate	71	Low	Low	83.1
Palatine	PaD	15 to 25	Silt loam	2.80	C	>200	Moderate	71	Low	Low	51.8

Table 10-1. Soil Types and Characteristics within the Facility Site

Soil Unit	Map Unit Symbol	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
Phelps	PpA	0 to 3	Gravelly loam	1.07	B/D	54	High	>200	High	Moderate	15.3
Phelps	PpB	3 to 8	Gravelly loam	1.07	B/D	54	High	>200	High	Moderate	16.7
Phelps, fan	Pr	0 to 8	Gravelly loam	1.07	C	76	Moderate	>200	High	Moderate	89.7
Rhinebeck	RhA	0 to 3	Silty clay loam	1.55	C/D	18	High	>200	High	Low	2.4
Rhinebeck	RhB	3 to 8	Silty clay loam	1.55	C/D	18	High	>200	High	Low	14.5
Rock outcrop-Farmington association, very steep	RLF	25 to 70	Bedrock, silt loam	N/A	N/A	>200	N/A	0	N/A	N/A	8.1
Water	W	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.0
Wassaic	WaB	3 to 8	Silt loam	2.00	C	>200	Moderate	69	Low	Low	9.7

Table 10-1. Soil Types and Characteristics within the Facility Site

Soil Unit	Map Unit Symbol	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
Wassaic	WaC	8 to 15	Silt loam	2.00	C	>200	Moderate	69	Low	Low	10.7

*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 several test borings during the on-site geotechnical surveys, at depths ranging from 3 to 28.0 feet bgs. Groundwater and/or 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 conditions, development of perched conditions, or ponding of water in low lying areas during wet periods. If perched groundwater or surface runoff are encountered during construction, sumps and pumps will be sufficient to control groundwater and provide stable working conditions.

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

A map delineating the surficial geology within the Facility Site is provided as Figure 10-4, and a map delineating the bedrock geology within the Facility Site is provided as Figure 10-5. The surficial geology of the Facility Site is dominated by glacial deposits, including till, lacustrine sand, lacustrine beach, and kame deposits. 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 Utica Shale, a fissile black shale of the Middle Ordovician period (Paleozoic era). Also present within the northern portions of the Facility Site are the Dolgeville Formation and the Beekmantown Group. The Dolgeville Formation consists of interbedded black calcareous shale and thin black calcilutites (limestone) of the Middle Ordovician period (Paleozoic era). The Beekmantown Group consists of grey dolostone of the Lower Ordovician period (Paleozoic era) and Cambrian Period (Paleozoic era) (Fisher et al 1970). Based on information provided by the NRCS, estimated depth to bedrock within the Facility Site ranges from 0 centimeters to greater than 200 centimeters. Depth to the groundwater table is estimated to range from 0 centimeters to greater than 200 centimeters (NRCS USDA 2023).

The Preliminary Geotechnical Engineering Report in Appendix 10-1, Geotechnical Engineering Report in Appendix 10-2, Supplemental Geotechnical Engineering Report in Appendix 10-3, and Supplemental Geotechnical Engineering Report for the Collection Substation and POI Switchyard in Appendix 10-4 evaluate and assess on-site 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 GeoModel and Boring Logs attached to the rear of Appendix 10-1, and in the Test Boring Logs attached to the rear of Appendix 10-2, 10-3, and 10-4.

During the geotechnical surveys, a layer of topsoil was encountered, underlain by a mixture of predominantly brown and grey silt and clay, with varying quantities of sand and gravel. Rock fragments, cobbles, and boulders were occasionally encountered throughout the sediment layers. During the preliminary geotechnical survey (Appendix 10-1), bedrock was encountered at two out of 16 boring locations at depths of approximately 10 and 13 feet bgs. During the second geotechnical survey (Appendix 10-2), auger refusal, which typically represents the presence of weathered rock or bedrock, was encountered in six out of 15 test boring locations at depths ranging from 4.6 feet bgs to 13.1 feet bgs. Difficult drilling conditions, which are typically indicative of hard or very dense soil conditions, presence of rock fragments, and/or decomposed rock, were also encountered at 12 of the 15 test boring locations during the second geotechnical survey. During the third geotechnical survey (Appendix 10-3), auger refusal was encountered in two out of eight test boring locations at depths of 6.0 feet bgs and 10.5 feet bgs. Difficult drilling conditions were also encountered at six of the eight test boring locations during the third geotechnical survey. During the fourth geotechnical survey (Appendix 10-4), auger refusal was encountered in two out of eleven test boring locations at depths of 33.6 feet bgs and 35.1 feet bgs. Difficult drilling conditions were also encountered at eight of the eleven test boring locations during the fourth geotechnical survey. Based on the results of these geotechnical surveys, areas of very dense soils, large cobbles, and/or boulders may be encountered during excavations, drilling, or driving, which may require the use of larger equipment, including but not limited to large heavy-duty excavators, hydraulic rams, or bulldozers with ripper blade attachment.

Additional details regarding geotechnical investigation of surficial and bedrock geology can be found in the "Geotechnical Characterization" Section of Appendix 10-1, in Section 2 "Site Conditions" of Appendix 10-2, in Section 2 "Site Conditions" of Appendix 10-3, and in Section 2 "Site Conditions" of Appendix 10-4.

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 completed to determine the types and locations of potential foundations to be employed within the Facility Site. Foundations will be built in association with the collection substation, POI switchyard, and inverter pads. Locations of foundations to be constructed within the Facility Site are specified in the Site Plans included as Appendix 5-1 to Exhibit 5, Design Drawings.

Ground-mounted photovoltaic arrays are typically installed and supported via driven posts. Based on the results of the geotechnical surveys, the use of driven posts is feasible and could be supported in the natural soils encountered at the Facility Site. However, due to the very dense soil conditions and shallow refusal observed during the geotechnical surveys, 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 an insufficient installation depth. Therefore, alternate installation methods and foundation support systems have been evaluated and recommended (i.e., helical piles).

Additionally, shallow foundations will be needed to support the equipment proposed at the substation location, such as the transformers and dead-end structures. A combination of shallow foundations and mats could be utilized to support structures or equipment to be placed on compacted load bearing fill or existing natural soils after proper subgrade preparation. Drilled piers could also be utilized.

All construction techniques shall conform to applicable building codes and industry standards. Each potential foundation method is described below.

(i) Driven Post Support System

As mentioned above, the use of driven posts is feasible and could be supported in the natural soils encountered at the Facility Site. However, due to the very dense soil conditions and shallow refusal observed during the geotechnical surveys, driven posts may not be feasible in all portions of the Facility Site. In these areas, pre-drilling will likely become necessary to break up the dense obstructions and achieve sufficient post depth to resist the required lateral and uplift loads. Alternatively, larger sized, heavier grade posts that will accommodate harder driving conditions can be utilized to provide increased embedment and sufficient lateral capacity and uplift. To resist impacts due to frost, piles should be designed and installed to resist frost heave, as mentioned in Section 10(a)(4)(ii) above.

(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 in areas where driving restrictions are less than 8 feet bgs for support of the proposed arrays. Installation of helical piles at depths where auger refusal has been encountered is typically not feasible. Embedment into the very dense/difficult augering 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 helical pile, the use of a 2-inch to 3-inch diameter continuous flight helical pile could be considered, as it can generally be drilled deeper into very dense soil conditions as compared to a conventional helical pile with larger diameter helices. If subsurface obstructions are encountered during installation, pre-drilling or pre-excavation will be required. If predrilling or pre-excavating, then all piles should be backfilled or grouted to ensure intimate contact with surrounding soils and so not to negatively impact lateral stability.

(iii) Shallow Foundations

Shallow foundation systems such as spread footings or rigid mats can be considered for support of electrical equipment or other ancillary equipment. Foundation subgrades for supporting electrical equipment or other ancillary structures subjected to freezing temperatures should be established at least 4 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 layer (minimum 24 inches thick) below the mat foundation to reduce frost impacts. To guard against a punching type shear failure, minimum widths of continuous footings should be 24 inches. If perched groundwater or surface runoff are encountered during excavations for shallow foundations, sumps and pumps will be sufficient to control groundwater and provide stable working conditions.

(iv) Drilled Shafts

Drilled shafts may be considered as an alternate foundation system, particularly for support of the heavier equipment, such as transformers and dead-end structures. The bottom of drilled shafts is anticipated to bear within the very stiff to hard clay or dense decomposed rock. Temporary casing may be required during shaft construction to maintain sidewall stability through the soft natural soils, where cobble inclusions are present, or in excavations where groundwater and/or perched water zones are encountered.

(2) Pile Driving Impact Assessment

A preliminary pile driving impact assessment will be completed to evaluate the potential impacts of pile driving on surrounding properties and structures. It is anticipated that pile driving will be required for solar panel rack installation. An estimated 97,601 piles will be installed within the Facility Site. Each pile will be embedded to approximately 9 feet bgs. Pile driving will be performed with equipment to be determined by the selected construction contractor; however, the expected pile driver type is the Vermeer PD10 vibratory hammer, or similar, and will exert a maximum centrifugal force of up to 145 kips while driving the pile to a depth of 8-12 feet. The pile driver that may be required for the inverter skids and substation equipment, if required, will have similar specifications.

(3) Pile Driving Mitigation

Vibrations generated from high-speed impact hammers are relatively low. At the Facility Site, pile driving activities will be conducted during a limited timeframe to reduce potential impacts. Facility setbacks from neighboring properties also allows for greater attenuation; therefore, there are no anticipated impacts to surrounding properties from vibrations associated with pile driving for construction of the Facility. Therefore, no mitigation as a result of pile driving vibration impacts is anticipated.

A plan for securing compensation for damages that may occur due to pile driving shall be developed by the Applicant. The Applicant's Complaint Management Plan, which will be prepared and provided to the public prior to construction in accordance with NYCRR Section 1100-10.2(e)(7), will detail methods to register vibration 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

As described in Section 10(a)(10), the Facility Site is not significantly vulnerable to seismic events. 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. Nonetheless, the Facility will be designed and constructed to resist the effects of earthquake motions and minimize potential impacts from seismic activity, in accordance with applicable regulations. For information regarding emergency preparedness, refer to Exhibit 6, Public Health, Safety, and Security.

The Facility Site is not vulnerable to tsunami events, as it is located a significant distance from major bodies of water.

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