TRELINA SOLAR ENERGY CENTER

Case No. 19-F-0366

1001.21 Exhibit 21

Geology, Seismology, and Soils

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Exhibit 21: Geology, Seismology, and Soils

This Exhibit will track the requirements of proposed Stipulation 21, dated June 19, 2020, and therefore, the requirements of 16 NYCRR § 1001.21.

This Exhibit contains a comprehensive summary of the geology, seismology, and soil impacts resulting from proposed construction of the Trelina Solar Energy Center (Project). This Exhibit provides identification and mapping of existing geological and surficial soil conditions, an impact analysis, definition of constraints resulting from these geological conditions, and a discussion on potential impact avoidance and mitigation measures.

Conclusions made within this Exhibit are based on the findings of a geotechnical investigation performed by Terracon Consultants, Inc. (Terracon), completed in October and November 2019. A total of 14 borings and six test-pits were completed at the Project Area during the geotechnical exploration. A summary of borings completed to-date is presented in Table 21-1.

Table 21-1. Summary of Test Borings During Site Survey

Test Boring No.	Depth of Bore (feet)	Date Completed
TR-1	20.0	11/04/2019
TR-2	20.0	10/31/2019
TR-3	20.0	11/05/2019
TR-4	20.0	10/31/2019
TR-5	20.0	10/31/2019
TR-6	20.0	11/01/2019
TR-7	20.0	11/06/2019
TR-8	25.0	11/06/2019
TR-9	20.0	11/01/2019
TR-10	20.0	11/04/2019
TR-11	20.0	11/04/2019
TR-12	20.0	11/05/2019
TRSS-1	50.0	10/29/2019
TRSS-2	50.0	10/29/2019

Test Boring No.	Depth of Bore (feet)	Date Completed
TTP-1	10.0	10/23/2019
TTP-2	10.0	10/23/2019
TTP-3	10.0	10/23/2019
TTP-4	10.0	10/23/2019
TTP-5	10.5	10/23/2019
TTP-6	10.0	10/23/2019

21(a) Existing Slopes Map

Slope data from the United States Geologic Survey (USGS) National Elevation Dataset was analyzed and mapped using ESRI ArcGIS software to delineate existing slopes (0-3%, 3-8%, 8-15%, 15-25%, 25-35%, and 35% and over) on and within the mapped drainage area which may be influenced by Project development and associated interconnections. Slopes within this area range from 0-3% to < 25%; but, most slopes within the Project Area are in the 0-3% range and approximately 99.9% of the Project Area occurs on slopes less than 15% (Figure 21-1). Table 21-2 presents the percent coverage that each slope range encompasses within the influenced drainage area.

Table 21-2. Percent Coverage of Slope Ranges within Drainage Area

Slope Range (%)	Percent within Drainage Area (%)
0 – 3	86.6%
3 – 8	12.8%
8 – 15	0.5%
15 – 25	0.1%
25 – 35	0.0%
> 35	0.0%
Total	**100%**

21(b) Slope Impact Avoidance

- Slopes over the majority of the Project Area range from 0-3% and only approximately 1.2 acres within the 1,067-acre Project Area exceed 15% grade and are too steep for panel installation without further grading. Project Components will be sited to avoid steep slopes; therefore, impacts are not expected in those areas. The 1.2 acres of steeper (≥15% grade) slopes will be avoided during Project development and erosion and sediment control measures as outlined in the Stormwater Pollution Prevention Plan (SWPPP) will otherwise be implemented to minimize soil disturbance in areas where construction activities are proposed

Erosion and sediment control measures are described in greater detail within the Preliminary SWPPP provided as Appendix 23-3 in Exhibit 23 and are also depicted in the Preliminary Design Drawings presented in Appendix 11-1.

21(c) Proposed Site Plan

A proposed preliminary site plan was prepared and included within the Preliminary Design Drawings presented in Appendix 11-1. The site plan shows existing and proposed contours at one-foot intervals for the Project Area and on-site interconnections. The site plan also identifies locations of all proposed infrastructure including all construction areas, solar panel locations, access roads, paved and vegetative surfaces, electrical collection line routes, and interconnections to existing utility infrastructure. No buildings are proposed.

21(d) Oil or Natural Gas Wells

There is one known oil and natural gas well located within the Project Area (NYSDEC, 2014). Well Clise 1240 is a plugged and abandoned dry hole drilled by Meridian Exploration Corp. located in wetland W-JJB-3 at 42.89363°N, -76.94976°W (Section 21[bb]). The well will be avoided by Project construction and, accordingly, there will be no impacts proposed to this well as a result of the Project. No additional mines or wells are located within 500 feet of the Project boundary as identified solely based upon records maintained by the NYSDEC. Figure 21-5 shows the locations of the dry well and proximity of wells located nearby.

21(e) Contaminated Soils

The New York State Electric and Gas Corporation (NYSEG) – Geneva – Border City manufactured gas plant remediation site (MGP site) is located approximately 1.3 miles to the southwest of the Project Area. According to the NYSDEC Environmental Site Remediation Database[1] (Site Code 850008), in 1901 the MGP site was originally a coking facility that produced gas as a by-product of the coking process. In 1909, the facility expanded to include gas production that was independent of the coking process. In 1934, the plant stopped operations. It has remained an active service center ever since. The historic use of the MGP site resulted in contaminants of concern onsite including coal tar, coke quenching process water and solid and liquid waste. Immediate remediation efforts were taken at the facility in 2010, and a remediation plan developed to contain contaminants was made effective in March 2010.

According to the NYSDEC database, the two primary waste products at the MGP site are coal tar and purifier waste. These waste products are found intermittently in the subsurface soil in areas associated with historic structures or known disposal areas. These waste products act as source areas for subsurface soil contamination and groundwater contamination in two separate aquifers (a shallow/overburden aquifer and a deeper bedrock aquifer).

Subsurface soil contamination exists at the MGP site. However, the impacted soil has been capped and fenced-off from the public. Therefore, according to DEC, exposures to contaminated soils on the MGP site are unlikely because the majority of the contaminated soils are covered with stone and public access to this area is limited by fencing. In the extremely unlikely scenario that contaminated soils are discovered during construction of the Project from the MGP site, the Applicant will contact NYSDEC and USEPA to report the contamination along with notifying the owner of the MGP site so they may identify the level of contamination and the type of chemical(s) present in the soil to determine the appropriate remediation requirements and the best methods to handle, store, and/or dispose of the contaminated soils.

Groundwater contamination exists in both aquifers underlying the MGP site but outside the Project Area. According to NYSDEC, public exposure to contaminated groundwater is not likely as the groundwater is not used for drinking water purposes since the area is served by public water.

[1] https://www.dec.ny.gov/cfmx/extapps/derexternal/haz/details.cfm?pageid=3

The groundwater flow direction in the shallow/overburden aquifer beneath the MGP site is toward the south/southwest, away from the Project Area. A plume of benzene, toluene, ethylbenzene and xylene (BTEX) and polycyclic aromatic hydrocarbons (PAH) compounds in this aquifer has migrated about 60 feet to the south, also away from the Trelina Solar Energy Center Project Area.

The groundwater flow direction in the bedrock aquifer is toward the east, cross-gradient from the Project Area. A plume that primarily consists of benzene in this aquifer has migrated approximately 0.5-miles to the east. There is a low to moderate potential for the southern reaches of the Project Area to contain contaminated groundwater in the bedrock aquifer. Regardless, this groundwater will not be impacted by solar development within the Project Area as there are no significant construction excavation or dewatering activities planned that would reach the bedrock aquifer.

21(f) Preliminary Calculations of Cut and Fill

Preliminary earthwork quantity calculations were prepared using AutoCAD Civil 3D software. An existing conditions surface was created based on one-foot contours generated from a LiDAR topographic survey of the Project Area. From that data set, a proposed conditions surface was created from the Project grading plan. Differences between these two surface designs indicated the amount of material which will be excavated for construction. Calculations are provided below for topsoil, subsoil and rock layers separately based on information provided in the Seneca County Soil Survey, USDA NRCS, and the New York State Museum and Science Service. These calculations do not account for the collection line trenching which would return soils to near existing conditions with the backfilling of the trench after collection line placement, negating any net change in the soil strata (similar to how this is achieved on operational solar farms across New York State).

Approximately 9,406 cubic yards of material will be excavated from the Project Area. Approximately 1,800 cubic yards of topsoil will be excavated for access roads and the substation and switchyards areas. The excavated topsoil will be replaced in kind, to the maximum extent practicable. Approximately 7,300 cubic yards of subsoil will be excavated from the Project Area. No excavation of rock is anticipated within the Project area because actual depth to bedrock is greater than 78 inches throughout the Project Area, as shown in Figure 21-3, and excavations are not expected to reach or exceed 78 inches.

Approximately 9,700 cubic yards of fill will be required for the proposed construction. This results in a net earthwork balance of approximately 296 cubic yards of fill material needed for the construction of the proposed solar arrays and associated Project infrastructure. Of this total, approximately 8,608 cubic yards of crushed stone is needed for access road, substation, and switchyard construction. Section 21(g) details the quantity of fill material to be imported into the Project Area for construction of the access roads, structural bases for foundations, and compacted fill for burial of electric lines.

It is anticipated that no material will be exported from the Project Area and any excess materials from on-site excavations will be used as fill throughout the Project Area, except for gravel for the access roads, which will consist of imported fill material. It should be noted that the initial design is conservative and likely overstates the amount of cut that will be necessary during construction of the Project, as the access roads and substation will in fact be constructed in both cut and fill conditions.

Invasive Species Management and Control Plan

The Applicant has developed an Invasive Species Management and Control Plan (ISMCP) to outline best practices and control measures for identifying the presence of invasive species in spoil material and for preventing the introduction and spread of invasive species within or outside of the Project Area. The ISMCP is provided in Appendix 22-7. The primary purpose of the ISMCP is to prevent the spread or introduction of invasive species in the excavated materials and avoid spreading and/or transporting invasive species by vectors (mechanisms of species transfer) directly linked to the construction and operation of the Project. The ISMCP will be appended to the Project construction contract, requiring the Contractor to implement the control measures outlined within the ISMCP. The principal construction-related control measure will include prohibiting fill material from being transported offsite from the Project Area. This action will minimize the potential for introduction and/or transport of invasive species identified within the Project Area to uncolonized regions.

Management actions will be grouped into four main categories: material inspection, targeted species treatment and removal, sanitation, and restoration. Within each category, specific actions or combinations thereof will be implemented based on best science regarding treatment and control options for a species and its density within the target area. Monitoring for invasive species will be conducted throughout the duration of the Project to ensure that the ISMCP is implemented appropriately and that the goals outlined therein are being met. A list of invasive species identified within the Project Area based on previously conducted field surveys is provided in Section 22 (p) of Exhibit 22. Invasive species identified at the Project Area prior to construction are likely to spread even in the absence of further human intervention. It is therefore necessary to distinguish between natural movement of invasive species and anthropogenic movement caused by Project related construction activities. The ISMCP will propose a goal of a zero-net increase in the number of invasive species present and their distribution in the Project Area resulting from actions directly attributable to Project construction and operation.

Post-construction monitoring will be conducted for a period of no less than five years following completion of Project-related activities on site. This monitoring is to ensure that ISMCP goals are met, as germination and spread of invasive species can continue long after construction activities have concluded. Failure to meet the goals of the ISMCP will result in revision of the control plan and extension of the post-construction monitoring phase for a period of two years from implementation of the revised plan.

21(g) Description and Preliminary Calculation of Fill, Gravel, Asphalt, and Surface Treatment Material

A preliminary calculation to estimate the quantity of cut and fill necessary for Project construction was performed using existing and proposed three-dimensional surfaces generated from one-foot contour data. Contour data for the existing site topography is derived from LiDAR survey data of the Project Area. Proposed topography/final grade was developed based on the design criteria and constraints required for the anticipated delivery of Project components and construction of the Project facility.

Fill material will be required for several purposes including subgrade material for access roads, backfill for burial of electrical lines, structural bases for electrical equipment pads, and site grading to achieve necessary construction grades. Based on the calculation of cut and fill, the material excavated from the site will be utilized for fill for the solar array sites. Importing additional graded fill material will be required for the construction of permanent access roads and the substation and switchyard. It is anticipated that approximately 9,700 cubic yards of fill will be required for construction of the Project. Approximately 8,608 cubic yards of crushed stone/gravel fill will be imported from off-Site for construction of the access roads, substation, and switchyard. Excess material from excavations will be distributed across disturbed areas and blended into existing topography to return each area to its pre-construction condition to the maximum extent practicable, or as described in the site grading plan, provided as part of the Preliminary Design Drawings in Appendix 11-1.

General fill should contain no particles larger than six inches and less than 20 percent, by weight, of material finer than a No. 200 mesh sieve. Several gradation options were identified and described in the preliminary geotechnical findings (Appendix 21-1). Any imported materials should be free of organic materials and debris (e.g. recycled concrete, asphalt, bricks, glass, and pyritic shale rock). Some on-site materials may be suitable for use as structural fill, however construction activities conducted during the wet season will require the use of imported fill. Moisture content in on-site soils may be too high during wetter periods to achieve optimum conditions for proper compaction and stability.

Additionally, imported surface material and concrete (used for footings and foundations) will also constitute as fill for the Project. The quantity of gravel and surface treatment materials was estimated based on the preliminary site plan. The estimated quantity of each imported material is presented in Table 21-3.

Table 21-3. Estimated Quantity of Imported Material

Imported Material	Quantity (yd^3)
Gravel	7,300
Granular Material	600
Concrete	4,100
TOTAL	**12,000**

At this time, it is assumed that off-road dump trucks with an approximate capacity of 22 cubic yards will be the primary truck used to transport materials throughout the Project Area. As such, it is presumed that approximately 332 truckloads would be required to transport imported gravel fill material into the Project Area throughout the duration of construction. Additionally, 27 truckloads of granular material will also be brought into the Project Area using these truck types. Concrete truck designs which are presumed to be used for this Project will carry approximately 8 cubic yards and weigh 70,000 lbs. With the estimated requirement of 4,100 cubic yards of concrete for this Project, an additional 513 concrete truckloads will also be necessary to transport concrete on-site. Note that 3,800 cubic yards of concrete will be used for the fence posts. This concrete will come from bags of concrete mix, mixed right at the location of each post. Only 300 cubic yards of concrete will be transported via concrete trucks the substation and switchyard foundations.

21(h) Description and Preliminary Calculation of Cut Material of Spoil to be Removed

Based on the preliminary cut and fill calculations performed in Section 21(d), it is not expected that any on-site material will be removed from the Project Area during construction. It is not expected that excess topsoil will be stripped from the ground surface where fill will be placed. Stripped topsoil will be replaced in kind, to the maximum extent practicable. This stripped topsoil material will be temporarily stockpiled and controlled through erosion and sediment controls along the construction corridors and incorporated in the site restoration where applicable, described in further detail on the Grading and Drainage Plans provided in Appendix 11-1.

During restoration of the Project, all excess topsoil materials will be regraded to approximate pre-construction conditions for the site character and drainage areas to be returned to existing conditions to the maximum extent practicable.

As stated in Section 21(g), imported structural fill (e.g., gravel) should adhere to the percent passing weight specifications for particle sizes described in the geotechnical investigation. The imported materials should be free of organic materials and debris including recycled concrete, asphalt, bricks, glass, and pyritic shale rock. Additional laboratory testing will be required to determine if the on-site soils are suitable for use as structural fill on site.

21(i) Construction Methodology and Excavation Techniques

The proposed start date for the construction of the Project is currently late 2021. Project excavation and construction will be performed in several stages and will include the main elements and activities described below.

Location and Extent of Horizontal Directional Drilling (HDD) Methods

The Applicant is proposing to employ trenchless excavation techniques, otherwise known as horizontal directional drilling (HDD), to route 34.5 kV collection circuits under a wetland feature connecting to Gem Lake and under an existing natural gas pipeline. The HDD method was chosen because it has proven to be a safe and efficient method of crossing roads, railroads, streams, wetlands, and other environmentally sensitive areas with minimal surface impact. The Applicant is currently locating and designing all specific target HDD locations; see the Preliminary Design Drawings in Appendix 11-1 and Figure 3-1 for potential locations and a typical HDD equipment layout diagram. Other areas may also be included, as identified in a Compliance Filing, where topographical or environmental constraints dictate that HDD installation methodology is the best construction practice.

Inadvertent Return Plan for Horizontal Directional Drilling (HDD)

The HDD process involves the use of a drilling slurry, usually a combination of water and bentonite (a naturally occurring clay) as a coolant and lubricant for the advancing drill head. The slurry also helps to stabilize the bore and aids in the removal of cuttings during the drilling process. Bentonite is nontoxic; however, if released into waterbodies has the potential to adversely impact fish, fish eggs, aquatic plants, and benthic invertebrates. Therefore, to protect these natural resources, the Applicant has prepared an Inadvertent Return Plan which outlines operational procedures and responsibilities for the prevention, containment, and cleanup of inadvertent returns associated with the HDD process. The objective of this Plan is to:

1. Minimize the potential for an inadvertent return of drilling fluids associated with HDD activities;
2. Provide for the timely detection of inadvertent returns;
3. Protect environmentally sensitive areas (streams, wetlands) while responding to an inadvertent return;
4. Ensure an organized, timely and “minimum-impact” response in the event of an inadvertent return and release of drilling fluids; and, ensure that all appropriate notifications are made immediately.

A detailed Inadvertent Return Plan was created for the Project and is included in Appendix 21-2 of this Application. Details within the Plan indicate:

- Site personnel responsibilities;
- Effective training regimes for handling an inadvertent return;
- Measures to prevent inadvertent returns;
- Equipment and containment materials which will be used in the event of an inadvertent return;
- An outline on effective responses to an inadvertent return;
- A list of parties to be notified at the unlikely event of an inadvertent return;

- Details outlining an effective clean up and restoration strategy;
- Steps on construction restart and avoidance of future inadvertent returns;
- Effective documentation of the incident;
- An assessment of potential impacts from inadvertent returns based on known soil and bedrock conditions;
- A description of inadvertent return mitigation and response measures, as necessary;
- A scaled drawing showing typical HDD equipment staging layout and design; and
- An identification of any locations where HDD or other trenchless installation methods were considered but determined infeasible.

Although HDD has proven to be a safe and reliable method of crossing surface features with very minimal impact, the potential still exists for inadvertent returns of drilling fluid to the surface, which can have a detrimental impact on the environment. These releases typically occur due to seeps which can form when pressure in the drill hole exceeds the capability of the overburden to contain it, or when fluids find a preexisting fault in the overburden. The likelihood of these situations occurring can be minimized by taking into consideration the soil type and bedrock composition. Bore depth should be determined based on these site-specific factors; however, a minimum depth of 25 feet in sound soils should be enough to prevent an inadvertent return.

The proposed HDD for the Project has a minimal risk of inadvertent return due to the existing site soils and bedrock features. The chance for an inadvertent return increases when unfavorable drilling stratum are experienced such as glacial till, highly fractured rock, non-cohesive alluvial material, or cobbles. The soil stratum at the Project Area, as discussed in further detail in Section 21(k), is comprised of silts and clays with varying amounts of gravel, cobbles, and possible boulders, and weathered shale. The HDD bore depths will remain primarily in the silty sand and sandy silt stratum layer; therefore, inadvertent return is not expected.

Construction Phases

Pre-Construction Survey and Environmental Monitoring

Prior to the commencement of Project related construction, an overall site survey will be performed to effectively locate and demarcate the exact location of Project Components and routes. This survey will facilitate assembly strategy and construction efficiency. An Environmental Monitor (EM) will be designated during the construction phase of the Project to oversee all construction and restoration activities in order to ensure compliance with all applicable certificate conditions and other permit requirements. Prior to the start of construction at specific sites, the EM, with support of construction management personnel, will conduct site reviews in locations to be impacted, or potentially impacted, by associated construction activities. Pre-construction site review will direct attention to previously identified sensitive resources to avoid (e.g., wetlands and waterbodies, archaeological sites, or agricultural resources), as well as the limits of clearing, location of drainage features (e.g., culverts, ditches), location of agricultural tile lines, and layout of erosion and sediment control measures. Work area limits will be defined by flagging, staking, and/or fencing prior to construction.

The pre-construction site review will also aid in the identification of any specific landowner preferences and concerns. The placement of erosion and sediment control features will also be located during this site review to mitigate potential impacts to sensitive sites and uphold erosion and sediment control State-wide initiatives. The pre-construction site review will serve as a critical means of identifying any required changes in the construction of the Project in a timely manner to avoid future delays to Project construction timeframes.

Site Clearing and Preparation

After the initial site review, Project-related construction will be initiated by clearing brush and woody vegetation within the limit of disturbance (LOD) established for the solar arrays, access roads, electrical collection line routes, and other supporting infrastructure (collection substation, switchyard, laydown yard, etc.). Vegetation cleared within this LOD will be removed, organized, and disposed of on site and outside any indicated sensitive sites (Appendix 11-1). The definitive clearing impacts which will occur due to the Project will be based on final engineering design. For more information on clearing impacts, including their description and quantification, refer to Exhibit 22 of this Application.

Laydown Yard Construction

All laydown yards were selected for ease of accessibility, and because of their strategic location in the construction work flow, relatively flat ground surface, occurrence outside of sensitive resources (e.g., wetlands, waterbodies), and limited shrubby or woody vegetation to reduce impacts to natural vegetation areas. Most laydown yards are situated within agricultural areas or within fallow fields.

Laydown yards will be developed by stripping and stockpiling the topsoil (stockpiles will be stabilized per the SWPPP) and grading the subsoil (as necessary). Geotextile fabric and gravel fill will then be put in place to create level working areas for the staging of temporary construction trailers, equipment, and materials. Laydown yards will also be utilized for contractor parking.

Upon completion of the construction phase of the Project, any gravel fill will be removed, and topsoil stockpiles will be used to return laydown yards to existing grades and conditions. For any laydown yards staged in active agricultural areas, subsoils will be "ripped" to reduce compaction caused by construction of the Project. Active agricultural lands will be restored in accordance with the New York State Department of Agriculture and Markets Guidelines (NYSDAM) for Agricultural Mitigation for Solar Energy Projects dated October 18, 2019, and other applicable NYSDAM guidance documents to the maximum extent practicable.

Access Road Construction

Access roads will be constructed to provide access to the Project Area from existing roadways. The new gravel access roads will be constructed to reach the proposed solar array location safely and effectively. Road widths will be approximately 14 feet of gravel for array access roads (with a total vehicle clearance width of at least 20 feet), and 20 feet of gravel for substation/switchyard access roads.

Road construction will initially involve the stripping of topsoil and grubbing of stumps, as necessary, after removal of vegetation. All topsoil will be segregated from subsoil and stockpiled (windrowed) along the access road corridor for use in site restoration and soil surface grading. Following removal of topsoil, exposed subsoils will be graded to the specifications outlined in the site design, compacted for constructability, and surfaced with gravel or crushed stone for intended use as an established Project access road. Geotextile fabric or grid may be installed beneath the road surface where needed to provide additional stability support to the access road. Details regarding access road construction are discussed in Exhibit 11 of this Application.

If necessary, dewatering of excavations may occur to keep the excavations free of standing water and permit a safe and constructible environment. Dewatering methods will involve pumping the water to a predetermined well-vegetated discharge point, away from wetlands, waterbodies, and other sensitive resources. Discharge of water will include measures/devices to slow water velocities and trap suspended sediment (e.g., sediment bags). All dewatering activities will also be conducted in accordance with the final Project SWPPP and in accordance with the State

Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities in effect at the time of construction. The use of temporary pump-around techniques or coffer dams will be used during the installation of access road waterbody crossings. Appropriate sediment and erosion control measures will be installed and maintained according to the final Project SWPPP, which will be finalized during final engineering and prior to construction. To facilitate effective draining and surface water management along an access road, culverts and/or water bars will also be employed where necessary. The access roads will be sloped where appropriate to direct water towards the edge of the road and/or down gradient to minimize the potential for ponding on or adjacent to the access roads.

Solar Array Racking System Construction

The construction of solar array racking systems (the supporting structures on which the solar modules will be mounted) will occur after associated access roads to the predefined array sites have been completed or are substantially in place. The grading and leveling of the array site location will occur once access via roads is established and be conducted in strict adherence to guidance from the site grading plan. Topsoil will be stripped from the excavation area as in the access road construction operation using conventional topsoil preservation methods. Topsoil will be stockpiled and stabilized in accordance with SWPPP guidelines for future use in site restoration efforts.

During excavation, subsoil and bedrock will also be segregated and stockpiled for reuse as backfill and for access road development. Stockpiled soils will be located outside of sensitive resource areas and will be stabilized in accordance with the final Project SWPPP. No blasting is proposed. Should blasting become necessary, a Blasting Plan will be submitted to the Secretary or as a compliance filing; all blasting operations will adhere to applicable New York State statutes and regulations governing the use of explosives. This is further addressed in Section 21(j).

Racking posts will be installed by one of three methods depending on site soil characteristics. The primary method is for the post to be driven directly into the soil. An alternate method is to use Helical posts (i.e., pile screws) which are augered directly into the soil. In cases of high ledge or bedrock, a pilot hole must be drilled into the rock to an appropriate depth and the post is then inserted and grouted. Based on the findings of the geotechnical investigation, no bedrock was encountered at exploration depths in the geotechnical investigation. Therefore, it is unlikely that drilling and reinforced foundations will be needed for installation.

34.5 kV Electrical Collection Line Construction

The construction of the 34.5 kV collection circuit between solar arrays will involve multiple methods including direct burial, open trench, and overhead construction methods using equipment such as a rock saw, cable plow, rock wheel, and/or trencher. Direct burial methods involve the installation of a bundle of electric and fiber optic cable directly into a narrow trench in the ground. Where direct burial is not possible due to site specific constraints, an open trench will be employed. Open trench operations involve the excavation, segregation, and stockpiling of topsoil and subsoil adjacent to the cutting of an open trench. Cable bundles are laid at the base of the trench and the trench is backfilled with suitable fill material and any additional spoils are spread out to match existing grades.

Trench breakers will be put into place as necessary along trench lines to prevent erosion caused by the lateral movement of runoff of soil strata in the open trench. These breakers will be located within the trench on steep slopes (based on field conditions) above agricultural, cultural, or wetland/waterbody areas to avoid erosion, sediment build up, and the deposition of sediment into any of the predetermined sensitive resources in the Project Area.

Following installation of the 34.5 kV collection line route, areas will rely on strategically positioned topsoil and subsoil piles to return disturbed areas to pre-construction grades. Installation of buried electrical lines would typically require a width of up to 20 feet of vegetation clearing for this Project. However, in areas where buried electrical lines have been routed collinear with proposed access roads, there will be no additional vegetation or soil disturbance beyond what is expected for the predetermined access road construction. All cleared areas along the buried electrical line routes will be restored through seeding and mulching, and areas outside of the Facility fence line will be allowed to regenerate naturally. As previously noted, HDD will be employed in select areas to navigate collection line around and prevent damage to an existing gas pipeline and sensitive natural resources. For more information on HDD drilling, refer to the Subsection 21(i) and the Inadvertent Return Plan presented as Appendix 21-2.

Solar Array Delivery

The solar array segments and racking will be delivered to the designated construction locations using large trucks using flatbeds and dry vans (for hardware) and offloaded by crane equipment. No excavation of soil strata or disturbance of bedrock is proposed to occur during this or any stage of the construction.

Collection Substation and Switchyard Construction

Much like the clearing of laydown areas, substation and switchyard construction will commence with clearing of any woody or shrubby vegetation within the substation footprint. After clearing, the topsoil will be stripped and stockpiled for later use in site restoration. Exposed subsoil will then be graded to specifications outlined in the Project grading plan and foundation areas will be excavated using standard excavation equipment. Construction staging areas for equipment and materials will also be graded and created. Structures will be supported with a combination of shallow and deep foundations. At this stage, the shallow mat/slab foundations will be poured, and deep foundations will be embedded or drilled. After the foundations have set, installation of electrical infrastructure (structural steel skeleton, conduits, cables, bus conductors, insulators, switches, circuit breakers, transformers, control buildings, etc.) will occur.

During substation and switchyard site finalization, gravel fill and/or crushed stone will be spread throughout the substation and switchyard surface and a perimeter of chain link fence will be erected for security and safety precautions. Finally, the high voltage link-ups will be connected and tested for charge and integrity through electrical control systems in the control house on-site. Restoration of the adjacent areas impacted by construction back to existing conditions in direct vicinity to the substation and switchyard will be completed using stockpiled topsoil, and the appropriate seed and mulch.

Blasting Operations

As stated above, this Project involves excavation of soil for the installation of foundations for the placement of solar arrays and substation facilities. The excavation consists of drilling holes of various sizes and depths for the installation of foundations to support steel structures. No bedrock was encountered at exploration depths in the geotechnical investigation conducted at the Project Area; therefore, blasting is not anticipated.

If rock or bedrock is encountered during excavation, the construction crews will extract and excavate it using a backhoe or other appropriate equipment. However, if the bedrock cannot be extracted with a backhoe, other means may be used for excavation (e.g., pneumatic jacking and/or hydraulic fracturing). Consequently, no blasting will be required if the above procedures are used for the excavation. However, if the rock cannot be excavated using above equipment, it may be necessary to use a blasting method to remove bedrock/rock laden foundation sites. In such cases a blasting plan shall be used. See Section 21(j) for more details on the Project Blasting Plan.

Subsurface Drain Tile Repair Impact and Repair/Replacement

The Applicant is committed to minimizing impacts to agricultural operations and will work with landowners/farm operators to address unanticipated post-construction impacts. The Applicant will work with affected landowners/farmers regarding potential drainage issues on their properties and will use trench breakers in areas of moderate to steep slopes on active agricultural land if deemed prudent (based on field conditions) to ensure that the deposition of impacted or stockpiled soils do not occur over agricultural lands.

Existing drain tiles will be identified and located before construction as much as is reasonably possible based primarily on consultation with the landowner. During and after construction operations, any existing drain tiles within the area of disturbance will be checked for damage, and damaged drain tiles will be replaced or repaired, consistent with the NYSDAM's details for "Repair of Severed Tile Line". The Applicant will coordinate with the landowner to continue to monitor drain tiles post-construction to ensure repairs are properly functioning.

Temporary Cut or Fill Storage Areas

In the initial siting and design process, the strategic placement and design of Project Components was undertaken with the direct strategy of minimizing the amount of areas which require cut and fill operations to occur. As stated previously, the construction and placement of Project infrastructure will require minor cut or fill to achieve the final grades within the Project Area. It is anticipated that approximately 9,400 cubic yards will be fill derived from excavated materials except for gravel for the access roads.

Following the solar array manufacturer's recommendations, array foundations on soil will be installed no less than 5 to 7 feet below the finished grade. Permanent access roads will be constructed using approximately 8 inches of compacted granular fill or native subsoils which will be stockpiled for this use. Where necessary, the native soils will be reinforced with geo-synthetic fabric.

Proper methods for segregating stockpiled and spoil material will be implemented. All excavated soils will be reused near the location it was unearthed to the maximum extent practicable. This technique will aide in reducing the proliferation of non-native flora to uncolonized areas within the Project Area.

21(j) Delineation of Temporary Cut or Fill Storage Areas

Excavation and grading plans, including design and location of temporary storage of topsoil and subsoil structures, are provided in Appendix 11-1 to this Application. Excess fill materials will be stockpiled and stored for use on-site. Several storage options may be employed to stockpile topsoil materials as determined appropriate for on-site conditions during the construction phase including but not limited to silt fencing and straw bale barriers. Concrete waste may be stored in a constructed concrete wash area sited away from wetlands, wetland buffers, and environmentally sensitive areas.

21(k) Characteristics and Suitability of Material Excavated for Construction

Terracon conducted a geotechnical investigation at the Project Area during October and November 2019. Fourteen test borings were completed. Their findings concluded that the subsurface materials encountered across the Project Area are suitable for construction of the proposed structures.

Six test pits were excavated to approximate depths between 10 and 10.5 feet. Laboratory corrosion series testing was performed at all six test pits and one boring location. Thermal resistivity dry-out curves were performed at three of these test pits and one additional boring location. Infiltration testing was performed at seven locations during the geotechnical investigation.

The results of the corrosion test are detailed in Table 21-4. Additional information on the corrosion series testing is provided in Section 21(y) of this Exhibit.

Table 21-4. Results of Laboratory Corrosion Analysis (reproduced from the Geotechnical Engineering Report, Appendix 21-1)

Boring	pH	Sulfates (ppm)	Sulfides (ppm)	Chlorides (ppm)	Red-Ox (mV)	Total Salts (ppm)	Resistivity (ohm-cm)
TTP-1	7.77	4	Nil	43	+685	953	2,910
TTP-2	6.72	83	Nil	25	+677	122	6,111
TTP-3	6.65	73	Nil	23	+678	128	15,520
TTP-4	7.84	30	Nil	60	+687	1,338	1,455
TTP-5	7.11	18	Nil	25	+679	191	20,855
TTP-6	7.68	103	Nil	50	+683	874	5,432
TRSS-1	7.35	62	Nil	70	+687	17,640	258

In general, a chloride concentration greater than 500 parts per million (ppm), or a sulfate concentration greater than 2,000 ppm is indicative of a corrosive environment for most structures. Based on the test results, it appears that a corrosive environment does not exist, and standard Type II cement may be utilized on this Project.

Frost depth in the Project Area is 30 inches. The foundations for new site structures will be below this depth to prevent frost heave.

Organic-laden soil was only encountered at the ground surface during the investigation. The depth of organic material in the topsoil was no more than approximately 1 to 2 inches. This material will be stripped during earthwork so that new structures do not bear on organic-laden soil.

The geotechnical investigation findings suggest that the three primary strata to be encountered at boring locations are:

- Stratum 1 – Surficial: topsoil containing significant organic matter
- Stratum 2 – Native Fine-Grained Soils: silts and clays
- Stratum 3 – Native Coarse-Grained Soils: sand and silty sand

These strata, which are generally suitable for Project development, are further described below.

Stratum 1 – Organic-laden topsoil was encountered to depths of 1.17 inches below ground surface, containing significant organic matter.

Stratum 2 – Native Fine-Grained soils consisting of silty sand, sandy silt, silts and clays were encountered from ground surface to a depth of between 3 - 22 feet below ground surface (the maximum exploration depth). This stratum is primarily composed of soft to very stiff sandy silts, silty sands, silts and clays. Standard Penetration Testing "N" values in this stratum ranged between 0 to 30 blows per foot. In some locations, stratum 2 soils were overlain by stratum 3 soils.

Stratum 3 – Native Coarse-Grained soils were encountered to a depth of 20 feet. The stratum material contains very loose to dense poorly-graded sand and silty sand. The Standard Penetration Texting "N" values ranged from 0 to 34 blows per foot.

During the geotechnical investigation, groundwater was encountered at 12 of the boring and test pit locations at depths ranging from 1 to 20 feet. Groundwater conditions can vary based on factors such as season and weather but were overall suitable for Project development.

Infiltration testing was conducted at six locations across the Project Area and was generally suitable for Project development. Testing at both locations was conducted at a depth between 3.5 - 5.0 feet below ground surface. Infiltration was encountered at three sites with rates ranging from -0.1 inches per hour (water came out of the borehole) to 1.0 inch per hour.

21(l) Potential Impacts to Existing Natural and Artificial Drainage Features

The Applicant is committed to minimizing impacts to agricultural operations to the maximum extent practicable, has worked with landowners, and will continue to work with landowners/farm operators to address unanticipated post-construction impacts, including potential drainage issues on their properties.

Existing drain tiles will be identified and located before construction as much as is reasonably possible based primarily on consultation with the landowner. During and after construction operations, any existing drain tiles within the area of disturbance will be checked for damage by inspecting the drain tile areas for unexpected wet spots, evidence of soil erosion or sedimentation, and monitor the inlets and outlets for proper flows and good water quality. If poor drain tile condition is observed, the drain tile may be misaligned, collapsed, or broken and in need of repair or replacement. Damaged drain tiles will be repaired/replaced by a qualified drain-tile specialist. The Applicant will coordinate with the landowner to ensure repairs are functioning properly.

Existing drainage patterns will be maintained to the maximum extent practicable. Minimal grading and impervious surfaces are proposed as part of the Project. Therefore, no adverse impacts to water wells and surrounding agricultural land uses are anticipated. Erosion and sediment controls will remain in place during site restoration until disturbed areas have been stabilized with vegetation. Section 21(y) provides additional discussion on construction and restoration activities in agricultural lands.

21(m) Preliminary Plan for Blasting Operations

Blasting and/or rock excavation techniques are not anticipated within the Project Area based on the results of the geotechnical investigation and proposed excavation depths. However, a Preliminary Blasting Plan has been prepared should blasting be determined necessary. The Preliminary Blasting Plan is provided as Appendix 21-3.

It is anticipated that the contractor for this Project can excavate with relatively little difficulty using an excavator, rock saw, cable trencher, or plow. Where bedrock is encountered, it is anticipated to be rippable due to its content, and thus will be excavated using large excavators, rock rippers, or chipping hammers. The method or combination of methods required will specifically be tailored to the structural integrity, depth, and robustness of rock/bedrock encountered.

In the event that a unique situation requiring blasting arises, the Preliminary Blasting Plan provided as Appendix 21-3, will be used. The Preliminary Blasting Plan includes procedural timeframes for notifying municipal officials and property owners (or persons residing at the location if different) within one-half mile radius of the blasting site of these activities, as well as an assessment of potential blasting impacts, and blasting impact mitigation measures plan. The blasting contractor shall be responsible for generating an overall Contractor Blasting Plan, if required, and also a written site-specific blasting plan if there are differences in selected blasting sites including the subsoil and bedrock conditions. This specification shall also be used for pre-blast surveys, notifications, use of explosives, security, monitoring, and documentation. It will be included in the Final Blasting Plan filed with the Secretary.

21(n) Assessment of Potential Impacts from Blasting

No bedrock was encountered during geotechnical surveys conducted within the Project Area (Appendix 21-1). Blasting and/or rock excavation techniques are not anticipated within the Project area, therefore no impacts are expected.

A description of the typical impacts associated with blasting, and procedures for avoidance and minimization of impacts to be undertaken in the event blasting is implemented at the Project, are provided in the Preliminary Blasting Plan (Appendix 21-3).

Should blasting be required, in addition to these measures, Applicant will conduct pre- and post-blast surveys on structures, wells, septic systems, drain tiles, and pipelines within a one-half mile radius of the blasting area if requested by the property owner. Any damage determined to be a result of the blasting activities will be repaired. The Applicant will make all reasonable efforts to complete the post-blast survey within 30 days of a request from a property owner.

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

The use of blasting techniques is not anticipated for this Project, therefore impacts requiring mitigation are not expected. Should blasting be required, an investigation and evaluation of reasonable mitigation measures will be provided with the Final Blasting Plan to be filed with the Secretary. Initial measures are provided in Appendix 21-3 and are designed in accordance with the limits for ground vibration set forth in United States Bureau of Mines (USBM) Report of Investigation (RI) 8507 Figure B-1 and air overpressure limits set forth in the Conclusion section in USBM Report of Investigation 8485 (USBM RI 8507 and USBM RI 8485).

Mitigation measures will include alternative technologies and/or relocation of structures in order to negate the need for blasting. Where reasonable alternative measures cannot be employed, blast mats and backfill will be used to control any excessive rock movement when blasting near identified structures. Additionally, as explained above the Applicant will outline a plan for securing compensation for damages that may occur due to blasting, including pre- and post-blast property surveys, if applicable, as detailed in the Complaint Resolution Plan (Appendix 12-3).

21(p) Regional Geology, Tectonic Setting, and Seismology

In addition to the Geotechnical Engineering Report in Appendix 21-1, several existing published sources were used to better understand regional geology, tectonic setting, and seismology within the Project Area. These sources include the Soil Survey of Seneca County (USDA, 2019), statewide bedrock geology mapping (NYSM/NYS Geological Survey, 1970), New York State surficial geology mapping (NYSM/NYS Geological Survey, 1970), 2014 New York State Hazard Map (DHSES), and USGS Earthquake Hazard Program (USGS, 2015).

Regional Geology

The Project Area is in both the Erie-Ontario Lowlands and Allegheny Plateau physiographic provinces. The Erie-Ontario Lowlands are the plains that border the Great Lakes. They are an area of generally subdued topography with low relief provided by a series of proglacial lake beach ridges (NYSDOT, 2013). The Allegheny Plateau is the most extensive physiographic province within the state and was formed by the erosion of glacial deposits by water and ice, leaving a flat-topped upland area with rugged relief. The province is marked by through valleys with steep side walls and large lakes, including the Finger Lakes (NYSDOT, 2013).

The Project Area consists of very gently rolling plains (approximately 1 to 3 percent slope). The Project Area appears to slope very slightly to the south/southeast, however due to the low relief of the area, it is more accurate to describe the site as undulating-flat. The topography remains consistent at approximately 450 feet above mean sea level across the Project Area.

Publicly available surficial geologic mapping, including surficial maps published by the New York State Museum (NYSM, 1970), suggests that the Project Area is primarily composed of lacustrine silts, sands and clays associated with large bodies of water and deposited in proglacial lakes. Silts and clays tend to exhibit lamination, while sands appear well-sorted and stratified containing primarily quartz. The thickness of these deposits vary across the soil types found within the Project Area ranging from 0 to 20 feet in lacustrine sands, and up to 50 feet in silts and clays. Formations prevalent throughout the Project Area may exhibit instability. A detailed description of soils present in the Project Area is provided in Section 22(q). Surficial geology is comprised of soils in the Dunkirk-Collamer association which contain lake-laid sediments of highly-sorted sands and silts. Erosion potential is high in soils within this association. Bedrock was not identified during geotechnical investigations of depths to 20 feet, however publicly available mapping indicates that within the Project Area, there is one main geologic unit present, the Onondaga Limestone group. This unit was formed in the middle Devonian and is comprised of predominately broad carbonate platform facies comprised of limestones and shales. Most of the rock types are made up of soft fragments and do not pose an obstacle to excavation (USGS, 2019).

Tectonic Setting and Seismology

According to USGS Seismic Hazards database, the Project Area is in an area of relatively low seismic activity with a 2% probability of a magnitude 5.0 earthquake occurring in the next 50 years of peak acceleration exceeding 10% to 14% of the force of gravity. This indicates relative low probability for seismic activity and bedrock shift near the Project Area. The seismic site classification identified during geotechnical investigations was Site Class D. In addition, the USGS Earthquake Hazards Program does not list any faults within the vicinity of the Project Area. Figure 21-4 depicts seismic hazards mapping of the Project and surrounding area.

Karst Topography

Publicly available mapping indicates that the Project Area sits in a carbonate karst topography region. Carbonate rocks form karst features such as sinkholes, disappearing streams, caves, and springs. These features are indicative of the dissolution of soluble rocks by surface and ground waters. The estimated depth of drive pile foundations in not anticipated to exceed 12 feet. Based on an evaluation of publicly available mapping and site reconnaissance, karst features (i.e. sinkholes, fractures, caves, etc.) were not identified within the Project Area, and therefore impacts resultant from excavation or other earth disturbance are not expected.

General risks to karst features and aquifers associated with HDD include creating loose, unstable soils and open voids along the drill path. More specifically, there may be a loss of drilling fluid to cave areas within a karst feature, creating fractures within the bedrock and possible sinkhole formation. Although HDD has proven to be a safe and reliable method of crossing surface features with very minimal impact, the potential still exists for inadvertent returns of drilling fluid, which can have a detrimental impact on the environment. These releases typically occur as a result of seeps which can form when pressure in the drill hole exceeds the capability of the overburden to contain it, or when fluids find a pre-existing fault in the overburden. Bore depths for HDD will consider site-specific factors such as soil type and bedrock composition, however, a minimum depth of 25 feet in sound soil should be sufficient to prevent an inadvertent return and impacts to karst areas and aquifer. Refer to the Section 21(i) of this Exhibit for a more complete description of proposed HDD activities. Additional information may also be found in the Preliminary Design Drawings in Appendix 11-1 of the Application, and the Inadvertent Return Plan in Appendix 21-2 which outlines the operational procedures and responsibilities for the prevention, containment, and cleanup of an inadvertent return.

Construction activities such as excavation, HDD, post installation, and in the unique circumstance, blasting, have the potential to increase sediment discharge, create loose or unstable soils, open voids in soils, and lower the water table. Impacts to karst features and aquifers may include sedimentation within caves, water quality deterioration, landform destruction, sinkhole development or collapse, and decreasing the amount of available water. The Applicant will minimize and avoid construction activities and excavation in karst-prone areas and aquifer regions wherever possible. The measures in the SWPPP will help avoid or minimize erosion, sedimentation and runoff impacts.

Best management practices will be used to reduce these potential impacts to karst and aquifer features to the maximum extent practicable. Best management practices include use of erosion and sediment controls, stormwater management, and avoidance of sensitive features. Stormwater management features proposed for the Project in the SWPPP will route stormwater around or away from earth disturbing activities and will slowly filter stormwater through the soil, preventing inundation of groundwater to underground features. Disturbed areas will be stabilized as soon as possible to prevent the transport of sediment and silt, and the Project Area will be revegetated following the completion of construction. In areas of excavation, trench breakers will be employed to prevent erosion caused by the lateral movement of runoff of soil strata in the open trench. These breakers will be located within the trench on steep slopes above agricultural, cultural, or wetland/waterbody areas to avoid erosion, sediment build up, and the deposition of sediment into any of the predetermined sensitive resources in the Project Area. A preliminary SWPPP is contained in Appendix 23-3 of the Application.

21(q) Facility Construction and Operation Impacts to Regional Geology

A Geotechnical Engineering Report has been completed and is presented as Appendix 21-1. In general, geologic conditions are favorable for the construction of this Project. The available information suggests that the solar array areas will be underlain by sand and silt with varying amounts of clay. Based on the subsurface conditions encountered during the investigation performed to-date, it appears that the primary geotechnical issue anticipated at the Project is stability of soils, which can be mitigated through proper implementation of erosion and sediment control practices and soil compaction as well as adherence to fill guidelines presented in the findings of geotechnical investigations.

Given the nature of construction associated with Project development, minimal adverse impacts to regional geology and soils are expected during the construction phase, and little to no temporary or permanent impacts are expected once the facility is operational. Project facilities will be designed and sited to avoid or minimize impacts to geology, topography and soils within the Project Area to the maximum extent practicable.

21(r) Seismic Activity Impacts on Project Location and Operation

The USGS Earthquake Hazard Program does not list any faults within the vicinity of the Project Area (Figure 21-4). The upland areas have a loose soil cover and may increase amplification of seismic waves (Seismic Site Class D soils under the New York State Building Code). The USGS Earthquake Hazard Program does not identify any young faults within the vicinity of the Project Area. Therefore, the impact due to seismic activity is negligible. In the unlikely case of emergency such as a significant seismic event, the design of current solar array technology allows for operational control and emergency shut off.

21(s) Soils Types Map

Figure 21-2 delineates soil types and USDA NRCS farmland classifications within the Project Area using the USDA NRCS Web Soil Survey application. A detailed discussion of each soil type is provided in Section 21(t).

21(t) Soil Type Characteristics and Suitability for Construction

Information regarding on-site soils was obtained from on-site investigations conducted by Terracon, and from existing published sources, including the Soil Survey of Seneca County (USDA, 1972), USDA Web Soil Survey and geographic database (2019).

The Soil Survey of Seneca County, New York (USDA, 1972) and the USDA Web Soil Survey indicate that all proposed facilities and solar arrays are sited within 24 soil types. The surveys indicate that the Project Area predominantly consists of silty loams, ranging from poorly drained to well-drained soils.

The **Arkport** series consists of well-drained to excessively drained sandy soils that have thin bands with a distinct increase in content of clay in the upper 4 to 5 feet.

> **ArB** is Arkport loamy fine sand occurring along1 to 6 percent slopes. It has a gently sloping undulating profile typical of the Arkport series and contains 0.83% organic matter. It shows little erosion by water but is susceptible to erosion due to wind. This soil is well suited to crops or forest.

The **Canandaigua** series consists of deep, poorly drained and very poorly drained, nearly level soils in low valley areas and in small depressions in uplands. They are formed in lacustrine deposits of silt, very fine sand, and clay.

Ca is Canandaigua silt loam. This soil is generally level or nearly level and occurs in low areas and contains 1.94% organic matter. This soil is best suited to most crops grown in Seneca County if it is adequately drained and fertilized.

Claverack soils consist of moderately deep, moderately well drained soils made up of loamy fine sand, generally deposited by water and wind. They are underlain by highly calcareous, heavy lacustrine clay or silty clay that restricts internal drainage.

CkA is Claverack loamy fine sand, 0 to 2 percent slopes. This soil occurs in areas that receive little or no runoff from adjacent areas and contains 1.16% organic matter. The water table is perched for long periods in spring due to the underlying silty clay or clay. The soil is well suited to crops, pasture, or forest. There is a moderate hazard of soil blowing for this soil.

CkB is Claverack loamy fine sand, 2 to 6 percent slopes. It occurs in smooth or very gently undulating areas and contains 1.16% organic matter. Some seepage or runoff from adjacent higher lying areas cause wetness for long periods in spring. This soil is well suited to crops, pasture, or forest. It has moderate hazards of soil blowing and water erosion.

The **Collamer** series consists of deep, moderately well drained, nearly level to gently sloping soils on glacial lake plains. The soils formed in silty, lake-laid deposits.

ClA is Collamer silt loam, 0 to 2 percent slopes. This soil has a profile typical of the Collamer series. It receives little or no runoff from adjacent higher lying areas and contains 1.11% organic matter. It is well suited to crops, pasture, or forest. Erosion is generally not a hazard on this nearly level soil.

ClB is Collamer silt loam, 2 to 6 percent slopes. This is a gently undulating soil that receives little or no runoff from higher, adjacent areas and contains 1.11% organic matter. Shallow drainageways commonly occur on it at close intervals. This soil is well suited to crops, pasture, and forest. Erosion is a hazard, even on the gentler slopes.

The **Cosad** series of soils consists of medium acid to neutral fine sand that is 18 to 40 inches deep over calcareous silty clay. They are somewhat poorly drained soils that occur on the lake plain in the northern part of Seneca County.

> **Cu** is Cosad loamy fine sand. This soil has a surface layer that is very sandy in most places but there are a few scattered spots of fine sandy loam and it contains 1.36% organic matter. The soil is suited to pasture or forest as it is too wet for most crops. When saturated, this soil flows readily and has the potential to plug ditches and drains.

Edwards soils consist of organic soils that are formed in mixed woody, grassy, or sedgy material underlain by white to light-gray calcareous marl at a depth of 10 to 40 inches.

> **Ed** is Edwards muck, which is a level or nearly level soil that occurs near the Seneca and Clyde Rivers. The undrained muck is best suited to woodland or wildlife habitat. Edwards muck contains 36.82% organic matter. If it has been drained, it is well suited to truck crops that are adapted to soils that are medium acid to mildly alkaline. If the soil is drained, it is susceptible to soil blowing and subsidence due to water.

The **Elnora** series consists of moderately well drained, coarse-textured soils that formed in deep, sandy deposits. They are level to gently sloping soils that occur mainly on a large sand delta at the northern end of Seneca Lake.

> **ElB** is Elnora loamy fine sand, 2 to 6 percent slopes. This soil generally occurs in places that receive seepage from adjacent areas and contains 1.18% organic matter. It is commonly underlain by slowly permeable material at a depth of more than 40 inches, which accounts for a moderately high water table during the wet season. It is well suited to crops, pasture, or forest. Water erosion and soil blowing are moderate hazards and special measures are generally needed to prevent sand from plugging the drains.

Fresh water marsh (Fw) consists of shallow, inundated areas around lakes and of ponded areas in the uplands. Fresh water marsh is covered by water most of the year and is too wet to support growth of trees except along the edges of the lakes, where the water is shallow. However, these ponded areas do support growths of marsh plants, many of which consist almost entirely of cattails (*Typha* sp.).

The **Lakemont** series consists of poorly drained, moderately fine textured soils that formed in calcareous, reddish, lacustrine clay and silty clay. They occur in low positions on the lake plains.

LcA is Lakemont silty clay loam, 0 to 3 percent slopes. This soil is poorly drained with 1.47% organic matter and generally occurs in small- to medium-sized areas on the lake plain. If undrained, this soil is mainly used for pasture or woods.

The **Lamson** series consists of moderately coarse textured, level or depressional, poorly drained and very poorly drained soils that have a medium-lime to high-lime content.

Lf is Lamson fine sandy loam and Mucky fine sandy loam. This unit is typical of for the series. Most areas are a mixture of the poorly drained and very poorly drained soils, though some areas are one or the other. This unit contains 2.14% organic matter. The undrained areas are best suited to water-tolerant pasture, forest, or wildlife. Drained areas may be used for a variety of crops. The soil flows readily when saturated, so special measures are needed to prevent drains from plugging.

Made land, tillable (Md) consists mainly of areas in which the original soil has been moved or disturbed, and the original surface and subsoil are not evident. Most areas of this land type consist of material that was dredged during the straightening and deepening of the barge canal. The soil unit contains 0.23% organic matter.

Muck consists of organic soil formed in a mixture of wood, grass, or sedgy materials. The soil is strongly acid to alkaline and the organic layer is generally more than three feet thick.

Mr is Muck, deep, which has the profile typical of the Muck series with slopes of 0 to 1 percent. Undrained muck compresses or subsides about a third of its original thickness within two to three years of being drained and is best suited to most crops. Undrained muck is best suited to woodland or to wildlife habitat. If the muck soil is drained, control of soil blowing and management of water are necessary to reduce the rate of subsidence and oxidation. This soil unit contains 84.5% organic matter.

The **Niagara** series consists of deep, somewhat poorly drained silty soils that formed in lacustrine deposits high in content of silt and very fine sand. They are nearly level soils that have little runoff and commonly receive water from higher, adjacent areas.

Ng is Niagara silt loam, which is generally nearly level with slopes of 0 to 2 percent and contains 1.58% organic matter. This soil is suited to crops, pasture, or forest. The soil flows readily when saturated and requires special measures to prevent drains and ditches from becoming plugged.

The **Odessa** series consists of deep, somewhat poorly drained, nearly level to gently sloping soils on glacial lake plains. The soils formed in reddish lacustrine deposits high in silt and clay content.

OdA is Odessa silt loam, 0 to 3 percent slopes. This soil is level and occupies moderately large to large, broad areas of the lake plain in areas which generally receive no runoff from adjacent areas. This soil unit contains 1.19% organic matter. Runoff from this soil is slow with little or no ponding occurring during wet periods. Odessa silt loam, 0 to 2 percent slopes is suited to crops, pasture, or forest.

The **Schoharie** series consists of deep, moderately well drained to well drained, gently sloping to moderately steep soils on glacial lake plains. The soils formed in reddish lacustrine deposits of silt and clay.

SeB is Schoharie silt loam, 2 to 6 percent slopes. This soil has a profile which is similar to the typical profile for the series but is slightly coarser in texture. The more smoothly sloping areas have moderately long to short, convex slopes that grade into narrow, nearly straight, concave drainageways. Undulating areas have short, convex slopes with many, narrow, irregular drainageways and shallow depressions. This soil unit contains 1.05% organic matter. The soil is suited to crops, pasture, or forest. Erosion is slight to moderate, but small spots of clay indicating severe erosion are common in the more steeply sloping, undulating areas. Drainageways and depressions commonly contain deposits of eroded material.

ShA is Schoharie silty clay loam, 0 to 3 percent slopes. This soil has a profile that is similar to the one described as typical for the series but is commonly mottled directly below the surface layer and is a little wetter. It occurs in slightly convex areas of the lake plain and contains 1.05% organic matter. This soil is best suited to crops, pasture, or forest.

ShB is Schoharie silty clay loam, 2 to 6 percent slopes. This soil has the profile described as typical for the series. The more smoothly sloping areas have moderately long to short, convex slopes that grade into concave drainageways. The undulating areas have short, convex slopes that are separated by narrow, concave drainageways and depressions. This soil unit contains 1.05% organic matter. This soil is best suited to crops, pasture, or forest. Water is absorbed slowly and runoff is moderately rapid, so erosion is a continuing hazard.

ShC is Schoharie silty clay loam, 6 to 12 percent slopes. This soil generally occurs in dissected areas and has short, convex slopes that are separated by narrow drainageways, but a few small areas have smooth, single slopes. The steeper side slopes are severely eroded, and clay or bald spots are common. The center and lower parts of drainageways and sags commonly contain deposits of eroded material. This soil unit contains 1.05% organic matter. This soil can be used for limited cropping, pasture, or forest.

The **Sloan** series consists of deep, poorly drained and very poorly drained, medium-textured and moderately fine textured soils that formed in slightly acid to mildly alkaline, recent alluvium. They are level to slightly depressional soils in slack-water areas and in old, partially filled stream channels or oxbows of the flood plains.

Sn is Sloan silt loam which occurs in low areas and depressions on the first bottom lands and is the first soil to flood. It occurs mainly along the larger streams, including the Clyde River, and contains 2.11% organic matter. If undrained, this soil is best suited to pasture or forest in which water-tolerant plants are predominant. Some areas provide suitable sites for ponds and wildlife marshes.

The **Stafford** series consists of deep, somewhat poorly drained, coarse-textured soils that formed in sandy lacustrine deposits. These are low or depressional soils on the lake plains.

Sr is Stafford loamy fine sand which is mostly level or depressional and has slopes of less than 2 percent. The soil is not extensive as most areas are small, with only a few larger than 20 acres. This soil unit contains 1.18% organic matter. The soil is suited to crops, pasture, or forest. The fine sand flows readily when saturated and requires use of special measures to prevent plugging of open ditches and tile drains.

Table 21-5. Summary of Soil Types

Map Unit Symbol	Map Unit Name	Slope (%)	Acres within Project Area
Al	Alluvial land	0 to 2	0.1
ArB	Arkport loamy fine sand	1 to 6	44.2
ArC	Arkport loamy fine sand	6 to 12	3.7
Ca	Canandaigua silt loam	0 to 2	3.9
CkA	Claverack loamy fine sand	0 to 2	158.5

Table 21-5. Summary of Soil Types

Map Unit Symbol	Map Unit Name	Slope (%)	Acres within Project Area
CkB	Claverack loamy fine sand	2 to 6	143.5
ClA	Collamer silt loam	0 to 2	45.4
ClB	Collamer silt loam	2 to 6	11.3
Cu	Cosad loamy fine sand	0 to 2	163.6
Ed	Edwards muck	0 to 2	13.0
ElB	Elnora loamy fine sand	2 to 6	8.1
Fw	Fresh water marsh	N/A	13.0
LcA	Lakemont silty clay loam	0 to 3	10.3
Lf	Lamson fine sandy loam and Mucky fine sandy loam	0 to 2	61.3
Md	Made land, tillable	0 to 8	<0.1
Mr	Muck, deep	0 to 2	31.9
Ng	Niagara silt loam	0 to 2	32.9
OdA	Odessa silt loam	0 to 3	87.2
SeB	Schoharie silt loam	2 to 6	110.0
ShA	Schoharie silty clay loam	0 to 3	77.8
ShB	Schoharie silty clay loam	2 to 6	10.9
ShC3	Schoharie silty clay loam	6 to 12	12.0
Sn	Sloan silt loam	0 to 2	5.7
Sr	Stafford loamy fine sand	0 to 2	16.9

Most soils in the Project Area are Claverack loamy fine sand. Soil drainage among mapped soil units is predominately classified as moderately well to well drained, although approximately 30 percent of soils are classified as somewhat poorly to poorly drained. For additional information about agricultural resources within the Project Area, including designated Agricultural District lands, see Exhibit 4 and Exhibit 22 of this Application.

The primary impact to the physical features of the Project Area will be the disturbance of soils during construction. The LOD for the Project is approximately 474 acres. Based on the assumptions outlined in Table 22-2, only approximately 10 acres will be permanent impacts where soils are converted to access roads, array foundations (posts), and structures, while the remaining will be restored and stabilized following the completion of construction. The area-of-disturbance calculations presented above assume significant soil disturbance will occur in all areas in which construction occurs. Actual disturbance will include overlap of some components and will be highly variable based on the specific construction activity, the construction techniques employed, and soil/weather conditions at the time of construction.

Earth moving and general soil disturbance will increase the potential for wind/water erosion and sedimentation into surface waters. Soils within the Project Area exhibit low permeability, a depth to bedrock of 80 inches or more, and are rated as having moderately low to moderately high infiltration capacity (0.06 to 0.20 in/hr). Implementing the erosion and sediment control measures outlined in the Preliminary SWPPP will minimize impacts to steep slopes and highly erodible soils that may occur in the event of extreme rainfall or other event that could potentially lead to severe erosion and downstream water quality issues. In addition, impacts to soils will be further minimized by the following means:

- Public road ditches and other locations where Project-related runoff is concentrated will be armored with rip-rap to dissipate the energy of flowing water and to hold the soils in place.

- Prior to commencing construction activities, erosion control devices will be installed between the work areas and downslope areas to reduce the risk of soil erosion and siltation. Erosion control devices will be monitored continuously throughout construction and restoration for function and effectiveness.

- During construction activities, hay bales, silt fence, or other appropriate erosion control measures will be placed as needed around disturbed areas and stockpiled soils.

- Following construction, all temporarily disturbed areas will be stabilized and restored in accordance with approved plans.

Impacts to soil resources will be minimized by adherence to best management practices that are designed to avoid or control erosion and sedimentation and stabilize disturbed areas. In addition, erosion and sedimentation impacts during construction will be minimized by the implementation of an erosion and sedimentation control plan developed as part of the SPDES General Permit for the Facility. Erosion and sediment control measures shall be constructed and implemented in accordance with a SWPPP (Appendix 23-3). All excavations will comply with state and federal regulations.

Construction excavations may encounter areas of perched groundwater if construction occurs during a time when a seasonally high-water table may be present. In addition, construction during rainy periods may see an increase in perched groundwater due to the low hydraulic conductivity and soil permeability within the Project Area. Temporary de-watering may be required during the construction if perched water, groundwater, or seepage is encountered. Open sump pumping is the most common and economical method of dewatering and is anticipated to be sufficient based on relatively low permeability soils reported at the site. The water will be discharged properly to an area identified within the Final SWPPP. Dewatering methods will involve pumping the water to a predetermined well-vegetated discharge point, away from wetlands, waterbodies, and other sensitive resources. Discharge of water will include measures/devices to slow water velocities and trap any suspended sediment. The Project will not contain any facilities below grade that would require continuous de-watering.

21(u) Bedrock and Underlying Bedrock Maps, Figures, and Analyses

Figure 21-3 depicts anticipated depth of bedrock within the Project Area. Depth to bedrock is greater than 78 inches below the ground surface across the entire Project Area. Test borings performed to-date by Terracon did not encounter bedrock at the maximum exploration depth at any test locations.

Groundwater was encountered at twelve of the boring locations at depths ranging from 1.5 feet below ground surface to 20 feet below ground surface. The groundwater conditions may vary with seasonal changes and weather conditions. A final geotechnical investigation will need to be completed prior to any site improvements to determine the actual elevations of groundwater near the proposed solar array.

Maps, figures, and analyses on depth to bedrock, underlying bedrock types, vertical profiles of soil, bedrock, water table, seasonal high groundwater, typical foundation depths, roadways to be constructed, and all off-Site interconnections required to serve the Project are provided in the Geotechnical Investigation Report, provided as Appendix 21-1 or on the Preliminary design drawing in Exhibit 11 of the Application. Additionally, Appendix 21-1 provides an evaluation of the potential impacts due to Project construction and operation, including any on-Site water disposal systems. These analyses were based on information obtained from publicly available maps, scientific literature, a review of technical studies conducted on and near the Facility, and on-site field observations, test pits and/or borings as available.

21(v) Evaluation of Suitable Building and Equipment Foundations

Foundation construction for Project Components within the collection substation and switchyard occurs in several stages, which typically include excavation; pouring of the concrete mud mat, rebar, and bolt cage assembly; outer form setting, casting, and finishing of the concrete; removal of the forms; backfilling and compacting; and site restoration. Excavation and foundation construction will be conducted in a manner that will minimize the size and duration of excavated areas required to install foundations.

Some equipment may be supported on shallow foundations, while other structures may be supported on deep foundations consisting of drilled shafts, direct embedded poles or rock anchors. Transmission line structures are anticipated to be constructed as poles on drilled shafts or as direct embed poles. Based on the subsurface conditions encountered in the soil borings and test pits, the proposed collection substation and switchyard will be constructed on deep foundations consisting of direct embedment with concrete backfill or driven shafts. Shallow foundation systems are not recommended or proposed for these structures based on stability constraints posed by the loose soils found within the Project Area. Drilled shafts should be constructed as straight shafts at least 24 inches in diameter. Settlement of drilled shaft foundations using design properties presented in this report is expected to be less than 0.5 inch. All building structure foundations should bear on suitable natural soil, or on properly compacted structural fill. Compaction recommendations for structural fill are provided in the geotechnical investigation (Appendix 21-1).

Settlement potential of shallow foundations was analyzed using soil compressibility properties derived from the SPT borings drilled in the planned collection substation and switchyard location and assumed structural loads. Estimated total settlements will be less than one inch provided column loads are less than 150 kips and the applied bearing pressure of small isolated slabs or mats is less than about 2,000 pounds per square foot (psf). Shallow foundation systems for support of lightly-loaded buildings and equipment pads will be acceptable provided that maximum loads are not exceeded. The minimum embedment depth for shallow spread footing foundations is 30 inches to counteract loose soils and frost heave.

The Applicant anticipates that the solar array racking systems will be supported by posts driven into the ground and will not require foundations.

(1) Preliminary Engineering Assessment

The Geotechnical Engineering Report analyzed spread footing and isolated slab foundations and drilled shaft foundation alternatives for the substation and switchyard foundations. Drilled shaft or direct embed foundations were found to be acceptable for light-loaded buildings provided that maximum loads are not exceeded. If drilled shaft foundations are used for the Project, a minimum shaft diameter of 30 inches is recommended for the foundations. Refer to Appendix 21-1 for additional information regarding the foundation engineering assessment and design recommendations.

The available information suggests that substation and point of interconnection (POI) switchyard foundations will be underlain by lacustrine deposits of silt and sand.

Solar array racking posts will be installed by driving the posts directly into the subsurface. Although unlikely based on the geotechnical study, if refusal is encountered while driving the posts directly into the subsurface, there are two alternative methods for installation. A helical post (i.e., pile screw) can be installed directly into the subsurface. In cases of high ledge or bedrock, a post hole can be pre-drilled into the rock to an appropriate depth prior to driving the post, and the post hole will be grouted. In situations with very hard rock, the post hole may need to be oversized and then grouted after the post is installed. See Preliminary Design Drawings included in Appendix 11-1.

Design frost depth is 2.5 feet in the Project Area, and foundations must be at or below this depth to prevent movement due to frost heave. Additionally, the manufacturer specifications indicate that standard embedment of 5 to 7 feet is required to support racking and panels.

Loose soils found in the Project Area may complicate excavation stability. Stabilization methods will be employed to reduce the risk of erosion during earthwork activities. Scarification and re-compaction of soils will be employed during periods of dry weather where feasible (e.g. loose/wet soils do not exceed a thickness of 12 inches), or granular fill will be used to improve stability. Undercutting where necessary will range from 8 to 24 inches and will be backfilled with compacted imported structural fill. Soil compaction will comply with recommendations provided in the geotechnical report.

Assuming the foundation excavations are properly managed during construction, an allowable bearing pressure of 2,000 psf is appropriate for shallow foundations bearing on undisturbed soils.

All construction techniques to be used conform to applicable building codes or industry standards.

(2) Pile Driving Impact Assessment

Pile driven foundations are not proposed for the substation and switchyard foundations, therefore engineering feasibility and impact assessments were not conducted. If pile driven foundations are determined to be necessary for Project construction, the foundation will be assessed for impacts to surrounding properties and structures, mitigation methods for vibration will be evaluated, the calculation of the number and length of piles to be driven will be included, and the daily and total number of hours of pile driving work will be estimated.

Based on manufacture specifications approximately 450 posts/MW will be required for a total of 36,000 posts. Posts are galvanized steel and load-carrying capacity will vary based on post dimensions and installation methods. Installation is typically completed using an excavator equipped with a vibratory driving attachment or drilling, setting, and backfilling posts. It is anticipated that the posts can be installed in 150 days using 4 post installation crews working 10 hours per day.

Based on soil types throughout the Project Area, the posts are anticipated to be driven with a vibratory hammer. Helical posts (i.e., pile screws), if utilized, will be installed with the minimum required torque per manufacturer's recommendations. If refusal is encountered during installation, the posts will be installed into pre-drilled holes and filled with grout.

The primary impacts from post installation operations are noise and vibration. The equipment used in post installation is not expected to generate any off-Site noise or vibration impacts (Exhibit 19).

(3) Pile Driving Mitigation

To minimize impacts associated with noise, post installation activities will be designed to minimize impacts to nearby residences and existing structures. Section 19(i) of Exhibit 19 describes noise abatement measures for construction activities. As mentioned in Section 21(s)(2), pile driven foundation systems are not considered to support the collection substation and switchyard. Mitigation measures are not required for these Components.

(4) Vibrational Impacts

All post installation operations which occur adjacent to residences, buildings, structures, utilities, or other facilities will be undertaken with specific planning and insight from industry professionals, contractors, inspectors, and the Applicant, with full consideration for all forces and conditions involved and with safety as the top priority. To the maximum extent practicable, facilities have been sited to avoid existing structures. Based on air-borne induced vibration modeling conducted by Epsilon Associates Inc. no receptors were found to experience sound levels equal to or greater than 65 dB at 16, 31.5, or 63 Hz, which are the outdoor criteria established in annex D of ANSI standard S12.9 – 2005/Part 4 and applicable portions of ANSI 12.2 (2008). This analysis is further discussed in Exhibit 19 and provided in Appendix 19-1.

Post installation for a solar facility is smaller scale compared to pile driving for heavy infrastructure (i.e., building foundations or bridges). Typically, posts are driven into the ground using hydraulic ram machinery, which is about the size of a small tractor or forklift and have much less vibrational impacts than equipment used for heavy infrastructure. Although unlikely, posts in the array can be pre-drilled if driving directly into the native subsurface is difficult. As such, no vibrational impacts are anticipated. The closest distance to a structure where post installation is proposed is over 100 feet and is well over several hundred feet in most locations.

As mentioned in Section 21(s)(2), pile driven foundation systems are not considered to support the collection substation and switchyard. Mitigation measures for vibrational impacts are not required for these components.

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

The Project Area is in an area of relatively low seismic activity. The USGS Seismic Hazards database indicates a 2% chance of an earthquake occurring in the next 50 years of peak acceleration exceeding 6% to 8% of the force of gravity in the Project Area. The Project Area has a loose soil cover and may provide amplification of seismic waves. Geophysical surveys are part of the overall scope of services but were not authorized for this phase of the investigation and no site-specific shear wave velocity data is available. The Project Area appears to have minimal vulnerability associated with seismic events based on review of publicly available data. The findings were provided in Section 21(r).

The nearest large body of water susceptible to tsunami events is located well over 100 miles from the Project Area, therefore this Application will not address vulnerability to tsunami events.

21(x) Evaluation of Corrosion Potential

Some soil units found within the Project Area are acidic. Acidic soils are likely to be corrosive to steel and concrete. Steel may need a protective coating and concrete may require additives in the mixture to protect against corrosion. According to the NRCS Web Soil Survey, soils in the Collamer, Cosad, Edwards, Odessa, Sloan, and Stafford series vary from strongly acidic to slightly acidic and may pose a risk of corrosion to steel. These soil units cover approximately 32% of the Project Area. Remaining soils are of low corrosion risk for uncoated steel. All soils, except alluvial lands, pose low risk of corrosion of concrete.

Six samples were collected during corrosion testing at depths from 0 to 4 feet below the existing ground surface. The samples were tested for pH, water soluble sulfate, sulfides, chlorides, total salts, reduction-oxidation potential, and electrical resistivity. Refer to Table 21-4 and section 21(i) for more detailed corrosion testing information. Additional corrosion potential information is included in the Geotechnical Engineering Report presented as Appendix 21-1. Detailed design requirements will be determined during the final engineering phase.

21(y) Consistency with New York State Department of Agriculture and Markets Guidelines

The Project will comply with the NYSDAM *Guidelines for Solar Energy Projects – Construction Mitigation for Agricultural Lands* requirements, dated October 18, 2019, and other applicable NYSDAM guidance documents that are in effect during construction, to the maximum extent practicable.

The Applicant will hire an EM to oversee construction and restoration work on agricultural land. The EM will coordinate with the NYSDAM Division of Land and Water Resources as necessary to ensure the guidelines are being met to the maximum extent practicable. The EM will contact the NYSDAM Division of Land and Water Resources if a farm resource concern, management matter pertinent to the agricultural operation, and/or site-specific implementation conditions, cannot be resolved.

The Project will comply, to the maximum extent practicable, with the guideline requirements for construction, restoration, monitoring and remediation, and decommissioning as detailed below.

Construction Requirements

The measures to be followed for the construction of the Project to comply, to the maximum extent practicable, with the NYSDAM's October 2019 guidance document "Guidelines for Solar Energy Projects – Construction Mitigation for Agricultural Lands" are detailed as follows.

- Before any topsoil is stripped, representative soil samples shall be obtained from the areas to be disturbed. The soil sampling shall be consistent with Cornell University's soil testing guidelines, and samples should be submitted to a laboratory for testing PH, percent organic material, cation exchange capacity, Phosphorus/Phosphate (P), and Potassium/Potash (K). The results are to establish a benchmark that the soil's PH, Nitrogen (N), Phosphorus/Phosphate (P), and Potassium/Potash (K) are to be measured again upon restoration. Should soil sampling not be performed, the Applicant will obtain fertilizer and lime application recommendations for disturbed areas at: https://www.agriculture.ny.gov/ap/agservices/Fertilizer_Lime_and_Seeding_Recommendations.pdf.
- Stripped topsoil shall be stockpiled from work areas (e.g. parking areas, electric conductor trenches, along access roads, equipment pads) and kept separate from other excavated material (rock and/or sub-soil) until the completion of the facility for final restoration. For proper topsoil segregation, at least 25 feet of additional temporary workspace (ATWS) will be provided along "open-cut" underground utility trenches. All topsoil will be stockpiled as close as is reasonably practical to the area where stripped/removed and shall be used for restoration on that particular area. Any topsoil removed from permanently converted agricultural areas (e.g. permanent roads, etc.) shall be temporarily stockpiled and eventually spread evenly in adjacent agricultural areas within the project Limits of Disturbance (LOD); however not to significantly alter the hydrology of the area. Topsoil stockpile areas and topsoil disposal areas will be clearly designated in the field and on construction drawings; changes or additions to the designated stockpile areas may be needed based on field conditions in consultation with the Environmental Monitor (EM). Sufficient LOD (as designated on the site plan or by the EM) area shall be allotted to allow adequate access to the stockpile for topsoil replacement during restoration.
    - Topsoil stockpiles on agricultural areas left in place prior to October 31st shall be seeded with Aroostook Winter Rye or equivalent at an application rate of three bushels (168 lbs.) per acre and mulched with straw mulch at rate of two to three bales per 1000 square feet.

- Topsoil stockpiles left in place between October 31st and May 31st shall be mulched with straw at a rate of two to three bales per 1000 square feet to prevent soil loss.

- The surface of access roads located outside of the Project's security fence and constructed through agricultural fields shall be level with the adjacent field surface. If a level road design is not feasible, all access roads should be constructed to allow a farm crossing (for specific equipment and livestock) and to restore/ maintain original surface drainage patterns.
- Culverts and waterbars shall be installed to maintain the natural drainage patterns.
- Vehicles or equipment will not be allowed outside the planned LOD without the EM seeking prior approval from the landowner (and/or agricultural producer), and associated permit amendments as necessary. All vehicle and equipment traffic, parking, and material storage will be limited to the access road and/or designated work areas, such as laydown areas, with exception the use of low ground pressure equipment. Where repeated temporary access is necessary across portions of agricultural areas outside of the security fence, preparation for such access shall consist of either stripping / stockpiling all topsoil linearly along the access road, or the use of timber matting.
- Proposed permanent access shall be established as soon as possible by removing topsoil according to the depth of topsoil as directed by the EM. Any extra topsoil removed from permanently converted areas (e.g. permanent roads, equipment pads, etc.) shall be temporarily stockpiled and eventually spread evenly in adjacent agricultural areas within the project Limits of Disturbance (LOD); however not to significantly alter the hydrology of the area.
- For open-cut trenching, topsoil will be stripped from the work area adjacent to the trench (including segregated stockpile areas and equipment access). Trencher or road saw like equipment will not be allowed for trench excavation in agricultural areas, as the equipment does not segregate topsoil from subsoil. HDD installations, primarily designed to avoid impacts to wetlands and an existing pipeline, will also help to minimize agricultural ground disturbances. Any HDD drilling fluid inadvertently discharged will be removed from agricultural areas. Narrow open trenches less than 25 feet long involving a single directly buried conductor or conduit (as required) to connect short rows within the array, will be considered exempt from topsoil segregation.
- Electric collection, communication and transmission lines installed above ground can create long term interference with mechanized farming on agricultural land. Thus,

interconnect conductors outside of the security fence are proposed to be buried in agricultural fields wherever practicable. Where overhead utility lines are required, (e.g., from the switchyard to the POI) installation will be located outside field boundaries or along permanent access road(s) wherever possible. Should overhead utilities must cross farmland, agricultural impacts will be minimized by using taller structures that provide longer spanning distances and locate poles on field edges to the greatest extent practicable.

- All buried utilities located within the Project's security fence will have a minimum depth of 18-inches of cover if buried in a conduit or a minimum depth of twenty-four inches of cover if directly buried (e.g. not routed in conduit).
- The following requirements shall apply to all buried utilities located outside of the generation facility security fence:
    - In cropland, hayland, and improved pasture buried electric conductors shall have a minimum depth of 48 inches of cover. In areas where the depth of soil over bedrock is less than 48 inches, the electric conductors shall be buried below the surface of the bedrock if friable/rippable, or as near as possible to the surface of the bedrock.
    - In unimproved grazing areas or on land permanently devoted to pasture the minimum depth of cover shall be 36 inches.
    - Where electrical conductors are buried directly below the Project's access road or immediately adjacent (at road edge) to the access road, the minimum depth of cover shall be 24 inches. Conductors shall be close enough to the road edge as to be not subject to agricultural cultivation/sub-soiling.
- Should buried utilities alter the natural stratification of soil horizons and natural soil drainage patterns, the Applicant will rectify the effects with measures such as subsurface intercept drain lines. The Applicant shall consult the local Soil and Water Conservation District concerning the type of intercept drain lines to install to prevent surface seeps and the seasonally prolonged saturation of the conductor installation zone and adjacent areas. The Applicant shall install and/or repair all drain lines according to NRCS conservation practice standards and specifications. Drain tiles shall meet or exceed the AASHTO M-252 specifications. Repair of subsurface drains tiles shall be consistent with

the NYSDAM's details for *"Repair of Severed Tile Line"* found in the pipeline drawing A-5[2].

- In pasture areas, it may be necessary to construct temporary fencing (in addition to the Project's permanent security fences) around work areas to prevent livestock access to active construction areas and areas undergoing restoration. For areas returning to pasture, temporary fencing will be erected to delay the pasturing of livestock within the restored portion of the LOD until pasture areas are appropriately revegetated. Temporary fencing including the project's required temporary access for the associated fence installations shall be included within the LOD as well as noted on the construction drawings. The Applicant will be responsible for maintaining the temporary fencing until the EM determines that the vegetation in the restored area is established and able to accommodate grazing. At such time, the Applicant shall be responsible for removal of the temporary fences.

Restoration Requirements

Agricultural areas temporarily disturbed during construction will be de-compacted to a depth of 18 inches to a level no more than 250 pounds per square inch when measured with a soil penetrometer. In areas where topsoil was stripped, soil decompaction will be conducted prior to replacing the topsoil. Rocks four inches and larger will be removed from the subsoil surface prior to topsoil replacement. The topsoil will be replaced to the original depth and contours where possible.

Rocks four inches and larger will be removed from the surface of the topsoil. Subsoil decompaction and topsoil replacement will be avoided after October 1. If areas are restored after October 1, provisions will be made to restore and reseed eroded and exposed areas the following spring to establish proper vegetative cover.

Access roads will be re-graded as needed to allow farm equipment crossing and to restore the original drainage patterns or incorporate the newly designed drainage pattern. Existing drain tiles will be identified and located before construction as much as is reasonably possible based primarily on consultation with the landowner. During and after construction operations, any existing drain tiles within the area of disturbance will be checked for damage, and damaged drain tiles will be repaired or replaced consistent with the NYSDAM's details for "Repair of Severed Tile

[2] (http://www.agriculture.ny.gov/ap/agservices/Pipeline-Drawings.pdf)

Line" to the maximum extent practicable. The Applicant will coordinate with the landowner to continue to monitor drain tiles post-construction to ensure repairs are properly functioning.

Restored agricultural areas will be seeded as specified by the landowner to maintain consistency with the surrounding areas.

Restoration practices will be postponed until favorable soil conditions exist. Restoration will not occur when soils are in a wet or plastic state of consistency. Regrading stockpiled topsoil and de-compacting subsoils will not occur until the plasticity, as determined by the Atterberg field test, is adequately reduced. Restoration activities will not occur on agricultural fields between October and May unless favorable soil conditions exist.

Construction debris will be removed from the Project Area following restoration efforts and disposed of in a licensed facility.

Monitoring and Remediation

The Applicant will provide monitoring and remediation for a period no less than 365 days following the date upon which the solar arrays are in commercial operations. The monitoring and remediation will identify remaining agricultural impacts associated with construction that need mitigation and follow-up restoration.

Monitoring efforts will assess the topsoil thickness, relative content of rock and large stones, trench settling, crop production, drainage and repair/replacement of severed subsurface drain line, fences, etc. If necessary, topsoil will be imported to the Project Area to repair trench settling and topsoil deficiency issues. Visual inspection will determine the presence of excessive amounts of rock and oversized stone material. Excess rocks and large stones will be removed as appropriate.

Should the subsequent crop productivity within affected areas fall to less than half that of adjacent unaffected agricultural land, the Applicant and other associated parties must determine the appropriate rehabilitation measures to be implemented.

Decommissioning

When the solar arrays are decommissioned, all above ground structures will be removed from the Project Area. Concrete piers, footer, and other supports will be removed to a depth of 48 inches below the soil surface and underground electrical lines will be abandoned in place. The Project

Area will be restored to as close to the previous condition as practicable. Previous agricultural lands will be restored with recommendations from the landowner, the Soil and Water Conservation District, and the Department of Agriculture and Markets. Access roads and landscaping in agricultural areas will be removed unless specified otherwise by the landowner.

21(z) Evaluation of Risk of Damage or Displacement to Foundations and Underground Cables

According to soil maps for the Project Area and geotechnical investigations, mapped soil units indicate moderate to high risk for frost action. Frost heaves exert pressure on underground structures resultant from intermittent freezing and thawing of the soil. The additional pressure causes soils to lift, which may result in displacement of underground structures (e.g. foundations, cables, etc.) which are constructed above the frost line. Frost depth in New York State averages 36 to 48 inches. In accordance with the NYS Building Code, concrete foundations and/or piers will be constructed to a minimum depth of 30 inches and adhere to all American Society for Civil Engineers (ASCE) 32 standards.

Existing soils composed of sand and gravel or imported sand are proposed for re-use as structural and/or compacted fill. The soils observed during geotechnical investigations consist of silty sand and sandy silt and have low-to-minimal shrink/swell potential. As a result, specific construction procedures associated with potential expansive clay will not be required for the Facility.

21(aa) Map Showing Mines/Quarries, Oil and Gas Wells, and Associated Features

The NYSDEC database of maps, wells, and quarries was evaluated to determine the location and proximity of these features within and adjacent to the Project. One gas well was identified within the Project Area but will be avoided by construction activities (Section 21[bb]). No additional features were identified in publicly-available mapping datasets. Identified features are shown on Figure 21-5.

21(bb) Identification of Oil and/or Natural Gas Wells Located within the Project Area

There is one known natural gas well located within the Project Area (NYSDEC, 2014). Well Clise 1240 is a plugged and abandoned dry hole drilled by Meridian Exploration Corp. located in wetland W-JJB-3 at 42.89363°N, -76.94976°W (Figure 21-5). The well’s location was confirmed during a magnetometer survey conducted in February 2020. The well is located outside of the

Project's limit of disturbance and therefore will be avoided No other mines or wells are reported within 500 feet of the Project boundary as identified from records maintained by the NYSDEC.

21(cc) Controls for Existing Gas Infrastructure during Construction

The reported location of Well Clise 1240 is approximately 160-ft beyond the Project's LOD and nearly 220-ft from the nearest solar racking. No impacts to this abandoned dry hole well are expected to occur as a result of Project construction or operation.

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