Stipulation 21-1001.21 Exhibit 21: Geology, Seismology, and Soils

Exhibit 21 shall contain:

A study of the geology, seismology, and soils impacts of the Facility consisting of the identification and mapping of existing conditions, an impact analysis, and proposed impact avoidance and mitigation measures, including:

a) A map delineating existing slopes, using USGS National Elevation Dataset and ESRI ArcGIS® Software, on and within the drainage area potentially influenced by the Facility site and interconnections;

b) A proposed site plan showing existing and proposed contours at two-foot intervals, for the Facility site, access roads and interconnections, at a scale sufficient to show all proposed buildings, structures, paved and vegetative areas, permanent stormwater facilities (including any proposed culverts, drainage systems with catch basins/inlets, retention ponds, etc.) and construction areas;

c) A description and preliminary calculation of the quantity of cut and fill necessary to construct the Facility, including separate calculations for topsoil, sub-soil and rock. The Applicant will include a plan to identify the presence of invasive species in spoil material and to prevent the introduction and/or spread of invasive species by the transport of fill material to or from the site of the Facility or interconnections in Exhibit 22;

d) A description and preliminary calculation of the amount of fill, gravel, asphalt, and surface treatment material to be brought in to the Facility site and interconnections;

e) A description and preliminary calculation of the proposed type and amount of cut material or spoil to be removed from the Facility site and interconnections;

f) A detailed description of construction methodologies and activities associated with the Facility, including anticipated excavation techniques to be employed based on site-specific preliminary geotechnical investigations. In addition, this section of Exhibit 21 will:

    1) Identify locations and approximate extent (lengths) of installations where horizontal directional drilling (HDD) or other trenchless methods of installing underground electrical collection lines may be proposed, if any. A typical staging or setup area for HDD or trenchless installation will also be provided in the Application, including typical setbacks from streams/wetlands, and sediment and erosion control measures. To the extent known, soil and bedrock conditions at anticipated boring locations, including the depth to bedrock, will be described and an assessment of the suitability of soils and shallow bedrock for HDD installations will be provided. If HDD or other trenchless methods are anticipated, this section will also include an Inadvertent Return Contingency Plan and a discussion of the site-specific geotechnical analysis as it relates to site suitability for HDD and trenchless crossing methods;

2) Describe methods anticipated to be used for installation of facilities across streams and wetlands;
3) Identify the location(s) of sensitive environmental resources (e.g., state-protected streams) and describe the proposed measures for avoidance and/or mitigation of impacts; and
4) Provide preliminary construction plan and profile information for protected stream crossings by proposed access roads, interconnection lines, or other facility components.

g) A delineation of temporary cut or fill storage areas to be employed;

h) A description of the characteristics and suitability for construction purposes of the material excavated for the Facility and of the deposits found at foundation level, including factors such as soil corrosivity, bedrock competence, and subsurface hydrologic characteristics, based on results of a Preliminary Geotechnical Investigation. The Preliminary Geotechnical Investigation will include boring logs and locations, results of geotechnical analyses, literature review and publicly available data regarding surface and subsurface soil, bedrock, and groundwater conditions, and discussion of the geotechnical investigation data and results will be included in Exhibit 21 and a copy of the Preliminary Geotechnical Investigation Report will be included as an appendix;

i) A preliminary blasting plan will be included if the results and data obtained from the Preliminary Geotechnical Investigation indicate blasting will be required. The preliminary blasting plan will describe all blasting operations including location, minimum blasting contractor qualifications, hours of blasting operations, estimates of amounts of rock to be blasted, warning measures, measures to ensure safe transportation, storage and handling of explosives, use of blasting mats, a protocol for a pre-blasting condition survey of nearby buildings, water supply wells, and improvements, coordination with local safety officials, monitoring procedures of nearby structures, and notification procedures for potentially affected residents and owners/operators of nearby above-ground and below-ground structures;

j) If the results and data obtained from the Preliminary Geotechnical Investigation indicate blasting will be required, the Application will include an assessment of potential impacts of blasting to environmental features, above-ground structures and below-ground structures such as pipelines and wells;

k) If the results and data obtained from the Preliminary Geotechnical Investigation indicate blasting will be required, the Application will include an identification and evaluation of reasonable mitigation measures regarding blasting impacts, including the use of alternative technologies and/or location of structures, and including a plan for securing compensation for damages that may occur due to blasting;

l) A description of the regional geology, tectonic setting and seismology within or adjacent to the Facility, including identification of areas of known karst geology within or adjacent to the Facility;

m) An analysis of the expected impacts of construction and operation of the Facility with respect to regional geology, to the extent those impacts can be determined;

n) An analysis of the impacts of typical seismic activity experienced in the Facility area, based on current seismic hazards maps, on the location and operation of the Facility identifying potential receptors in the event of failure, and if the Facility is proposed to be located near a young fault or a fault that has had displacement in Holocene time, demonstration of a suitable setback from such fault;

o) A map delineating soil types at the Facility and interconnections sites using data from USDA NRCS Web Soil Survey. Maps shall also depict vulnerable agricultural soils including, but not limited to, those identified in the county soil surveys as fragipans, lacustrines, dense basal tills, soils with a seasonally high water table or soils with less than 5 feet of depth and be identified on maps using the following codes: 'VE' (designate the general area of vulnerability of erosion due to factors of slope and/or texture of exposed soil); 'VW' (designate the general area of vulnerability to soil horizon wetness as described above0; 'VB' (designate the general area of vulnerability due to shall depth of bedrock; and 'V/OR' (designate the location of unavoidable mucklands). NYS Department of Agriculture and Markets *Guidelines for Agricultural Mitigation for Wind Power Projects* will be used to avoid, minimize, and/or mitigate impacts to agricultural soils;

p) A description of the characteristics and suitability for construction purposes of each soil type identified above, including a description of the soil structure, texture, percentage of organic matter, and recharge/infiltration capacity of each soil type and a discussion of any de-watering (including a discussion of locations with poorly drained soils) that may be necessary during construction and whether the Facility shall contain any structures or installations below grade that would require continuous de-watering. The locations of subsurface drainage tiles will be identified and the methods proposed for minimizing disruption and restoring agricultural drainage systems will be provided, to the extent that information is available;

q) A map delineating soil types at the Facility using data from USDA NRCS Web Soil Survey, indicating locations of Prime Farmland, Prime Farmland if drained, Unique Farmland, Farmland of Statewide Importance, and Farmland of Local Importance. Specifically, Prime Farmland, Prime Farmland if Drained, and Farmland of Statewide Importance will be mapped based on data obtained from the Soil Survey Geographic Database (SSURGO), while Unique Farmland and Farmland of Local Importance will be mapped based on consultation with the local NRCS office (i.e., assuming the local NRCS office is able to provide a list of such soils).

r) Maps, figures, and analyses delineating depth to bedrock and underlying bedrock types, including vertical profiles showing soils, bedrock, water table, seasonal high groundwater, and typical foundation depths on the Facility site, and any area to be disturbed for roadways to be constructed and all off-site interconnections required to serve the Facility, including an evaluation for potential impacts due to Facility construction and operation, including any on-site wastewater disposal system, based on information to be obtained from available published maps and scientific literature, and the Preliminary Geotechnical Analysis;

s) A foundation evaluation including:

1) A preliminary engineering assessment to determine the types and locations of foundations to be employed. The assessment shall investigate the suitability to support turbine foundations and of such foundation types as spread footings, caissons, or piles for any buildings, including a statement that all such techniques conform to applicable building codes and industry standards;
2) If piles are to be used, a description and preliminary calculation of the number and length of piles to be driven, the daily and overall total number of hours of pile driving work to be undertaken to construct the Facility, and an assessment of pile driving impacts on surrounding properties and structures due to vibration;
3) Identification of mitigation measures (including any monitoring that may be necessary) regarding pile driving impacts, if applicable, including a plan for securing compensation for damages that may occur due to pile driving; and

t) An evaluation of the vulnerability of the Facility site and the operation of the Facility to an earthquake event and a tsunami event, as applicable.

Stipulation 22– 1001.22 Exhibit 22: Terrestrial Ecology and Wetlands

Exhibit 22 shall comply with the requirements of 1001.22 by containing:

a) Specific information on the existing plant communities within the Facility site including:

1) Plant community mapping using GIS software and based on Facility-specific field investigations conducted at the proposed locations of Facility components (e.g., ecological cover type assessments, habitat assessments, and wetland delineations) along with roadside observations and aerial photo interpretation for adjacent properties;

2) Detailed description of all ecological communities identified within the parcels that will host the Facility components. Ecological community descriptions will be classified according to Ecological Communities of New York State (Edinger et al., 2014); and

3) A list of plant species observed during Facility-specific field investigations as described in (a)(1) and (a)(2) above, including the date(s) each species was observed.

b) Proposed temporary and permanent impacts to plant communities shall be calculated and discussed based on specific assumptions associated with the proposed limits of vegetation disturbance areas for each type of Facility component, or the limits of disturbance, as identified in the Preliminary Design Drawings (Exhibit 11).

1) The limits of disturbance shall include all areas of anticipated vegetation clearing and soil disturbance. In addition to identification on Preliminary Design Drawings, the dimensions of these areas shall be listed by component type in tabular format. These impact assumptions will be based on prior industry experience with similar wind power projects.

2) A map will depict vegetative cover types in relation to the proposed limits of vegetation disturbance.
3) A summary impact table will quantify the number of acres that will be temporarily and permanently impacted by the various Facility components (permanent impact calculations will include all tree clearing for construction and operation of the facility), including the estimated acreage of hedgerow removal.
4) A list of all non-native invasive plant species observed during Facility-specific field investigations (within the anticipated limits of disturbance) and maps of any concentrations of non-native invasive plant species will be included.
5) An Invasive Species Prevention and Management Plan that addresses the species listed in 6 New York Code Rules and Regulations (NYCRR) Part 575 will be included in the Application. Specifically, the Invasive Species Prevention and Management Plan will include the following:

    i) A summary of the survey methods Lighthouse Wind used to identify existing non-native invasive plant and insect species within the Facility site;
    ii) A discussion of best management practices which will be employed to achieve no net increase in invasive species from construction of the Facility, such as the use of plants native to New York (or appropriate crop plants where agricultural lands are involved) to replace vegetation removed during construction;
    iii) Specific methods Lighthouse Wind will use to ensure that imported fill and fill leaving the Facility site will be free of non-native invasive plant and insect species to the extent practicable;
    iv) Indication whether fill materials to be placed within the Facility site will be free of non-native invasive plant and insect species or only used within the areas free of non-native invasive plant and insect species infestation;
    v) Proposed Facility site grading and erosion and sediment control methods that will be used to prevent the introduction, spread or proliferation of non-native invasive plant and insect species to the extent practicable;
    vi) Details of cleaning procedures for removing non-native invasive plant and insect species from equipment and personnel, and properly disposing of infested materials;
    vii) Details of procedures for preventing the spread of invasive insects, such as the emerald ash borer, and compliance with the state quarantine on the transport of ash trees, where applicable, from the Facility site;
    viii) Implementation plans for ensuring that equipment arrives at and departs the Facility site free of non-native invasive plant and insect species;
    ix) Description of the Best Management Practices or procedures that will be implemented, and the education measures that will be used to educate workers;
    x) Details of post-construction monitoring and survey measures and procedures for revising the Invasive Species Prevention and Management Plan in the event that the goals of the initial plan are not met within a specified timeframe; and
    xi) Anticipated methods and procedures used to treat non-native invasive plant and insect species that have been introduced or spread as a result of the construction or operation of the Facility.