

Appendix 5-3:  
Preliminary Operations and Maintenance Plan



# **PRELIMINARY OPERATION AND MAINTENANCE PLAN**

Garnet Energy Center  
Cayuga County, New York

**FACILITY OPERATOR:**  
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## **1.0 Overview**

The purpose of this Preliminary Operation and Maintenance (O&M) Plan (Plan) is to establish a maintenance and management schedule intended to apply safe work practices and minimize potential hazards during operation of the Garnet Energy Center (Project). This Plan is specific to solar development and the nature of the proposed Project. This Plan will present and identify the commitment of Garnet Energy Center, LLC (Applicant) to instill safe work practices while conducting routine maintenance on the solar array and associated components. Operation and maintenance practices outlined in this Plan have been identified to prevent and/or minimize, to the maximum extent practicable, any adverse impacts to the surrounding environment and local community within the Project Area.

## **2.0 O&M Purpose**

The Applicant has prepared this preliminary Plan to follow all applicable requirements of Stipulation 5 of the Project's Stipulations (dated February 8, 2021), related to facility maintenance and management plans, procedures and criteria. The Applicant is a limited liability company formed on November 12, 2019 in Delaware, and will develop, own, operate, and maintain a wholesale, solar-powered generating facility in Cayuga County, New York. Garnet Energy Center, LLC is a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER). As such, the Project will directly contribute to NEER's reliable reputation in the energy industry by providing clean, renewable energy.

NEER is a nationally recognized clean energy provider with a portfolio of facilities totaling over 21,900 megawatts (MW) of generating capacity in the United States and Canada, of which over 2,000 MW is derived from the sun. NEER operates its facilities with respect for the environment and supports communities. Approximately 99 percent of NEER's electricity is derived from clean or renewable sources, including solar and wind.

## **3.0 Solar & Energy Storage Technology**

Solar arrays have been selected for the Project in consideration of various factors including market competition, tax incentives, availability of panels, industry trends, and solar resource suitability/characteristics. Shade and tilt were also considered when determining whether to use tracking panels or fixed panels. The selected technology, monocrystalline solar tracking and/or fixed panel systems are one of the most efficient models currently available. The Project also

includes an energy storage system with a capacity of 20 MW for a 4-hour duration. There are 11 energy storage systems located throughout the Project Area adjacent to Project inverters.

## **4.0 Maintenance Schedule**

Inspections will be completed in accordance with all applicable engineering, design, and manufacturing standards. Scheduled and unscheduled safety inspections will occur to the electrical system from the inverters to the substation which includes the pad-mount transformers and collection system. Routine inspections may occur via ground patrols, aerial patrols, Light Detection and Ranging (LiDAR), and/or imagery analysis. Inspections to North American Electric Reliability Corporation (NERC) applicable lines and lines designated as critical to the reliability of the electrical system in the region will occur, at a minimum, annually with no more than 18 months between each inspection. The following lists of inspection, testing, and commissioning procedures will be necessary, at a minimum, for the proposed panels and collection system for the Project. Table 1 provides a description of the preventative maintenance tasks and schedule.

### ***Collection System***

- Abiding by employee safety requirements;
- De-energized verification to ensure no current is flowing through panel electrical components;
- Verifying all wires and cables have been routed properly without sharp bends;
- Confirming all protective equipment has been properly installed;
- Checking that all fuses, connections, safety switches, breakers, inverters, and all other systems/components are appropriately installed and securely fastened;
- Ensuring that there are no short circuits or short protections to confirm components are ready to receive power; and
- Panel and inverter testing.

### ***Substation***

- Visual, mechanical, and electrical testing of power transformers and high-voltage breakers;
- Testing of all metering units;
- Testing of all surge breakers, transformers, switches, relays, computer systems, valves, and other instruments;

- Switchgear and switchboard inspections and testing;
- Testing and diagnostics of all cables;
- Testing of the grounding systems; and
- Substation integration into the data collection system.

### ***Energy Storage System***

- Abiding by employee safety requirements
- Confirming all protective equipment has been properly installed
- Testing of the grounding systems
- Checking that all fuses, connections, safety switches, breakers, and all other systems/components are appropriately installed and securely fastened
- Confirming Battery Management System (BMS) is operating properly

The timing and number of inspections is flexible in order to respond to changing weather conditions that may potentially impact Project components including heavy rain falls or high winds, as well as factors such as landowner intervention or tree mortality caused by disease outbreaks or insect infestations.

## **4.1 Vegetation Maintenance Overview**

The objective of vegetation maintenance/management is to establish an integrated vegetation management schedule for solar arrays, collection lines, collection substation, and access roads (as necessary) for the Project to preserve the reliability of the Project Components. Regular vegetation management helps to prevent outages associated with vegetation located on or near Project components, to minimize outages caused by insufficient clearances from nearby vegetation, and to implement inspection schedules, treatment schedules, and environmental controls to avoid off-site effects.

Vegetation maintenance will target only those plants that are incompatible with the Applicant's use of the land with the following objectives:

- Transmission Reliability – the reliability of electrical service through vegetation control regardless of accessibility or workability.
- Minimizing Fire Hazards – through first identifying potential problems and then by reducing electric current levels to acceptable limits.

- Compliance – ensuring that the Applicant is compliant with the Article 10 certificate conditions and Best Management Practices (BMPs) approved thereunder, Invasive Species Management and Control Plan (ISMCP; Exhibit 22), applicable laws and regulations, and industry standards.
- Resource Management – the ability to control resources by identifying workload.
- Mechanical means such as mowing and weed whacking will be employed to control vegetation in the first instance. Herbicide treatments, if necessary, will be a secondary method and applied only on an as-needed, spot, selective basis, thus allowing allocated resources to be utilized efficiently. Aerial or broadcast spraying will not be employed. As a result, work load and resources will be balanced.
- Improving/Maintaining Accessibility – promoting accessibility to Project components by controlling vegetation on and around component locations and access roads where practical. NYPA will maintain the right-of-way (ROW) under the 345-kilovolt (kV) line tying the Point of Interconnection (POI) switchyard to the existing transmission line.

#### ***4.1.1 Practices and Prescriptions***

The Applicant's vegetation management practices represent a system for managing plant communities through identifying compatible and incompatible vegetation. The evaluation, selection, and implementation of appropriate control method or methods will be designed to achieve the set objectives described in Section 4.1. The selection of control method or methods will be informed by presumed environmental impact and anticipated effectiveness given site characteristics, security, economics, current land use and other factors. These methods include, but are not limited to pruning, removal, mowing, weed whacking, and as a secondary method, spot/selective herbicide applications, using New York State Department of Environmental Conservation (NYSDEC) approved products and treatment methods.

**Mowing/Brush Removal (Primary Method):** During the operation and maintenance period of the Project, vegetation will be mowed at least twice a year (typically two to six annual mows depending on seasonal growing conditions) within array fence lines and will not be allowed to grow above the height of the lowest portion of the panels. Vegetation immediately around the outside of fence lines will be mowed, maintained or brush-hogged periodically, as needed, to prevent shading on the panels and to facilitate maintenance along the fence line; this brush

removal or mowing will likely take place every two to three years. All brush removal and mowing clippings will be left on-site.

**Herbicides (Secondary Method):** Herbicides may be used as a secondary means of control where necessary. Spot treatments will be employed to target specific discrete locations; broadcast or aerial application of herbicides is not proposed. If necessary, herbicides are only anticipated to be used to prevent potential fire hazards and to treat invasive species. All herbicide use will comply with the regulations and requirements of NYSDEC's Pesticide Control Regulations. The NYSDEC requires that application of herbicides be made under the direct supervision of a New York State (NYS) Certified Applicator who either owns or is employed by a business or agency registered with NYSDEC for the purpose of herbicide application. All herbicides used will have valid registrations with both United States Environmental Protection Agency (USEPA) and NYSDEC. Application of herbicides will conform to all label instructions and all applicable state and federal laws and regulations.

#### ***4.1.2 Inspection Schedule***

Vegetation inspections will include periodic inspections for invasive species and will follow the ISMCP for the Project (Exhibit 22). Site checks will be confined to the limits of disturbance, with some exception to checks warranted within other portions of the Project Area. Site checks will include ensuring stable ground conditions, functioning stormwater management features, and identifying perimeter landscaping necessary to maintain effective visual screening intended for the Project.

Special attention to ground cover, landscaping features, and more frequent checks will occur for stormwater management features during the initial operation phase of the Project. The seed mix selected for the Project will depend on the time of year it will be applied. Seeded areas will be checked for establishment during initial site seeding and the addition of topsoil or reseeding implemented as necessary. Identification of faster growing weeds and invasive species will be prioritized to ensure the seeded mix becomes well established as the primary ground cover. Site checks will occur more often, as necessary, to address concerns and/or action items noted in previous invasive species reports and in areas where invasive species occur.



### **4.1.3 Inspection Elements**

The following elements will be implemented during scheduled inspections in order to maintain unimpeded operation of the facility, promote stable ground conditions, meet vegetation maintenance and compliance objectives, and control invasive species.

Regular planned routine inspections will evaluate and identify:

- Excessive growth of ground cover grass or weeds;
- Vegetation height at/below bottom edge of photovoltaic (PV) modules;
- Bare spots and/or excessive weed growth;
- Condition of landscaped trees (signs of stress);
- Deterioration of erosion control and storm water management features;
- Vegetation that impedes on facility equipment;
- Condition of the wetland vegetation;
- Signs of uncontrolled runoff or sedimentation;
- Signs of damage to the perimeter fence due to vegetation growth;
- Trash and debris;
- Inspections for invasive species per ISMCP; and
- Road conditions and signs of mud tracking off-site and address accordingly.

Periodic mowing and repairs to grassed areas:

- Maintain vegetation height based on actual observed growth (typically maintained to below 18-24 inches);
- Approximately 2-6 annual mows depending on conditions;
- Avoid mowing while ground is wet or with 24-48 hours after heavy rain;
- Mow of fenced area and between solar module rows;
- Mow less often just outside (about 5 to 15 feet) from the fence;
- Mow select landscaped areas as needed to promote tree growth;
- Add or repair stakes and support cables for newly planted trees, as needed;
- After full growth, trimming of shrubs and landscaping trees (as required);
- Trim targeted storm water management features and ditches;
- Trim around and within substations;
- Repair bare or eroded areas as necessary; and
- Check for and remove loose debris.

Periodic selective herbicide treatment:

- Will use only USEPA and NYSDEC-approved products; and
- Used to support vegetation management efforts as explained in Section 4.1 (e.g. reduction of fire hazards, invasive species control, etc.).

Periodic management of perimeter landscaping:

- Trim branches as needed;
- Repair stakes and guide strings; and
- Remove dead or fallen trees and limbs, as needed.
- Periodic repairs to storm water management and erosion control features as necessary, which may include vegetation management measures.

#### ***4.1.5 Communication of Imminent Outage Threat Cause by Vegetation***

The Applicant shall communicate vegetation conditions that present an imminent threat to the appropriate control center.

##### Immediate Communication Requirements for the Applicant's Employees and Contractors:

When a vegetation condition representing an imminent threat is discovered, it will be promptly reported to the Applicant's vegetation specialist. The vegetation specialist will verify the distance to conductor. After the imminent threat is confirmed, the verifying employee will establish communications with the appropriate control center and area operations. In that communication they will jointly formulate a plan to resolve the risk timely.

##### Action:

After the appropriate personnel are apprised of the imminent threat, action will be delegated to appropriate personnel to remediate the emergency. Safety and system reliability shall be guiding factors for the plan of action. Actions may be to reduce line load or switch the line out of service until the vegetation threat has been removed.

##### Documentation:

The vegetation specialist will maintain a detailed log of the event to track the work until completion. The imminent threat reporting will be documented and maintained by the Applicant's Vegetation Management team.

## 5.0 Inspection Records

Any observed conditions requiring maintenance during operation of the Facility, which are identified through the inspection process, will be recorded and stored electronically. The inspection records will identify and prioritize maintenance based on the risk of reliability for each Project component. Each inspection shall be documented electronically with the date completed and the name of the Inspector.

## 6.0 Maintenance Implementation

Tracking – Monthly, the Applicant’s maintenance team will review the progress of inspections, and work scheduled to establish a work plan. Resource movements and schedule adjustments will be made as necessary to ensure work plan objectives are met. The Applicant will ensure items included on the work plan will be completed at the end of the calendar year.

Quality Assurance and Auditing – Upon completion the contractor will certify the work as completed to the specification. In addition, the work is inspected documented in the database by the Applicant’s employee or representative.

Documentation – The work plan is maintained in the database. Reports are monitored to ensure work plan is complete and exceptions are noted. Archiving the documentation in the database occurs and ends the process.

## 7.0 Quality Assurance, Quality Control, and Independent Patrol

Quality Assurance and Quality Control (QAQC): A random, statistically representative sample of open, scheduled and completed work will be selected and reviewed annually to improve our ability to capture and assess performance improvement opportunities.

QAQC and Independent Patrol will enable the Plan to derive an independent picture of the overall management of the Project Area as well as bolster continuous improvement.

## 8.0 Safety

All operational staff personnel will be familiar with the Site Security Plan (Appendix 18-1) and Emergency Response Plan (Appendix 18-2) established for the Project. Any person designated to conduct inspections or maintenance on the Project will complete any necessary training to carry out their assigned task(s). All inspection and maintenance staff will also wear the appropriate

personal protective equipment identified for the task(s). NEER’s Safety Information Management System will capture any/all injury events, unsafe conditions, and near misses related to operation of the Project. These records will be used to develop and implement corrective measures for newly identified hazards.

**Table 1. Maintenance Schedule – Facility Components**

<u>Service Description</u>	<u>Service Frequency</u>
<b><u>Solar Field</u></b>	
<b>Panels</b>	
Module Inspection	1 Week
Module Cleaning	As Needed
Thermography (IR) Scan	12 Months
String Current Checks	1 Month
<b>Inverters</b>	
Inspection	1 Week
Cleaning/Torque checks	12 Months
HVAC Inspection	1 Week
HVAC Maintenance	12 Months
HVAC Condenser Coil Cleaning	6 Months
<b>Pad Mounted Transformers</b>	
Inspection	1 Week
IR Scan	12 Months
Oil Sample	12 Months / As Needed
<b><u>Control Room/Switchyard</u></b>	
<b>Control Room</b>	
Inspection	1 Week
Battery Cell Test	6 Months
HVAC Inspection	1 Week
HVAC Maintenance	6 Months

**Table 1. Maintenance Schedule – Facility Components**

<u>Service Description</u>	<u>Service Frequency</u>
<b>Switchyard</b>	
Inspection	1 Week (Manned) / 1 Quarter (Unmanned)
Switchyard IR Scan	12 Months
SF6 Breaker Maintenance (Minor)	6 Years
SF6 Breaker Maintenance (Major)	As Needed
Transformer Oil Sample	12 Months
Revenue Meter "A" Phase Calibration	12 Months
Revenue Meter "B" Phase Calibration	12 Months
Revenue Meter "C" Phase Calibration	12 Months
<b>Safety</b>	
Site Safety Audit	1 Month
Site Safety Assessment	12 Months
First Aid Kit Quantity Inspection	1 Month
Fire Extinguisher Inspection	1 Month
Fire Extinguisher Recertification	12 Months
Protective Grounds Recertification	12 Months
Voltage Rated Glove Recertification	6 Months
Switch Stick Recertification	2 Years
<b>Administrative</b>	
Spare Parts Inventory	3 Months (Partial Count)
Spare Parts Inventory	12 Months (Full Count)
SCADA Inspection	Daily
SCADA Maintenance	1 Month
PI/Historian Inspection	Daily
PI/Historian Maintenance	1 Month