

**Operation and Maintenance Plan**

**Hawthorn Solar**

**Pine Valley Road and Fords Road**

**Town of Hoosick, NY**

**Hawthorn Solar, LLC**

**2045 Lincoln Highway**

**Edison, NJ 08817**

## **1 Overview**

This Operations and Maintenance Plan (the Plan) is intended to address the ongoing operations and maintenance for the Hawthorn Solar Project (the “Project”). This plan will address potential issues that may arise throughout the life of the Project and identify specific preventative measures to be deployed on the Project site to effectively avoid issues throughout its operations and maintenance.

## **2 Systems and Site Description**

Hawthorn Solar (the “Project”) is an approximately 20MW AC solar project proposed for land along Pine Valley and Fords Road in the Town of Hoosick. The Project is to be constructed on approximately 130 acres of land currently being used for agricultural and forest purposes by the current landowners. The purpose of the facility is the generation of solar electricity. The facility will be interconnected to the National Grid 115 kV transmission line which runs through the project area.

The project is a ground mounted single axis tracking system solar array. The solar panels are mounted on steel structures consisting of posts, beams, rails, and bracing. Vertical steel posts will be driven in the ground to a depth of approximately 5-8 feet to anchor the structures. The solar panels will be electrically connected to combiner boxes which will be combined into central inverters which will be mounted on concrete foundation pads. The inverters will be electrically connected to step-up transformers which will transform the voltage to 34.5kV. The transformers will be loop fed together and a single generator tie-line will be installed to the 115 kV transmission line. The site will be accessed via new and improved gravel access roads on Pine Valley and Fords Road.

The estimated useful project life-time is 25 to 40 years. The following list is a summary of the site features:

- 20MW AC Solar array consisting of silicon based solar panels (modules)
- Driven post steel and aluminum racking system
- Chain link (or similar) security fence surrounding the array perimeter.
- 8 Central inverters mounted on concrete pad
- 8 Step-up transformers mounted on concrete pad
- 1 Collector 34.5 kV / 115 kV electrical substation
- Copper and aluminum wire
- Underground conduit at the array location and connecting the array to the point of interconnection.
- Gravel access roads
- Metal security fence and gates at array location.

### **3 Property Operation**

During the project's operational lifetime, very little hands-on maintenance is required to allow the project to successfully operate. While the project will likely employ up to two full-time employees, much of the work required to operate and maintain the project consists of remote monitoring of the project's data collection systems. The monitoring focuses on the system and analysis of resulting data to maintain insight and oversight into the on systems status, metering for revenue purposes, alarms, diagnostics, and security monitoring.

Additional operations activities include any day-to-day operation of the system to maximize power delivery, assess performance and trends, operate the grid interface, manage curtailments, or adjust settings such as power factor or other ancillary services.

During operation, the community will benefit financially from payments that the project will be paying to the local taxing jurisdictions.

### **4 System Maintenance**

Scheduling and frequency of preventive maintenance is influenced by several factors, such as equipment type, environmental conditions at the site and warranty terms. Scheduled maintenance is often carried out at intervals to conform to the manufacturers' recommendations, as required by the equipment warranties. Periodically, on-site electrical testing will be performed which will require a number of technicians to enter the site and physically test some of the connections and equipment to verify the accuracy of the remotely collected data.

Approximately once every 10 years, the inverters will need to be replaced, which will involve temporarily shutting down the facility, removing the existing inverters, and replacing them with new or refurbished inverters. Other major equipment may similarly require replacement during the project's lifetime.

Outside of any solar modules which may be damaged during the project's lifetime, no panels should need replacement during the project's useful life.

As needed, the landscaping on site will be watered and otherwise maintained by a local landscaping contractor, to ensure that all landscaping intended for visual screening continues to effectively screen the project from view.

### **5 Safety Guidelines**

In general, solar facilities are not known to pose any significant health risks to the public at large, or to the property in the vicinity of the facility. The Project will not create any public health or safety hazards through its construction, outside of the general risks associated with any form of large-scale construction activities. These risks are limited to increased noise levels throughout the construction period, potential pollutants emitted through construction activities, such as dust and vehicle use throughout the Project Site, and increased traffic for construction deliveries and

movement of laborers. These common risks are generally not associated with significant impacts to public health and safety and will be minimized and mitigated by the Applicant.

Once constructed, the presence of electrical equipment both within the arrays and at the collection substation carries some risk of an electrical hazard. However, generally, these systems have been tested and proven to operate safely, and these areas will have fencing and signage, as is required by local law and National Electrical Safety Code to prevent potential injury.

In the event of a medical, natural, or security emergency, the personnel at the Project or subcontractors will immediately contact 911 and notify local first responders. The first responders will assess the situation and assist in implementing the appropriate actions.

Any fire that occurs will be extinguished at the ground level within the array, so as to protect the panels and the Project from further damage and reduce the potential for additional electrical issues or emergencies on the Project Site.

After an emergency event, the operations and maintenance team will investigate the cause of the emergency, analyze preventative measures that could or should be implemented, and revise protocols to minimize the likelihood of a similar situation in the future.

To report emergency situations at the Project Site, signage displaying an emergency contact number for Hawthorn Solar will be prominently displayed at access road gates, the collection substation, and/or an off-site O&M facility. This ensures that local first responders, local or state personnel, or members of the public can easily report an emergency.

## **6 Preventative Maintenance**

The system will be virtually monitored 24 hours a day, seven days a week through a Supervisory Control and Data Acquisition system. This system will be able to identify and assess any potential emergencies, or if a panel is not functioning properly.

Several times a year, depending on the rate of vegetation growth, the grass and other vegetation on the project site will be cut as needed to prevent overgrowth, fire hazard, and shading of the panels. Local landscaping contractors will be employed to manage vegetation on the property and mow grasses growing beneath the solar panels. The Project will also explore opportunities to partner with local sheep farmers to utilize grazing as an alternative form of vegetation management.

Should the Project pursue grazing as the maintenance option for the site, it will graze the site through a planned rotation throughout the Project area. The Project will contract with a local sheep farmer who will be responsible for the overall maintenance at the Project site. It is expected that the number of sheep to fully maintain the site will take multiple years to accrue as the maintenance contract will not be entered into until closer to the commercial operation date of the Project. Provided a contract is pursued for sheep grazing, grazing will begin at the earliest point possible. The person or entity that enters into a maintenance contract with the Project will

be responsible for all maintenance for the Project, and will supplement sheep grazing with mowing as is necessary until the point the number of sheep can be accrued that can effectively maintain the site, and then on an as needed basis depending on weather or other extenuating circumstances. Should a maintenance contract be under consideration or negotiation six months prior to the estimated commercial operation date of the Project, Hawthorn Solar will provide the town with a detailed plan for sheep grazing that provides for the number and resources necessary to support sheep farming on the solar site.

All access roads will be gated to restrict access to the Project and all gates will be locked when maintenance activities are not underway. Signs will be placed on gates to warn the public of potential hazards and forbid trespassing.

Emergency responders will be notified of the project and the local fire department will participate in trainings for emergency response to system emergencies. Any emergency response equipment that is required for response to an emergency on solar sites that the fire department is not in possession of will be provided. Equipment that is required will be reviewed through the training session and provided prior to the project begins producing electricity.

## **7 Data Acquisition System (DAS)**

A Data Acquisition System will be established prior to construction completion. System details and an overview of the system will be added to this section once the DAS has been established.

## **8 Supervisory Control and Data Acquisition (SCADA)**

A Supervisory Control and Data system will be established prior to construction completion. Information about the SCADA system and its operation will be added to this plan when the SCADA system has been established.

## **9 System Specifications & Operations**

This information will be added when system specifications have been made for the project. System operations information will be added to this plan when system specifications have been finalized for the project.

## **10 Vendor Documentation**

This information will be added when the system vendor has been established.

## **11 Commissioning Reports**

This information will be added when commissioning reports have been established.

## **12 Warranties and Product Certifications**

This information will be added when the warranties and product certifications have been established for the system.

### **13 As-Built Construction Drawings**

As built construction drawings will be added once the construction of the Project is complete.