



## **OPERATIONS AND MAINTENANCE PLAN**

### **I. Introduction**

Upon completion of the proposed Project, Petitioner will enter into a third-party Operations and Maintenance contract with an experienced third-party operations and maintenance provider (“O&M Manager”). With a fleet of electricians, production analysts and vegetation management personnel, the O&M Manager works diligently to ensure the Project maintains peak performance, reliability and safety.

Prior to energization of the PV Project, the O&M contractor will perform a quality and safety inspection. This inspection is a detailed and site wide inspection to ensure all mechanical and electrical components are installed per manufacturer specifications and per site design. The O&M Manager will also provide detailed safety and emergency response training for Windham municipal employees.

Upon energization, the O&M Manager is responsible for the health and safety of the plant. The site will be continuously monitored (24/7/365 monitoring) remotely via a data acquisition system (“DAS”). The DAS has the ability to send alarms identifying communication, power generation or safety related issues. The O&M Manager has a team dedicated to on-call service dispatches to address immediate issues from its data acquisition center. In addition to its dedicated on-call team, the O&M Manager will perform detailed annual inspections and will perform routine vegetative management on the Site.

### **II. Scope of Work**

- A. **Daily Monitoring of Plant Operation:** For each solar Project, an O&M Manager monitors the Project continuously and receives data from the DAS of any performance or safety related issues. When an alert occurs, it is the responsibility of the O&M Manager to assess the severity of the alert and dispatch the on-call team if necessary. From there, the on-Site service technicians will assess the severity and repair/replace equipment as required. The service details of the O&M Manager are as follows:

1. *Monitoring Operations:*

- Monitoring, 24 hours a day, 7 days a week, 365 days per year
- Alarm Notification
- Remote Corrective Diagnostics
- Remote Power Plant Operation

2. *Performance Optimization Services:*

- Performance Trend Analysis
- Performance Engineering
- Data Storage

B. **Annual Inspection, Testing & Preventative Maintenance:** The O&M Manager is also responsible for performing an annual site wide inspection. This inspection is targeted towards securing the safety, performance and reliability of the solar Project. A full report is outputted from the results of the inspection. This inspection includes the following:

1. *Aerial Thermal Imaging and Reporting:*

- Full Site aerial inspection of all PV modules. UAV (drone) coupled with thermal imaging camera and Raptor Maps proprietary mapping and diagnosis software will identify module level inefficiencies and failures.

2. *PV Modules*

- Module Inspection, Front
  - Inspect front of modules for broken glass, delamination, yellowing or browning, burnt or oxidized cells, or cracks in cells. Inspect module frames for cracks or bends. Inspect module conductors for tension and indicators of heat.

3. *Mounting System*

- Mounting System, Support Structure
  - Visually inspect support posts and structural components for evidence of rust, corrosion, settling, or tilt. Visually inspect mounting system hardware for tightness and evidence of rust or corrosion. Inspect and test rack grounding, check for torque levels, re-torque as necessary. Measure and record earth to ground resistance between rack and ground rod with low-resistance ohmmeter.

4. *DC Combiner*

- Inspect enclosure and devices for corrosion, heat distortion, moisture entry, insect and rodent infestation, and exterior damage. Confirm that all signage and labeling is in place. Inspect surge protection devices for indication of failure. Perform thermographic survey of all terminations and overcurrent protective devices.

5. *DC/AC Raceway*

- Inspect all DC raceways for loose connections, missing sealant, corrosion and above-grade moisture intrusion.

6. *DC/AC Disconnect*

- Inspect enclosure and devices for corrosion, heat distortion, moisture entry, insect and rodent infestation, and exterior damage. Confirm that all signage and labeling is in place. Perform thermographic survey of all terminations and overcurrent protective devices.

7. *Inverter*

- Inspect enclosure, door seals, latches and door stops for signs of corrosion, heat distortion, moisture entry, insect and rodent infestation, and exterior damage in accordance with manufacturer's recommendations and requirements. Confirm that all signage and labeling is in place. Clean all ventilation plates, air ducts, screens, devices and seals in accordance with manufacturer's recommendations and requirements. Inspect Surge Protection Devices for indication of failure. If any single SPD indicates failure mode, replace all SPD modules. Perform thermographic survey of all terminations and overcurrent protective devices.

8. *Medium Voltage Transformer*

- Inspect enclosure and devices for corrosion, heat distortion, moisture entry, insect and rodent infestation, and exterior damage. Confirm that all signage and labeling is in place. Inspect anchorage and alignment.

9. *SCADA/DAS System*

- Inspect devices and enclosures for physical damage. Clean as needed. Check tightness of electrical connections. Inspect weather station and all sensors for proper alignment.

C. **Vegetative Maintenance:** Maintenance within the array is typically performed (3) times annually during the growing season. During this time, the site is inspected for evidence of erosion and vegetation health. Vegetative growth exterior to the array is analyzed annually for shade impacts on the array. Any vegetative or site concerns are noted within the annual report. No pesticides or herbicides will be used in the vegetative maintenance of the site. Grass will be cut 2-3 times per year depending on the growing season. Mechanical devices (String Trimmers) are used where mowers cannot reach so that no chemicals will be used.

D. **Module Washing and Snow Removal:** Module washing and snow removal is performed on an as needed basis. Due to the tilt of the modules included within the proposed design, soiling effects due to snow build up, pollen or dust is naturally removed from the module surface. In the event the modules require cleaning, clean water with no chemicals or additives will be used.

E. **Emergency Response:**

**Willimantic Police Department:**

22 Meadow St  
Willimantic, CT 06226  
Phone: (860) 465-3135

**Willimantic Fire Department:**

13 Bank St  
Willimantic, CT 06226  
Phone: (860) 465-3126

**Utility Contact Information:**

Eversource CT  
(800) 286 -2000

**Owner Contact information:**

LSE Horologium LLC  
40 Tower Lane, Suite 201  
Avon, CT 06001  
Phone: (410) 274 -2716  
Email: [rchristie@lodestarenergy.com](mailto:rchristie@lodestarenergy.com)

**O&M Provider Contact Information:**

Ameresco  
Phone: (800) 916 -8066  
Email: [ROC@ameresco.com](mailto:ROC@ameresco.com)

If it is determined the site must be shut down, the following emergency shutdown procedure should be conducted in conjunction with representatives of police and fire department:

- 1) Open AC disconnect located on equipment pad
- 2) Turn off DC disconnects on all inverters located on equipment pad
- 3) Turn off all DC disconnects on DC combiners located throughout array
- 4) Contact the Willimantic Fire Department and Police Department if not already present.

## **II. Spill Prevention Control Plan**

Certain precautions are necessary to store petroleum materials, refuel and contain and properly clean up any inadvertent fuel or petroleum (i.e., oil, hydraulic fluid, etc.) spill to avoid possible impact to nearby habitats.

A spill containment kit consisting of a sufficient supply of absorbent pads and absorbent material will be maintained by the Contractor at the construction site throughout the duration of the project. In addition, a waste drum will be kept on site to contain any used absorbent pads/material for proper and timely disposal off site in accordance with applicable local, state and federal laws.

The following petroleum and hazardous materials storage and refueling restrictions and spill response procedures will be adhered to by the Contractor.

1. Petroleum and Hazardous Materials Storage and Refueling
  - a. Refueling of vehicles or machinery shall occur within the Construction Laydown Area ONLY and shall take place on an impervious pad with secondary containment designed to contain fuels. This area must be a minimum of 100 feet from wetlands or watercourses and the aquifer protection area on the Site.
  - b. Any fuel or hazardous materials that must be kept on site shall be stored on an impervious surface utilizing secondary containment a minimum of 100 feet from wetlands or watercourses.
2. Initial Spill Response Procedures
  - a. Stop operations and shut off equipment.
  - b. Remove any sources of spark or flame.
  - c. Contain the source of the spill.
  - d. Determine the approximate volume of the spill.
  - e. Identify the location of natural flow paths to prevent the release of the spill to sensitive nearby waterways or wetlands.
  - f. Ensure that fellow workers are notified of the spill.
3. Spill Clean Up & Containment
  - a. Obtain spill response materials from the on-site spill response kit. Place absorbent materials directly on the release area.
  - b. Limit the spread of the spill by placing absorbent materials around the perimeter of the spill.
  - c. Isolate and eliminate the spill source.
  - d. Contact the appropriate local, state and/or federal agencies, as necessary.
  - e. Contact a disposal company to properly dispose of contaminated materials in accordance with all local, state and federal regulations.
4. Reporting
  - a. Complete an incident report.
  - b. Submit a completed incident report to the Connecticut Department of Environmental Protection, municipal officials, Connecticut Siting Council and other applicable local, state and federal officials, the Owner, and O&M Provider.

Spill Prevention Plan Contractor Contact Information:

LSE Horologium LLC

40 Tower Lane, Suite 201

Avon, CT 06001

Phone: (410) 274 -2716

Email: [rchristie@lodestartenergy.com](mailto:rchristie@lodestartenergy.com)

**V. Incident Report Form**

Any accidents or injuries should be reported through an Incident Report Form and sent to the Connecticut Department of Environmental Protection, municipal officials, Connecticut Siting Council and other applicable local, state and federal officials, the Owner, and O&M Provider. A blank copy is attached for reference.

# Incident Report Form

## ACCIDENT INVESTIGATION REPORT

Project: \_\_\_\_\_

Date of Accident: \_\_\_\_\_

Accident Description:

Location of accident: \_\_\_\_\_ Time of Day: \_\_\_\_\_ Day of Week: \_\_\_\_\_

Vehicle No. or Type: \_\_\_\_\_ Were police called? \_\_\_\_\_ Police Report No.: \_\_\_\_\_

Describe any equipment or environmental damage/estimate cost:

WITNESSES: (attach written statements)

Name: \_\_\_\_\_ Job Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

Name: \_\_\_\_\_ Job Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

Name: \_\_\_\_\_ Job Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

# INJURY INVESTIGATION REPORT

Department/Division: \_\_\_\_\_ Project: \_\_\_\_\_

Injured Employee's Name: \_\_\_\_\_ Date of Injury: \_\_\_\_\_

Sex: \_\_\_ Age: \_\_\_ Employment Status: \_\_\_ Full Time \_\_\_ Part Time \_\_\_ Seasonal \_\_\_ Temporary

Regular assigned position: \_\_\_\_\_ Length of time in this position: \_\_\_\_\_

Was employee performing regular job duty? \_\_\_ If not, explain: \_\_\_\_\_

Was employee working overtime? \_\_\_ If yes, explain: \_\_\_\_\_

Does employee work a rotating shift? \_\_\_ Was there a recent change in the shift? \_\_\_\_\_

Explain: \_\_\_\_\_

Location of accident: \_\_\_\_\_ Time of Day: \_\_\_\_\_ Day of Week: \_\_\_\_\_

Body part injured: \_\_\_\_\_ Type of injury: \_\_\_\_\_

Severity of injury:

\_\_\_ First Aid \_\_\_ Dr. Visit \_\_\_ Emergency Care \_\_\_ Restricted Duty \_\_\_ Lost Time \_\_\_ Near Miss

Vehicle No. or Type: \_\_\_\_\_ Were police called? \_\_\_ Police Report No.: \_\_\_\_\_

Describe in detail what happened: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Has this employee received training in the prevention of this type of injury? \_\_\_\_\_ Date: \_\_\_\_\_

Describe any equipment damage/estimate cost: \_\_\_\_\_

\_\_\_\_\_

WITNESSES: (attach written statements)



Name: \_\_\_\_\_ Job Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

Name: \_\_\_\_\_ Job Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

Name: \_\_\_\_\_ Job Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

## ROOT CAUSE ANALYSIS

Use this listing as an aid in identifying the factors that contributed to this event

### STEP 1 – CONTRIBUTING FACTORS

<p><b>PROCEDURES</b></p> <p>Not Developed <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Developed – Not Communicated <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Developed – Not Understood <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Developed – Not Followed <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Lack of Disciplinary Policy <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Other <input style="width: 20px; height: 15px;" type="checkbox"/></p>	<p><b>COMMUNICATION</b></p> <p>Insufficient Planning for Tasks <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Lack of Worker Communication <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Lack of Supervisor Instruction <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Work Team Breakdown <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Confusion After Communication <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Other <input style="width: 20px; height: 15px;" type="checkbox"/></p>
<p><b>HAZARD(S)</b></p> <p>Unidentified <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Known But Not Corrected <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Created by External Factors <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Documented But Not Repaired <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Condition Changes Not Conveyed <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Repaired Deficiently <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Unforeseen Emergency <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Other <input style="width: 20px; height: 15px;" type="checkbox"/></p>	<p><b>TRAINING</b></p> <p>Deficient Orientation Training <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Deficient Job-Specific Training <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Insufficient for New Conditions <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Lack of Follow-Up Reinforcement <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Lack of Supervisor Training <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Hazards Overlooked in Training <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Tool(s) Used Incorrectly <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Other <input style="width: 20px; height: 15px;" type="checkbox"/></p>
<p><b>PRODUCTION FACTORS:</b></p> <p>Heavy Workload <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Tight Schedule <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Long/Unusual Working Hours <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Falsely Perceived Need to Hurry <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Co-worker Competition <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Lack of Teamwork <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Changes in Production <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Other <input style="width: 20px; height: 15px;" type="checkbox"/></p>	<p><b>WORK BEHAVIOR</b></p> <p>Shortcuts taken <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Required PPE Not Used <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>PPE Not Used Properly <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Tool/Equipment Used Incorrectly <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Over-exertion/Fatigue <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Distraction <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Drug/Alcohol Use/Influence <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Other <input style="width: 20px; height: 15px;" type="checkbox"/></p>
<p><b>FACILITIES/EQUIPMENT</b></p> <p>Poor/Faulty Equipment Design <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Corrosion/Wear <input style="width: 20px; height: 15px;" type="checkbox"/></p>	<p><b>ENVIRONMENT</b></p> <p>Weather, Temperature <input style="width: 20px; height: 15px;" type="checkbox"/></p> <p>Poor Housekeeping <input style="width: 20px; height: 15px;" type="checkbox"/></p>

Equipment Not Guarded	<input type="checkbox"/>	Poor Lighting	<input type="checkbox"/>
Awkward Workspace Design	<input type="checkbox"/>	Poor Visibility	<input type="checkbox"/>
Lack of Preventive Maintenance	<input type="checkbox"/>	Air Quality	<input type="checkbox"/>
Other	<input type="checkbox"/>	Other	<input type="checkbox"/>

**STEP 2- MAJOR CAUSE**

- Procedures
- Production Factors
- Communication
- Work Behavior
- Hazard
- Facilities/Equipment
- Training
- Environment

**STEP 3 – ANALYSIS OF MAJOR CAUSE(S):**

List out 5 reasons why major cause(s) happened to get to root cause:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Corrective steps for contributing factors: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Corrective steps for major cause: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

