

*Operation & Maintenance Plan
Ground-Mounted Photovoltaic System
April 10, 2023*

OPERATION AND MAINTENANCE PLAN

**Ground-Mounted Photovoltaic System
200 Route 15
Sturbridge, Massachusetts
April 10, 2023**

Project Owner/Responsible Party:

**Bear Peak Power, LLC
2420 17th Street
Denver, CO 80202
Chris.vorlicek@bearpeakpower.com**

Signature Chris Vorlicek **Date** April 10, 2023

The above designated party is responsible (financially and otherwise) for the operation and maintenance, including emergency repairs of the 200 Route 15 Ground-Mounted Photovoltaic System, including the arrays, the land occupied within and outside the fenced area, the access roads leading into the fenced-in area, the utility lines serving the array, and the stormwater facilities associated with the project, as shown on the Site Plans. This area is herein referred to as the Solar O&M Area.

The project owner/responsible party agrees to the following:

- A. At all times, the solar photovoltaic installation will be maintained in good working condition and regular maintenance will be performed in accordance with this approved operation and maintenance schedule. A record shall be kept of all maintenance performed, and said maintenance record will be provided to Town officials whenever requested to verify maintenance or status.
- B. A copy of the site plan and emergency shutdown procedures will be provided to the Police Chief and Fire Chief prior to issuance of an occupancy permit. The project owner/responsible party will cooperate with local emergency services in developing an emergency response plan.
- C. Contact information for a person responsible for responding to public inquiries and complaints throughout the life of the project will be provided to the Building Inspector and this information will be posted in a visible location at the installation. This contact information will be updated, as necessary.

- D. The Town will be notified of changes in project ownership or assignment of operation and maintenance financial responsibility.
- E. The maintenance schedule in this operation and maintenance (O&M) Plan will only be amended by mutual agreement of the Town and the responsible party. Amendments will be made in writing and signed by the responsible party.

1.0 Service Visits

An O&M contractor that specializes in commercial scale solar farms will be contracted to provide service visits two times per calendar year, occurring approximately six (6) months apart. The service visits will incorporate the inspection and maintenance procedures outlined in Section 2.0 (Preventative Maintenance), Section 4.0 (Equipment Inspections), Section 5.0 (Vegetation Maintenance), Section 6.0 (Access Roadways, Perimeter Fences, and Access Gates), and Section 7.0 (Stormwater and Erosion Control Facilities). Note that Item 7.0 (Stormwater and Erosion Control Facilities) will require additional visits during certain rainfall events. After each service visit, the O&M contractor will issue a report to the project developer/owner. The report will summarize all maintenance and inspection activities conducted, identify any issues encountered, and provide recommendations to correct any of the issues. After review and any clarifications requested by the project developer/owner, the report will be forwarded to the Town, as required.

2.0 Preventative Maintenance

The following Preventative Maintenance (PM) services will be performed during each service visit:

- (a) Ensure the site is clean, secure and any site management such as cutting grass (see below) or cleaning of modules is performed as needed.
- (b) Ensure the proper structure and operation of all racking, modules, wiring, electrical boxes, conduit, string, inverters and sensors.
- (c) Visual checks of each module for broken glass, debris, or other causes of low performance.

- (d) Ensure that the racking system (posts, crossbeams, brackets, bolts, clips, etc.) that support the panels are free of major rust or corrosion.
- (e) Ensure that all signs/labels for inverters, disconnects, and safety warnings are intact and legible.
- (f) Ensure that all enclosures, fences, and facilities that are part of installation are maintained to retain original appearance, aside from reasonable wear and tear, including but not limited to paint, roadways, gates and access panels.

3.0 Continuous Monitoring

The following will be performed continuously for the duration of the project, by either the project developer/owner or a company that specializes in solar monitoring:

- (a) Monitoring of system production.
- (b) A monthly report will be produced comparing system output to expected production taking into account actual climatic conditions. The project developer/owner or the O&M contractor shall summarize this information.
- (c) Responding to alerts from the array's automated alert system(s) regarding potential system malfunction(s), and if necessary a service visit by an O&M contractor.

4.0 Equipment Maintenance

The project developer/owner and/or an O&M contractor will conduct regular, scheduled equipment maintenance biannually, including but not limited to the following:

Panels

- (a) Should panel washing be determined to be necessary, panels will be washed utilizing only water. Use of a squeegee is permitted for solar modules. Soap or any detergents are not required to clean the panels and are not allowed.
- (b) Conditions such as snow and ice will be removed as necessary.
- (c) Damaged or inoperative array panels observed during service visits will be investigated to determine the cause of the damage or inoperability with the plan to prevent, repair and/or replace as soon as possible.
- (d) Array panels that have deteriorated in efficiency in excess of the manufacturer's warranty will be reported to the manufacturer for repair or replacement as soon as possible.

String Inverters

Inverters will be checked for the following during inspections:

- (a) Power capacitors for any sign of damage.
- (b) Any visible discoloration.
- (c) Voltage and current readings.
- (d) Corrosion, dust and water ingress on terminals and cables.
- (e) Condition of both the AC and DC surge suppressors.
- (f) Operation of all safety devices.
- (g) Cleaning and replacement of air filters.

Racking

- (a) Racking system components that have major rust or corrosion will be repaired or replaced as soon as possible.
- (b) Visual inspections will be completed of the equipment, including sub-assemblies, wiring harnesses, contacts and major components.

Other Components

The following will also be checked during semi-annual inspections:

- (a) Visual inspection of all feeder terminations for corrosion and proper attachment.
- (b) Inspection and testing of surge arrester and lightning protection operation.
- (c) Ground continuity testing, lightning protection and overall system safety inspection, to include correction of any unsafe or abnormal issues.
- (d) Inspection/survey of all combiner boxes, disconnects (AC&DC), switchgear, and inverters with an infrared camera, with the purpose of detecting hotspots, bad connections, and related issues.
- (e) Mechanical and structural integrity of the system, and correction of issues.
- (f) Modules for excessive dirt and debris.
- (g) Replacement of unserviceable or degraded system labeling.

- (h) Testing of voltage and amperage of all source conductors.
- (i) Documentation and inspections reporting to include:
 - (i) PV System Quality Assurance and Quality Control Plan;
 - (ii) PV System Commissioning Form; and
 - (iii) System Component Torque Specifications Form.

5.0 Vegetation Maintenance

- (a) The Solar O&M area will be mowed to maintain a grass height of approximately 12 inches. Use of a weed whacker is recommended underneath the panels and around the posts of the racking system. Woody seedlings may also be removed by hand. No pesticides, fertilizers, herbicides or chemicals will be used to manage vegetation.
- (b) An O&M contractor shall monitor the ground cover growth rate and system performance to determine whether vegetation maintenance frequency requires modifications.
- (c) An O&M contractor should be aware of the locations of any wiring associated with the system. The project developer/owner shall complete a site walk of the Solar O&M area with any new O&M contractor before scheduling the first vegetation maintenance event.
- (d) The state of vegetation will be monitored during normal maintenance visits and, as appropriate, a landscape professional will be contracted to repair any areas of concern.
- (e) A landscape professional will be contracted to perform the following adjustments if areas of topsoil are observed within the solar array limit:
 - (i) Adjust the seed mix that is appropriate to the current vegetative cover and the season in which seed is spread.
 - (ii) Manually rake topsoil to prepare for seeding.
 - (iii) Spread seed atop raked area at an appropriate density.
 - (iv) Implement temporary precautions within the seeded area to help the restoration process.
 - (v) Monitor the vegetative cover to restoration completion.
- (f) The state of vegetation outside of the fenced in solar development area will be monitored during normal maintenance visits to confirm that excessive growth which

will result in shading of the solar panels has not occurred. If shading is visible, a landscape professional will be contacted to trim/cut the vegetation as necessary.

- (g) The use of herbicides, pesticides, fertilizers or chemicals for maintenance of vegetation throughout the array and outside the fence is prohibited.

6.0 Access Roadways, Perimeter Fences, and Access Gates

- (a) As part of the bi-annual service visit, the gravel surface of the access road shall be inspected. This inspection will cover the following areas at a minimum: settlement, rutting, erosion/barren spots, vegetation/tree growth, wash boarding, and potholes. A roadway maintenance firm, to be hired by the developer, shall immediately repair any deficiencies encountered during the inspection to the extent it cannot be handled by the O&M contractor.
- (b) During the bi-annual service visit, the perimeter fencing and access gates shall be inspected for workable locks and knock boxes, settlement, erosion around post footings, significant corrosion, and signs of vandalism (i.e. holes cut in the wire, removed wooden panels, project ID signs damaged/stolen). A fence maintenance firm, to be hired by the developer, shall immediately repair any deficiencies encountered during the inspection to the extent it cannot be handled by the O&M contractor.
- (c) Plowing the access drive sufficiently to provide emergency vehicle access at all times will be the responsibility of the owner.

7.0 Stormwater and Erosion Control Facilities

- (a) Erosion control barriers (i.e. Silt Soxx compost filter socks) should be inspected immediately after each run-off producing rainfall event and at least daily during prolonged rainfall. Sediment deposits must be removed when the level of deposition reaches approximately one-half the height of the barrier. Sediment shall be disposed of in a suitable area and protected from erosion by either structural or vegetative means.
- (b) Inspect inlets for subsurface drainage facilities at least twice a year thereafter or after major storm events (2" or greater). Remove any debris that may potentially clog the system.

8.0 Annual Operation & Maintenance Budget

Operation & Maintenance Budget

BMP	Quantity	Action	Frequency	Cost / year
Catch Basins / Manholes	3	Clean / Remove Debris	4 times a year	\$4,500
Stormceptors	2	Inspect / Remove Debris	2 times a year	\$2,500
Infiltration Chamber Systems	3	Inspect	2 times a year	\$3,000
Landscaping	1	Inspect / Mow as needed	2 times a year	\$4,000
Emergency Repair	1	In case of emergency	1 time a year	\$5,000

Total Yearly Budget for Operation & Maintenance: \$19,000