Bristol, RI

Bristol Landfill Solar Facility

January 2023

OPERATIONS AND MAINTENANCE MANUAL

Prepared for:

Town of Bristol
10 Court Street
Bristol, Rhode Island 02809

And

NuGen Capital Management, LLC
267 Water Street
Warren, Rhode Island 02885

Prepared by:

BETA
701 George Washington Hwy
Lincoln, Rhode Island 02865
401.333.2382
www.BETA-Inc.com

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A. NUGEN CAPITAL OPERATIONS MANUAL

INTRODUCTION

On behalf of the Town of Bristol, Rhode Island and NuGen Capital Management, LLC (NuGen), BETA Group, Inc., (BETA) has prepared this Operation and Maintenance (O&M) Manual for site activities following the installation of the PV system at the Bristol Landfill. This manual covers maintenance of the existing stormwater management system, maintenance of the landfill cap and cover system, and the operation of the PV system itself. This plan has been prepared in accordance with the guidance provided in the 2015 Rhode Island Stormwater Design and Installation Standards Manual and pertinent Solid Waste Regulations.

The Town of Bristol is presently responsible for operations and maintenance of all systems related to the closed landfill. The Town and NuGen have entered into a 25-year lease agreement (dated August 30, 2019) that will shift some of these responsibilities to NuGen once the Commercial Operation date is reached. Once installed, access to the PV system will be restricted to NuGen maintenance personnel, Town emergency personnel and the Town's environmental monitoring consultant. As such, NuGen will assume the following responsibilities:

- Maintenance of access roads, gates and fences associated with the PV system;
- Mowing within the confines of the PV system plus a 15-foot buffer;
- Settlement upkeep within the confines of the PV system; and,
- Maintenance of all electrical components and systems

An operations manual prepared by NuGen that delineates responsibilities between NuGen and the Town of Bristol and provides various inspection frequencies is appended to this document.

I – GENERAL INFORMATION

The following general information is provided in accordance with Appendix Section A.1.1 of the RIDEM manual:

I-A - Owner

Town of Bristol
10 Court Street
Bristol, RI 02809
Project Contact: Diane Williamson
(401) 253-7000 Phone

NuGen Capital Management, LLC
267 Water Street
Warren, RI 02885
Project Contact: Aaron Rust
(859) 537-6149 (Cell Phone)

I-B – Site/Stormwater Management Designer and Environmental Monitoring

BETA Group, Inc.
701 George Washington Highway
Lincoln, RI 02865
Project Managers: Nicole Iannuzzi, P.E.
Steven Richtarik, PE
(401) 333-2382 (Office Phone)
(401) 333-9225 (Fax)

I-C - Address of Site

The project site is located at 6 Minturn Farm Road, Bristol, RI 02809.

I-D - Vicinity Map

Please refer to Figure I-1 – Vicinity Map.

II – STORMWATER MANAGEMENT SYSTEM SUMMARY

There are no proposed changes to the landfill's stormwater management system resulting from the proposed Bristol Landfill solar project. The existing stormwater management system servicing the site

consists of diversion berms with underdrains and drainage swales. These components are inspected semi-annually, and necessary maintenance is performed by the Town of Bristol.

III - OPERATION AND MAINTENANCE PLAN

All components of the stormwater management system within the confines of the solar project area, shall be the responsibility of NuGen to operate and maintain. The following summarizes the actions specific to this project.

III-A GENERAL:

III-A.1 Inspections

Inspections shall assess the following conditions for all components of the stormwater management system:

Structural Elements – The condition of all elements of the particular component being inspected shall be assessed, and if deemed to be deficient or compromised by routine wear and deterioration, shall be scheduled for repair or replacement as soon as possible.

Accumulated Materials – The volume and nature of accumulated materials shall be noted during all inspections. The accumulation of excessive levels of materials (sediments, trash and other debris) and/or the presence of atypical materials or contaminants within the structure shall be cause for further inspection of the stormwater system and/or the land area tributary thereto, to locate and identify the source of the excessive or atypical material and to correct the cause of same.

An inspection form shall be completed for each structure inspected; completed sheets shall be kept in a binder to be managed by the maintenance provider.

III-A.2 Cleaning

Cleaning shall include completely removing all accumulated material (e.g., sediments, trash, debris, and organic material) by means appropriate to the particular component of the stormwater system and legally disposing of the material at an off-site location.

In the case of atypical materials or contaminants in the stormwater system, said materials may require additional sampling, testing and analysis to determine the nature of the contamination and the appropriate methods of handling and disposal for same.

III-A.3 Access & Safety

Access to the stormwater management system for inspections and cleaning shall be made at the designated locations for same and shall be made in a manner that avoids or minimizes interference with the operation of the stormwater management system.

Inspections and cleaning of all elements of the stormwater management system shall be performed by properly trained personnel using appropriate tools and equipment and shall at all times be performed in a manner which prioritizes safety for the personnel performing the inspections and/or cleaning.

In instances where impacts to the site or the stormwater management system cannot be avoided during inspections and/or cleaning, all reasonable measures and precautions shall be taken to protect the personnel performing the inspections and/or cleaning as well as the travelling public using the roadway corridor. Such measures may include, but not be limited to:

Stormwater Management System Impacts:

- Temporary stormwater flow diversion;
- Bypass pumping

III-B EASEMENTS:
For the purposes of this project, the stormwater management system is located on Town-owned property.

III-C FUNDING SOURCE:
As stated above, the work described herein, within the confines of the PV system, shall be performed by NuGen and/or its designated agents. Funding of these maintenance activities shall be provided by NuGen in accordance with the terms of the lease.

NuGen shall be responsible for ensuring that adequate funds are allocated and reserved for use in the proper implementation of this plan each year and shall adjust its annual budget accordingly to reflect any changes in the costs/expenses associated with same.

III-D SPECIFIC COMPONENTS:

III-D.1 Components

III-D.1.1 – Vegetative Cover

Inspections: The vegetative cover within the PV area shall be inspected quarterly. The inspection will include identifying evidence of erosion along the drip edge line of the panels and settlement adjacent to the ballast tubs.

Scheduled Maintenance:

- The grass shall be mowed two (2) to three (3) times per year (as needed).

Corrective Maintenance:

- If concentrated flows result in erosion along any portion of the vegetative cover, the impacted areas shall be immediately loamed, reseeded and stabilized (straw mulch, bio-degradable erosion control blanket, etc.) until such time as the new grass has sufficiently established itself.
- If erosion continues to occur, scour protection below the drip edge line will be installed (such as a level spreader made of crushed stone).
- There shall be no fertilizer applications on site.

III-D.1.2 – Access Road

Inspections: The access road within the PV area shall be inspected quarterly.

Scheduled Maintenance: The washed crushed stone shall be scarified bi-annually or more frequently if necessary.

Corrective Maintenance: If at any time the access road is not a uniform 8” in depth or the width is not consistent with design, the stone will be replenished, as necessary.

BETA

BRISTOL LANDFILL SOLAR

FIGURE 1

VICINITY MAP

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APPENDIX A

NUGEN CAPITAL O&M MANUAL

Bristol Landfill Solar, LLC
Operations Manual

The following procedure shall be performed after initial commissioning of the Site, and again at regular intervals thereafter to ensure continued peak performance and reliability expectations are met.

Site Information	
Site Name:	Bristol Landfill Solar
Site Address:	6 Minturn Farm Road
Site City:	Bristol
Site State:	Rhode Island
Zip:	02809

Preventative Maintenance Schedule		
General Visual Inspection	Frequency	Responsible Party
Overall site conditions, Roads, PV arrays, electrical equipment, Racking, Gates, fence, vegetation, erosion, corrosion, modules, MV transformers, switchgear, and protective relays.	Quarterly	NuGen O&M
Additional Upkeep of Grounds		
Mowing | Solar Area Everything under the foot print of the solar site to include a 15' buffer around the perimeter of the array.	2 to 3 times a year, depending on rate of growth of grass.	NuGen O&M
Mowing | Outside Solar Area Everything outside of a 15' buffer around the perimeter of the array.	2 to 3 times a year, depending on rate of growth of grass.	Town of Bristol
Settlement Upkeep | Ballast Block Area Settlement Upkeep will be maintained, as needed, for all settlement underneath the ballast blocks under the footprint of the array on the landfill.	As Needed	NuGen O&M
Settlement Upkeep | Outside Ballast Block Area Everything outside of the ballast block area.	As Needed	Town of Bristol
Road Upkeep | Solar Area The road will be maintained within the footprint of the solar array.	As Needed	NuGen O&M
Fence Upkeep and maintenance of fencing and fence line	As Needed	Town of Bristol

Groundwater Requirements & Drainage System Upkeep Maintenance and upkeep of groundwater requirements & drainage system elements.	As Needed	Town of Bristol
Landfill Gas Monitoring Maintence and upkeep of landfill gas monitoring.	As Needed	Town of Bristol
Electrical Inspection (each to be performed between March 1 and April 30 in each calendar year on sunny days) and conducted in accordance with the Electrical Inspection Requirements below	**Frequency**	**Responsible Party**
Test Switches and disconnects.	Once per year	NuGen O&M
Infrared scans combiner and re-combiner boxes; tighten loose connections;	Once per year	NuGen O&M
Check sensors and meters, including pyranometers, anemometers, and tilt sensors when present. Ensure battery back-up is working	Once per year	NuGen O&M
Wash pyranometer	Once per year	NuGen O&M
Additional Electrical Inspection Requirements		
Thermal Inspection • Open each combiner box and photograph the connections using the IR Camera. Write down a list of all connections that are more than +5 deg. C higher in temperature, to be tightened when the power is removed in the next section. • Open each DC disconnect switch and photograph the connections using the IR Camera. Write down a list of all connections that are more than +5 deg. C higher in temperature, to be tightened when the power is removed in the next section. • Open each AC disconnect switch and photograph the connections using the IR Camera. Write down a list of all connections that are more than +5 deg. C higher in temperature, to be tightened when the power is removed in the next section.	Once per year	NuGen O&M
Sensor and Meter Inspection Check sensors and meters, including pyranometers, anemometers and tilt sensors when present. • Record meter readings as available. • Turn meters OFF and ON to make sure they are communicating properly, and ensure the battery backups are working if present. Check calibration labels. Write down serial numbers of exchanged meters.	Once per year	NuGen O&M
Equipment Verification • Turn off the PV inverter. • For all AC Disconnect Switches – Turn them OFF then ON to verify they function properly.	Once per year	NuGen O&M

• Turn off all AC Disconnect switches. • For all DC Disconnect Switches – Turn them OFF then ON to verify they function properly. • Turn off all DC Disconnect switches.		
Connection Verification o Verify the Inverter and all AC, and DC disconnect switches are in the OFF position. o Referring to the images taken at each combiner box and disconnect switch, verify and correct Torque at all connections that were +5 deg. C or higher than the normal temperature to the manufacturer's specifications. (Confirm Torque settings to manufacturer's documentation.)	Once per year	NuGen O&M
PV Array Maintenance for Modules	**Frequency**	**Responsible Party**
Wash all panels with water with no chemicals or solar panel cleaning solution.	As needed	NuGen O&M
Remove snow and control vegetation.	As needed	NuGen O&M
Perform infrared scan of a randomly selected sample	Once per year	NuGen O&M

Electrical System Preventative Maintenance	Frequency	Responsible Party
Clean and/or replace filters (as necessary to comply with applicable manufacturer's warranties), check pressure gauges (address as necessary), check MOVs, thermal imaging (address connections and hot spots), inspect DC/AC capacitors, inspect all inductors and transformers, inspect all power cables included lug connections, inspect DC fans (replace as necessary), inspect weather stripping (replace as necessary), inspect AC contactor (replace parts as necessary), and heat exchanger (if applicable on inverter manufacturer's schedule).	As necessary to comply with the applicable manufacturer's warranties.	NuGen O&M
Clean all cabinet air vents.	Once per year	NuGen O&M
Clean and remove dust from heat sinks per manufacturer's warranty requirements.	Once per year	NuGen O&M
Check torque marks and re-tightening appropriate wiring connections to design specification torque force per manufacturer's guidelines	Once per year	NuGen O&M
Alarm Monitoring and Dispatch		
Dispatch resources in response to alarms and alerts/service requests received by Asset Management Team.	Upon occurrence	NuGen O&M