



DiPrete Engineering

Stormwater System Operation & Maintenance Plan



Sharpe Drive Solar

Located in Cranston, RI

Applicant: Sharpe Solar, LLC

12-22-2023

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Operation & Maintenance Plan Overview

An essential component of a successful Stormwater System (SS) is the ongoing Operation and Maintenance (O&M) of the various components of the stormwater drainage, control, and conveyance systems. These components include swales, pipes, catch basins, and treatment/ control devices are commonly referred to as Best Management Practices (BMPs). Failure to provide effective maintenance can reduce the hydraulic capacity and the pollutant removal efficiency of stormwater practices.

Many people expect that stormwater facilities will continue to function correctly forever. However, it is inevitable that deterioration of the stormwater system will occur once it becomes operational. The question is not whether stormwater system maintenance is necessary but how often.

This plan has been developed to proactively address operations and maintenance to minimize potential problems and maximize potential stormwater runoff treatment and management. Ongoing inspections and maintenance will extend the service life of the Best Management Practices.

This plan addresses:

1. Stormwater management system(s) owners;
2. The party or parties responsible for operation and maintenance, including how future property owners will be notified of the presence of the stormwater management system and the requirement for proper operation and maintenance.
3. A description and delineation of public safety features.
4. The routine (scheduled) and non-routine (corrective) maintenance tasks for each BMP to be undertaken after construction is complete and a schedule for implementing those tasks.
5. A plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point.
6. An estimated operation and maintenance budget; and
7. Funding source for operation and maintenance activities and equipment.

A major contributor to unmaintained stormwater facilities is a lack of clear ownership and responsibility definition. In order for an inspection and maintenance program to be effective, the roles for each responsibility must be clearly defined prior to construction of a system. This can be accomplished with a maintenance agreement between the site owners and the responsible authority.

This report is suitable for recording as an attachment to a maintenance agreement between the site owner and the responsible authority. A copy of a sample agreement prepared by RIDEM is attached to this report as Appendix B.

Stormwater System Owner / Party Responsible for O&M

Stormwater BMPs are maintained during construction by the site contractor as identified in the Soil Erosion and Sediment Control Plan (SESC) for the site. A copy of the SESC is required to be kept on site during construction. The SESC requires maintenance and inspection of the BMPs during the construction phase of project and requires a log be kept of these activities. Once construction is complete and the contractor's warranty period is elapsed, the contractor must obtain the signature of the stormwater system's owner releasing the contractor from his maintenance and inspection responsibilities. A copy of this release of contractor's responsibility must be attached to this document.

The Stormwater System Owner is the Party Responsible for the ongoing O&M of the system.

The two key components to adequately maintain the stormwater infrastructure are:

1. Performance of periodic and scheduled inspections
2. Performance of scheduled maintenance

The actual operation and maintenance of the system may be performed by a third party designated by the owner. If the owner contracts with a third party for O&M the name, address, and emergency contact information must be added below, and updated if the third party designee changes.

Name: _____

Mailing Address: _____

Emergency Contact Name: _____

Phone: _____

Transfer of Ownership

In the event that the owner of the property changes, the current owner (grantor) must provide a copy of this document to the new owner (grantee). The new owner must notify the Rhode Island Department of Environmental Management of the change of ownership and provide a signed updated Operations and Maintenance Plan to the Rhode Island Department of Environmental Management.

Public Safety

Public safety was a critical factor in designing the stormwater system. Public safety features included in this design are:

- 8' high security fence
- Winter & Non-Winter Maintenance

Winter Maintenance

The following tasks must be performed to protect public safety during the winter season:

- Inspect roadways post-storm event to alleviate any signs of icing or damming.

Particular care must be taken in the operation and maintenance of these features.

Inspections & Maintenance

Inspections must be performed on a regular basis and scheduled based on the BMP type and configuration. It is not mandatory that all inspectors be trained engineers, but they must have some knowledge or experience with stormwater systems and in general, trained stormwater engineers should direct the inspectors. Follow-up inspections by registered professional engineers must be performed where a routine inspection has revealed a question of structural or hydraulic integrity affecting public safety.

Not all inspections can be conducted by direct human observation. For subsurface systems, video equipment may be required. There may be cases where other specialized equipment is necessary. The inspection program must be tailored to address the operational characteristics of the system.

The inspection process must document observations made in the field and must cover structural conditions, hydraulic operational conditions, evidence of vandalism, condition of vegetation, occurrence of obstructions, unsafe conditions, and build-up of trash, sediments and pollutants.

Maintenance of the stormwater management system is essential and can be divided into two types, scheduled and corrective.

Scheduled maintenance tasks are those that are typically accomplished on a regular basis and can generally be scheduled without referencing inspection reports. These items consist of such things as vegetation maintenance (such as mowing) and trash and debris removal. These tasks are required at well-defined time intervals and are a requirement for all stormwater structural facilities.

Corrective maintenance tasks consist of items such as sediment removal, stream bank stabilization, and outlet structure repairs that are done on an as-needed basis. These tasks are typically scheduled based on inspection results or in response to complaints.

Since specialized equipment may be required, some maintenance tasks can be effectively handled on a contract basis with an outside entity specializing in that field. In addition, some maintenance may also require a formal design and bid process to accomplish the work.

Appendix A provides an "Inspection Schedule & Maintenance Checklist" for the stormwater system components on this site. Completed checklists must be maintained as an ongoing record of inspections for each component of the stormwater system.

In addition to the maintenance of the stormwater system, maintenance of other site improvements can significantly enhance the ability for the BMPs to function as designed. Several of these have been listed below, along with the recommended maintenance.

Grass and Landscape Management

- Project landscaping will take place a minimum of two times a year or as necessary to eliminate shading on panels. Typically trimming occurs in the spring and the fall.
- Grass shall be maintained to a height of no shorter than 4" and no taller than 12" (grass) and 18" (meadow).

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- No fertilizer shall be used onsite.
 - Weeds must be dug or pulled out. Large areas of weeds can be removed by covering with large plastic sheet(s) for a few days.
 - All trees/shrubs will be trimmed as necessary to maintain proper screening, plant health, and preferred height.
 - Chemical pesticides must be used as a last resort in limited amounts to establish initial vegetative cover. Grass is naturally disease resistant.
 - Visible insects can be removed by hand, by spraying with water, or even vacuum cleaning.
 - Store bought traps, specific for a species can be used.
 - Slugs and other soft bodies insects can be eliminated using diatomaceous earth.
 - Plants infected with bacteria and fungi must be removed and disposed of.
 - Beneficial organisms must be maintained on the property and must be encouraged/attracted to the property. Property facility maintenance personnel must become familiar with these beneficial organisms.
 - Irrigation must only be required for establishment of recently seeded areas.
 - Established vegetation requires no more than one inch of water per week.
 - If needed, areas shall be watered before 9:00 AM to avoid evaporation.
 - During National Grid and maintenance activities, a visual inspection of the site will be performed checking for any erosional features or any incipient erosion. If any substandard erosion conditions are found, immediate corrective measures will occur. Please see Appendix A for the Inspection Schedule & Maintenance Checklists.

Road and Parking Area Management

Street and Parking Lot Sweeping

- There are no streets onsite, therefore, no street sweeping is needed.

Deicing:

- No deicing shall occur onsite.

Sealants:

- No coal-tar based asphalt sealants shall be used onsite.

Snow Removal:

- No snow removal is proposed.

Solid Waste Containment

- The site will not be accessed by the public and will not contain trash and recycling receptacles.

Solar Panel Drip Edge Management

- Drip edge along panels shall be inspected on an annual basis.
- If evidence of gullyng is found, the owner shall install turf reinforcement mats in the locations noted on the Soil Erosion & Sediment Control Plan.

Erosion

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- Project area must be inspected for erosion, or incipient erosion, on an annual basis, and any such eroded areas must be re-graded and re-vegetated as soon as practicable.
 - All proposed grassed and/or meadow areas be maintained in a “good” hydrologic condition.

Reference; Additional information relating to operation and maintenance of specific BMPs can be found in the Rhode Island Stormwater Design and Installation Standards Manual.

www.dem.ri.gov/pubs/regs/regs/water/swmanual.pdf

Estimated Inspections & Maintenance Budget

Given that no stormwater systems are proposed for the site, there are minimal anticipated costs for inspection and maintenance.

Appendix A – Inspection Schedule & Maintenance Checklists

Solar Site Operation, Maintenance, and Management Inspection Checklist

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Notes:

- Beyond inspection frequency noted in parentheses (quarterly), inspections shall be completed after storms equal to or greater than the 1-year 24-hour Type III storm event (2.7" of rain fall).
- All Checklist maintenance items are MANDATORY.
- During inspections, if maintenance items are found not to be applicable, note as N/A in comments
- All removed sediments shall be disposed at an approved and permitted location.

MAINTENANCE ITEM	SATISFACTORY (YES/NO)	COMMENTS
1. Site Inspection (Semi-Annually)		
Adequate vegetation and ground cover		
Grassed and/or meadow areas are maintained and are performing in 'good' hydrologic condition with at least 85% coverage		
Vegetative cover beneath and between panels to be mowed at least annually. Vegetation to be kept no shorter than 4" and a maximum height of 12" (grass field) or 18" (meadow)		
Erosion (i.e. check for erosion within the areas of the solar panels, along crushed stone access paths, and in and around stormwater facilities)		
Differential settling around and under solar panel arrays, crushed stone access paths, and stormwater facilities		
Areas needing re-stabilization with vegetation		
Fence requiring repairs		
<ul style="list-style-type: none"> • Fence signage in place 		

**Solar Site
Operation, Maintenance, and Management
Inspection Checklist**

Project:

Date:

Location:

Time:

Site Status:

Inspector:

Accumulated sediment		
Debris and/or litter accumulation (must be removed immediately)		
<p>Washed crushed stone access roadways. 1" of stormwater infiltrates through surface. If system does not infiltrate, rejuvenate stone surface by one or more of the following:</p> <ul style="list-style-type: none"> • Removal of surface sediments • Replenishment of washed stone • Surface Scarification 		

Appendix B – RIDEM Sample Stormwater Facility Maintenance Agreement

A site-specific Stormwater Facility Maintenance Agreement between the Owner and the responsible authority must be developed prior to construction

Sample Stormwater Facility Maintenance Agreement

THIS AGREEMENT, made and entered into this ____ day of _____, 20____, by and between (Insert Full Name of Owner)

_____ hereinafter called the "Landowner", and the [Local Jurisdiction], hereinafter called the "[Town/City]".

WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as (Tax Map/Parcel Identification Number) _____ as recorded by deed in the land records of [Local Jurisdiction] Deed Book _____ Page _____, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site Plan/Subdivision Plan known as _____, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the [Town/City], provides for detention of stormwater within the confines of the property; and

WHEREAS, the [Town/City] and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of [Local Jurisdiction] require that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the [Town/City] requires that on-site stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.
2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater management facilities in accordance with the required Operation and Maintenance Plan. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions. The Stormwater Best Management Practices Operation, Maintenance and Management Checklists are to be used to establish what good working condition is acceptable to the [Town/City].

3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, basin areas, access roads, etc. Deficiencies shall be noted in the inspection report.

4. The Landowner, its successors and assigns, hereby grant permission to the [Town/City], its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the [Town/City] deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The [Town/City] shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.

5. In the event the Landowner, its successors and assigns, fails to maintain the stormwater management facilities in good working condition acceptable to the [Town/City], the [Town/City] may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the [Town/City] to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the [Town/City] is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the [Town/City].

6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.

7. In the event the [Town/City] pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assigns, shall reimburse the [Town/City] upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the [Town/City] hereunder.

8. This Agreement imposes no liability of any kind whatsoever on the [Town/City] and the Landowner agrees to hold the [Town/City] harmless from any liability in the event the stormwater management facilities fail to operate properly.

9. This Agreement shall be recorded among the land records of [Local Jurisdiction] and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

WITNESS the following signatures and seals:

Company/Corporation/Partnership Name (Seal)

By: _____

(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of _____, 20____, by

NOTARY PUBLIC

My Commission Expires: _____

By: _____

(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of _____, 20____, by

NOTARY PUBLIC

My Commission Expires: _____

Approved as to Form:

[Town/City] Attorney Date