



December 23, 2022

Last Revised: February 13, 2024

RPM-211

STORMWATER MANAGEMENT OPERATION AND MAINTENANCE MANUAL

FOR

**RPM DEVELOPMENT GROUP
MONTGOMERY SENIOR AFFORDABLE HOUSING
BLOCK 20001, LOT 10.05
MONTGOMERY TOWNSHIP, SOMERSET COUNTY NEW JERSEY**

PREPARED BY:

**SHORE POINT ENGINEERING, LLC
1985 HIGHWAY 34, SUITE A7
WALL, NJ 07719**

**1985 Highway 34, Suite A7, Wall, NJ 07719
T: 732-924-8100 F: 732-924-8110
Shorepointengineering.com**

TABLE OF CONTENTS

- I. PROJECT DETAILS**
 - A. INTRODUCTION**
 - B. DESCRIPTION OF STORMWATER MANAGEMENT FACILITIES**
 - C. PROJECT CONTACTS AND RESPONSIBLE PARTIES**
 - D. STORMWATER BEST MANAGEMENT PRACTICES**
- II. MAINTENANCE AND INSPECTIONS**
 - A. REGULAR MAINTENANCE AND INSPECTIONS**
 - B. MAINTENANCE EQUIPMENT AND MATERIALS**
 - C. INSPECTION CHECKLISTS AND LOGS**

APPENDIX

- A. SITE MAP**
- B. MAINTENANCE CHECKLISTS AND LOGS**
- C. COST ESTIMATE**
- D. MAINTENANCE REQUIREMENTS PER THE NJBMP MANUAL**
 - i. UNDERGROUND DETENTION BASIN**
 - ii. SMALL-SCALE BIORETENTION BASIN**

I. PROJECT DETAILS

A. INTRODUCTION

This Operations and Maintenance Manual has been prepared in support of the proposed Stormwater Management Plan for the Montgomery Senior Affordable Housing project in Montgomery Township. The overall parcel is being subdivided creating a 4.21-acre lot for the senior affordable housing building containing 71 units.

B. DESCRIPTION OF STORMWATER MANAGEMENT FACILITIES

The stormwater management system for the proposed development includes the construction of one (1) underground detention basin and one (1) bioretention basin to handle the runoff from the proposed development. Appendix A includes a Site Map identifying each component of the stormwater management system.

C. PROJECT CONTACTS AND RESPONSIBLE PARTIES

The responsible party for the execution of preventative and corrective maintenance regarding the proposed improvements, including replacement of all stormwater management systems to ensure proper functionality, shall be the owner of the new proposed ± 4.2 AC parcel, to be designated as Lot 10.07. The property owner is responsible for maintaining a detailed log of all preventative and corrective maintenance actions for the constructed stormwater facilities, including record of all inspections and copies of all maintenance-related work orders. The maintenance plan and any future revisions shall be recorded upon deed of record for each property on which the maintenance described in this maintenance plan must be undertaken by the current property owner. The property owner is also responsible to evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and deed as necessary. The property owner shall always maintain a copy of this manual onsite.

The required deed restriction shall reference the maintenance manual by title, preparer, and most recent revision date. Further, the restriction shall allow that, if the responsible party fails to maintain the system, the Township shall have the right (but not the obligation) to enter upon the property to perform the requisite maintenance at the responsible party's expense.

Contract Purchaser / Ultimate Property Owner (± 4.2 AC parcel):
RPM Development
77 Park Street
Montclair, NJ 07042
(973) 744-5410

The remainder of the property, being ± 41 AC, to remain designated as Lot 10.05, shall be retained by its current owner, the Somerset County Improvement Authority (SCIA). The Township currently leases the property with an option to purchase. The Township will be the responsible party for maintenance on this portion:

Lessee (±41 AC parcel):
Montgomery Township
100 Community Drive
Skillman, NJ 08558
(908) 359-8211

D. STORMWATER BEST MANAGEMENT PRACTICES

Underground Detention Basin

The proposed underground detention basin has been designed in accordance with the applicable standards of N.J.A.C. 7:8 Stormwater Management, the New Jersey Soil Erosion and Sediment Control Standards and the Montgomery Township Stormwater Control Ordinance. The basin is a series of 48" HDPE pipes, with a total pipe length of 700 LF. Stormwater runoff generated by the proposed building only will be collected and conveyed to the underground detention basin located behind the building. The basin is located at; Northing: 585,480; Easting: 546,605.

A summary of the basins' peak flows, storage and basin elevations are outlined below:

Storm Event (YR)	Basin Inflow (cfs)	Basin Outflow (cfs)	Max. Basin Storage (ac-ft)	Water Surface Elevation
WQ	1.40	0.15	0.038	84.98
2	1.90	0.19	0.067	85.46
10	2.54	0.23	0.109	86.12
100	3.33	0.30	0.187	87.49

Roof runoff entering the underground detention basin is considered clean and does not need to be treated for TSS removal. As such, the proposed systems have been designed in accordance with Water Quality requirements of N.J.A.C. 7-8-5.5.

Small-Scale Bio-Retention Basin

The proposed bioretention basin have been designed in accordance with the applicable standards of N.J.A.C. 7:8 Stormwater Management, the New Jersey Soil Erosion and Sediment Control Standards and the Montgomery Township Stormwater Control Ordinance. Stormwater runoff from the proposed development, with the majority of the new pavement and sidewalk included in this area, will be collected and conveyed to the basin by the proposed stormwater drainage network. Runoff from the water quality storm will be entirely infiltrated through the bio-soil within the basin and into a 3" perforated underdrain below. Larger storm events are controlled via several orifices within the outlet structure and discharge towards the existing rear basin. The basin is designed to store and release all storm events up to the 100-year storm. Per Chapter 9.7, Small Scale Bioretention Systems, when located in an area subject to pedestrian traffic, should be designed with drain times reduced to within 24 hours. During the 100-year storm, the basin is designed to drain within the allotted time frame.

Bioretention basins are approved as having an 80% total suspended solids (TSS) removal rate. As such, the proposed systems have been designed in accordance with Water

Quality requirements of N.J.A.C. 7-8-5.5. The basin is located at; Northing: 577,607; Easting: 448,016.

A summary of the basins' peak flows, storage and basin elevations are outlined below:

Storm Event (YR)	Basin Inflow (cfs)	Basin Outflow (cfs)	Max. Basin Storage (cf)	Water Surface Elevation
WQ	0.63	0.00	1,300	86.56
2	1.51	0.14	3,596	87.39
10	2.60	1.19	4,894	87.80
100	4.26	2.67	6,726	88.33

II. MAINTENANCE AND INSPECTIONS

A. REGULAR MAINTENANCE AND INSPECTIONS

The proposed stormwater management system has been designed to control the runoff generated by the proposed development to ensure that the runoff leaving the site once constructed, is less than the runoff currently leaving the site. Without proper maintenance and inspections, the stormwater management system may lose some of its capability to function as designed.

Regularly scheduled maintenance inspections should be performed of the stormwater management facilities at least once every 6 months or following any storm event exceeding 1 inch of rainfall within 1 hour. The primary purpose of the inspections is to observe and determine the operations condition and safety of the facilities. These inspections will provide information on the effectiveness of the regularly scheduled Preventative Maintenance procedures and will help identify areas where changes to the maintenance program are necessary. These inspections are also used to identify when Corrective Maintenance procedures are necessary.

At a minimum, annual reporting must be provided to the Township of Montgomery in accordance with Municipal Code.

Preventative Maintenance

Preventative Maintenance is done to maximize the effectiveness of the stormwater management facilities so that the system functions as designed. Preventative Maintenance is broken down into the following tasks:

1. Parking Lot Maintenance

Since the stormwater management facilities are located beneath the parking lot surface, maintaining a clean parking lot is essential to minimizing potential pollutants into the facilities. Regular parking lot sweeping is strongly encouraged to remove sediment, debris and other pollutants from the paving area before they can enter the stormwater management system.

2. Trash, Debris and Sediment

Stormwater features such as the underground basin, drainage conveyance network (pipes and structures), trash racks and the outlet control structure should be inspected for clogging, excessive debris and sediment accumulation at least once every 3 months or following any storm event exceeding 1 inch of rainfall within 1 hour.

3. Potential Mosquito Control

Stagnant water presents an inviting habitat for mosquitos to breed. The stormwater basin has been designed to full drain within 72 hours. The basin should be inspected 3-4 days after a storm event to ensure that it is fully drained. If stagnant water is noticed, corrective measures shall be implemented to manually drain the basin.

4. Vegetated Areas

Bi-weekly inspections are required when establishing/restoring vegetation and all vegetated areas must be inspected at least once annually for erosion, scour and unwanted growth. A minimum of one inspection during the growing season and one inspection during the non-growing season is required to ensure the health, density and diversity of the vegetation. Mowing/trimming of vegetation must be performed on a regular schedule, including perimeter grass being mowed at least once per month during the growing season. Grasses within the bioretention system must be carefully maintained with lightweight equipment, such as hand-held trimmers, in order to maintain permeability of the basin bottom. Vegetative cover must be maintained at 85% and any damaged areas must be addressed through replanting in accordance with the original specifications. All use of fertilizers, pesticides, mechanical treatments and other means to ensure optimum vegetation health must not compromise the intended purpose of the bioretention system.

Corrective Maintenance

Corrective Maintenance should be performed as soon as possible after a situation that requires attention is reported. Corrective Maintenance is broken down into the following tasks:

1. Removal and Disposal of Trash, Debris and Sediment

If clogging, excessive debris and/or sediment accumulation is observed in any of the stormwater management facilities, they should be removed and disposed of immediately.

2. Structural Repairs

If structural damage is observed in the drainage conveyance network (pipes and structures), trash racks and/or outlet control structure, a Professional Engineer should be consulted with regarding the appropriate repairs necessary.

3. Mosquito Control

If mosquito breeding is observed, a licensed pest/mosquito control professional should be contacted immediately. If mosquito control becomes necessary, the preventative maintenance program may need to be re-evaluated to help prevent future occurrences.

4. Snow and Ice Removal

Accumulation of snow and ice possesses a threat to drainage inlets and should be removed of immediately.

5. Vegetated Areas

Unwanted growth should be removed with minimum disruption to the remaining vegetation. Only lightweight equipment, such as hand-held trimmers, may be used for maintenance of the basin bottom plantings in order to maintain permeability of the basin bottom.

B. MAINTENANCE EQUIPMENT AND MATERIALS

Below is a list of equipment and materials that should be onsite or readily available for maintenance responsibilities:

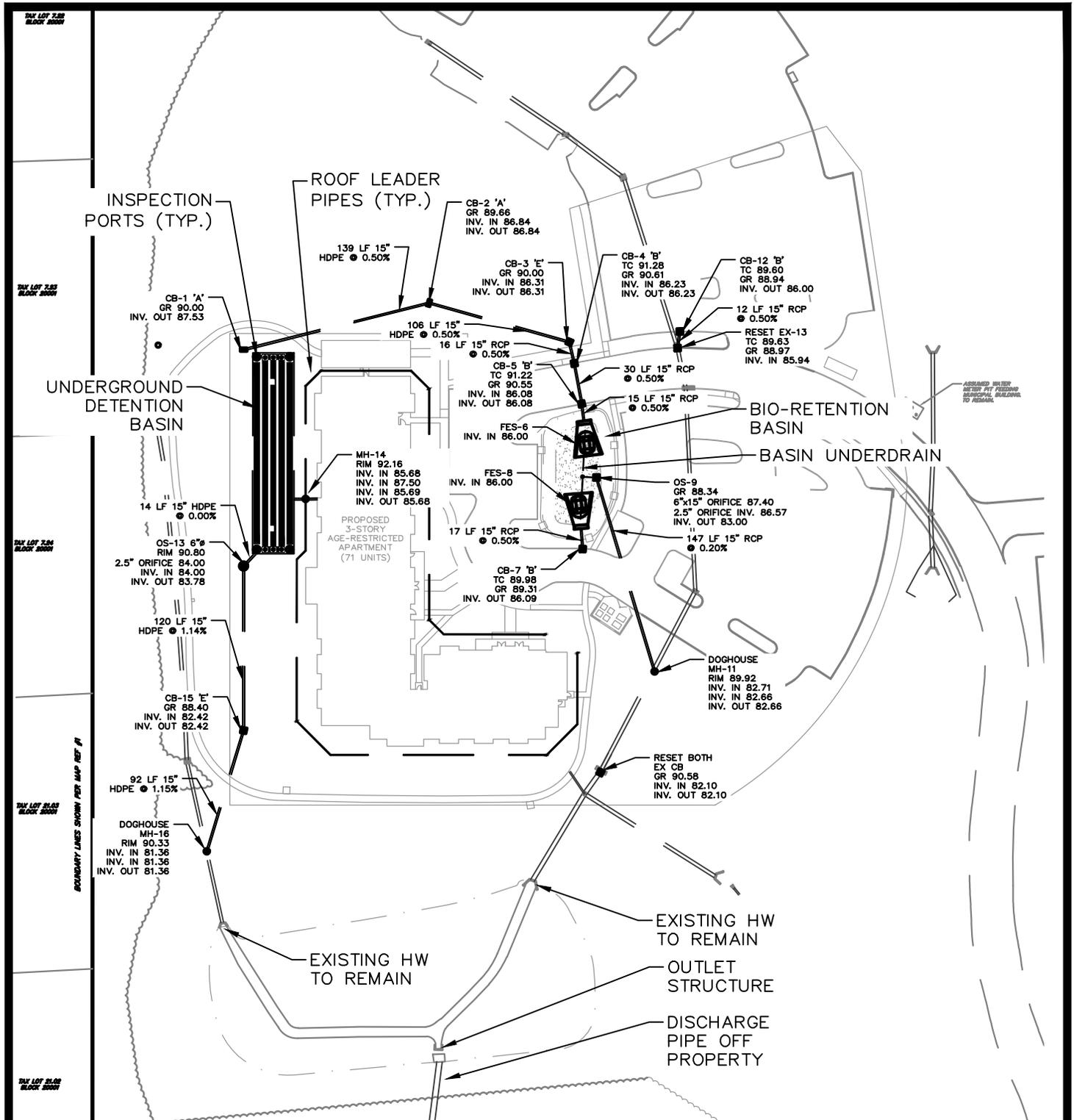
- Shovels, Rakes, Brooms
- Hand-held trimmers
- Gloves
- Wheel Barrows
- Portable Pump with sediment bag for dewatering

C. INSPECTION CHECKLISTS AND LOGS

Appendix B of this manual contains sample checklists and logs for various aspects of inspections and maintenance.

APPENDIX A

SITE MAP



SITE MAP
MONTGOMERY SENIOR AFFORDABLE HOUSING
 BLOCK 20001, LOT 10.05
 SITUATED IN
 MONTGOMERY TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

Date
Kevin E. Shelly, P.E.
 PROFESSIONAL ENGINEER
 N.J. Lic. No. GE05031300
 PO Box 257, Manasquan, NJ 08736
 T: 732-924-8100 | F: 732-924-8110
 www.shorepointengineering.com
 Certificate of Authorization No. 24GA28317800

PROJECT No.:
 RPM-211
 DRAWN BY:
 RZH

SCALE:
 N/A
 CHECKED BY:
 KES

DATE:
 02/13/24
 RELEASED BY:
 KES

APPENDIX B

MAINTENANCE CHECKLISTS AND LOGS

Basin Inspection Log

Name of Facility:

Location:

DATE

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FACILITY NAME	INSPECTION FINDINGS (1, 2 OR 3 - SEE BELOW)									
A. TRASH AND DEBRIS REMOVAL										
1. PERIMETER AREAS										
2. BASIN										
3. INLETS										
4. OUTLETS										
5. TRASH RACKS										
6. OTHERS										
B. SEDIMENT REMOVAL										
1. INLETS										
2. OUTLETS										
3. TRASH RACKS										
4. BASIN BOTTOM										
5. OTHERS										
E. STRUCTURAL REPAIRS										
1. PIPES										
2. INLETS										
3. MANHOLES										
4. OUTLET STRUCTURE										
5. TRASH RACKS										
6. ASPHALT										
7. OTHERS										
F. UNDERGROUND BASIN MAINTENANCE										
1. BASIN BOTTOM										
2. OUTLETS										
3. TRASH RACKS										
4. ACCESS MANHOLES										
5. OTHERS										

(1) ITEM INSPECTED IS IN GOOD OR SATISFACTORY CONDITION AND NO FURTHER ACTION IS REQUIRED

(2) ITEM INSPECTED REQUIRES MAINTENANCE BUT PRESENT CONDITION DOES NOT POSE AN IMMEDIATE THREAT TO BASIN FUNCTIONS OR OPERATIONS

(3) ITEM INSPECTED REQUIRES IMMEDIATE ATTENTION TO PREVENT DAMAGE TO OTHER BASIN COMPONENTS

NOTES AND REMARKS

Basin Inspection Log

Name of Facility:

Location:

DATE

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FACILITY NAME	INSPECTION FINDINGS (1, 2 OR 3 - SEE BELOW)									
A. TRASH AND DEBRIS REMOVAL										
1. PERIMETER AREAS										
2. BASIN										
3. INLETS										
4. OUTLETS										
5. TRASH RACKS										
6. OTHERS										
B. SEDIMENT REMOVAL										
1. INLETS										
2. OUTLETS										
3. TRASH RACKS										
4. BASIN BOTTOM										
5. OTHERS										
E. STRUCTURAL REPAIRS										
1. PIPES										
2. INLETS										
3. MANHOLES										
4. OUTLET STRUCTURE										
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3. TRASH RACKS										
4. ACCESS MANHOLES										
5. OTHERS										

(1) ITEM INSPECTED IS IN GOOD OR SATISFACTORY CONDITION AND NO FURTHER ACTION IS REQUIRED

(2) ITEM INSPECTED REQUIRES MAINTENANCE BUT PRESENT CONDITION DOES NOT POSE AN IMMEDIATE THREAT TO BASIN FUNCTIONS OR OPERATIONS

(3) ITEM INSPECTED REQUIRES IMMEDIATE ATTENTION TO PREVENT DAMAGE TO OTHER BASIN COMPONENTS

NOTES AND REMARKS

APPENDIX C

COST ESTIMATE

Cost Estimate

Cost Overview

Cost Type	Cost	Details
Cost of sediment , trash, and debris removal	\$3,500	
General cost for routine maintenance (e.g., quarterly maintenance)	\$2,750	Table A
General cost – unscheduled maintenance	\$2,640	Table B
Total cost	\$8,890	

Table A: General cost for routine maintenance (e.g., quarterly maintenance)

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew	2 persons per day quarterly	\$400 / day	\$1,600
Equipment			
Truck	1 truck per day quarterly	\$150 / day	\$600
Mower	1 mower	\$75 ea	\$75
Supplies			
Seed	1 bag	\$100 ea	\$100
Topsoil	1 cubic yard	\$100	\$100
Working garments / gloves / protective measures	1 per person	\$25	\$25
Subtotal			\$2,500
Overhead	10%		\$250
Total Cost			\$2,750.00

Table B: General cost – unscheduled maintenance in a year (e.g., inspection after 1 inch of rain)

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew	2 persons per day 12x per year	\$200	\$2,400
Overhead	10%		\$240
Total Cost			\$2640.00

APPENDIX D

MAINTENANCE REQUIREMENTS PER THE NJBMP MANUAL

- i. UNDERGROUND DETENTION BASIN**
- ii. SMALL-SCALE BIORETENTION BASIN**

Maintenance

Regular and effective maintenance is crucial to ensure effective extended detention performance; in addition, maintenance plans are required for all stormwater management facilities associated with a major development. There are a number of required elements in all maintenance plans, pursuant to N.J.A.C. 7:8-5.8; these are discussed in more detail in *Chapter 8: Maintenance and Retrofit of Stormwater Management Measures*. Furthermore, maintenance activities are required through various regulations, including the New Jersey Pollutant Discharge Elimination System (NJPDES) Rules, N.J.A.C. 7:14A. Specific maintenance requirements for extended detention basins are presented below; these requirements must be included in the extended detention basin's maintenance plan.

General Maintenance

- All structural components must be inspected, at least once annually, for cracking, subsidence, spalling, erosion and deterioration.
- Components expected to receive and/or trap debris must be inspected for clogging at least twice annually, as well as after every storm exceeding 1 inch of rainfall.
- If accumulated sediment is detected during an inspection, it must be removed; otherwise, it can lead to loss of detention volume. Sediment removal should take place when the basin is thoroughly dry.
- Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.

- Access points for maintenance are required on all extended detention basins; these access points should be clearly identified in the maintenance plan. In addition, any special training required for maintenance personnel to perform specific tasks should be included in the plan.

Vegetated Areas

- Bi-weekly inspections are required when establishing/restoring vegetation.
- A minimum of one inspection during the growing season and one inspection during the non-growing season is required to ensure the health, density and diversity of the vegetation.
- Vegetative cover must be maintained at 85%; damage in excess of 50% must be addressed through replanting in accordance with the original specifications.
- Vegetated areas must be inspected at least once annually for erosion, scour and unwanted growth; any unwanted growth should be removed with minimum disruption to the remaining vegetation.
- All use of fertilizers, pesticides, mechanical treatments and other means to ensure optimum vegetation health must not compromise the intended purpose of the extended detention basin.

Drain Time

- The approximate time it would normally take for the extended detention basin to drain the maximum design storm runoff volume and begin to dry must be indicated in the maintenance manual.
- If the actual drain time is significantly different than the design drain time, the basin's outlet structure, underdrain system and both groundwater and tailwater levels must be evaluated and appropriate measures taken to return the basin to minimum and maximum drain time requirements.
- If the extended detention basin fails to fully drain within 72 hours, corrective action must be taken and the maintenance manual revised accordingly to prevent similar failures in the future.

Maintenance

Regular and effective maintenance is crucial to ensure effective small-scale bioretention system performance. There are a number of required elements in all maintenance plans, pursuant to N.J.A.C. 7:8-5.8; these are discussed in more detail in *Chapter 8: Maintenance of Stormwater Management Measures*. Furthermore, maintenance activities are required through various regulations, including the New Jersey Pollutant Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A. Specific maintenance requirements for bioretention systems are presented below; these requirements must be included in the maintenance plan. Detailed inspection and maintenance logs must be maintained.

General Maintenance

- Proper and timely maintenance is essential to continuous, effective operation; therefore, an access route must be incorporated into the design, and it must be properly maintained.
- All structural components must be inspected, at least once annually, for cracking, subsidence, spalling, erosion and deterioration.
- Components expected to receive and/or trap debris and sediment must be inspected for clogging at least four times annually, as well as after every storm exceeding 1 inch of rainfall.
- Sediment removal must take place when all runoff has drained from the planting bed and the basin is dry.
- Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.
- In systems with underdrains, the underdrain piping must be connected, in a manner that is easily accessible for inspection and maintenance, to a downstream location.
- Access points for maintenance are required on all enclosed areas within a small-scale bioretention system; these access points must be clearly identified in the maintenance plan. In addition, any special training required for maintenance personnel to perform specific tasks, such as confined space entry, must be included in the plan.
- Stormwater BMPs may not be used for stockpiling of plowed snow and ice, compost, or any other material.
- A detailed, written log of all preventative and corrective maintenance performed on the small-scale bioretention system must be kept, including a record of all inspections and copies of maintenance-related work orders. Additional maintenance guidance can be found at https://www.njstormwater.org/maintenance_guidance.htm.

Vegetated Areas

- Bi-weekly inspections are required when establishing/restoring vegetation.
- A minimum of one inspection during the growing season and one inspection during the non-growing season is required ensure the health, density and diversity of the vegetation.
- Mowing/trimming of vegetation must be performed on a regular schedule based on specific site conditions; perimeter grass should be mowed at least once a month during growing season.

- Grasses within the small-scale bioretention system must be carefully maintained with lightweight equipment, such as a hand-held line trimmer, in order to maintain the permeability of the system.
- Vegetative cover must be maintained at 85%; damage must be addressed through replanting in accordance with the original specifications.
- Vegetated areas must be inspected at least once annually for erosion, scour and unwanted growth; any unwanted growth should be removed with minimum disruption to the remaining vegetation.
- All use of fertilizers, pesticides, mechanical treatments and other means to ensure optimum vegetation health must not compromise the intended purpose of the bioretention system.

Drain Time

- The planting bed should be inspected at least twice annually to determine if the permeability of the bed has decreased.
- The design drain time for the maximum design storm runoff volume must be indicated in the maintenance manual.
- If the actual drain time is significantly different from the design drain time, the components must be evaluated, and appropriate measures taken to return the bioretention system to the original tested as-built condition.
- If the bioretention system fails to drain the Water Quality Design Storm within 72 hours, corrective action must be taken and the maintenance manual revised accordingly to prevent similar failures in the future.
- The water surface elevation for each of the design storms must be indicated on the maintenance plan and in the maintenance logs to facilitate inspections. It is suggested that indelible markings be drawn or physical markers be set on the inside of the outlet control structure as visual indicators of the design storm water surface elevations.