CIVIL ENGINEERING
ENVIRONMENTAL
SURVEYING
LANDSCAPE ARCHITECTURE
GEOTECHNICAL

STORMWATER MANAGEMENT MAINTENANCE MANUAL

248 Stickles Pond Road
Block 151 Lot 21
Andover Township
Sussex County, New Jersey

Prepared For:
BHT Properties Group
5081 SW 48th Street, 1023
Davie, Florida 33314

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Maintenance Logs and Inspection Records

PARTY RESPONSIBLE FOR MAINTENANCE:

BHT Properties Group
Address:5081 SW 48th Street. 1023, Davie, Florida 33314
Contact Person(s): _____
Phone: _____

This plan is recorded in

Deed Book # _____ Page # ____ with _____ County Clerk on Date _____

Last Revised on _____/_____/_____

PART I - MAINTENANCE PLAN

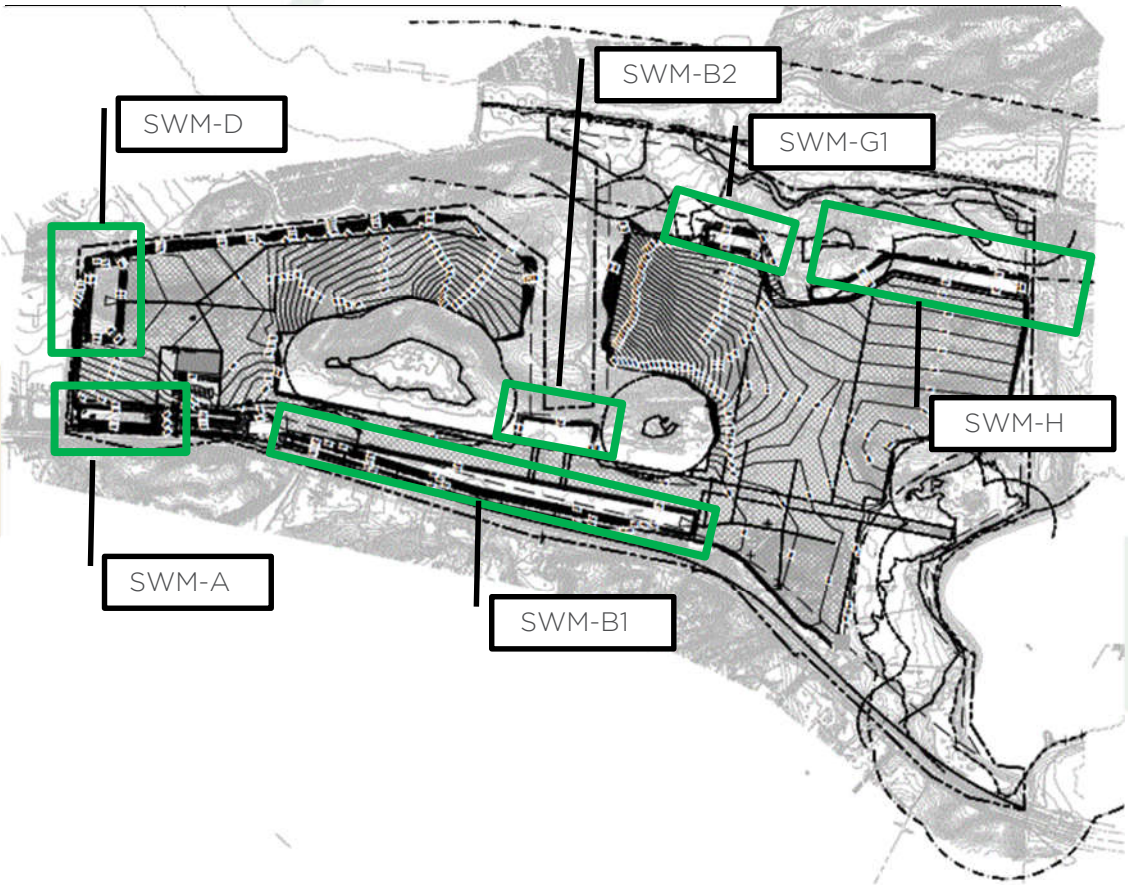
1. LIST OF STORMWATER MANAGEMENT MEASURES

The stormwater management measures incorporated into this development are listed below. The corresponding Field Manuals for the stormwater management measures are located in Part II of the Maintenance Plan.

Type of Stormwater Management Measure	BMP No.	Location Description	State Plan Coordinates / Lat., Long.
Surface Infiltration Basin	SWM-A	Southern Section of Site	N(Y): 797,322.43 E(X): 419,229.886
Surface Infiltration Basin	SWM-B1	Middle Section of Site	N(Y): 798,325.44 E(X): 420,540.19
Surface Infiltration Basin	SWM-B2	Middle Section of Site	N(Y): 798,476.15 E(X): 420,387.26
Surface Infiltration Basin	SWM-D	Western Section of Site	N(Y): 797,593.22 E(X): 418,911.61
Surface Infiltration Basin	SWM-G1	Northern Section of Site	N(Y): 799,480.665 E(X): 420,353.378
Surface Infiltration Basin	SWM-H	Northern Section of Site	N(Y): 799,928.706 E(X): 420,896.96

2. LOCATION MAP

The map below shows the proposed site improvements and stormwater management measures for the subject property.



3. DESCRIPTION OF STORMWATER MANAGEMENT MEASURES

Surface Infiltration Basin (SWM-A)
Design storm:

- Design Purposes:
  - Water Quality, Quantity, and Recharge
  - 1.25 inches in 2 hours;
    Max WSE: 592.76
    Drain Time: 1.2 hours
  - 2-year storm in 24 hours (3.24 inches)
    Max WSE: 593.28
    Drain Time: 3.5 hours
  - 10-year storm in 24 hours (4.73 inches)
    Max WSE: 593.92
    Drain Time: 5.2 hours
  - 100-year storm in 24 hours (7.51 inches)
    Max WSE: 595.05
    Drain Time: 8.5 hours
- Dimensions: 259' (Length) x 41' (Width) x 5.0' (Depth)

Surface Infiltration Basin (SWM-B1)
Design storm:

- Design Purposes:
  - Water Quality, Quantity, and Recharge
  - 1.25 inches in 2 hours;
    Max WSE: 598.62
    Drain Time: 1.1 hours
  - 2-year storm in 24 hours (3.24 inches)
    Max WSE: 599.19
    Drain Time: 3.6 hours
  - 10-year storm in 24 hours (4.73 inches)
    Max WSE: 599.93
    Drain Time:5.7 hours
  - 100-year storm in 24 hours (7.51 inches)
    Max WSE: 601.18
    Drain Time: 9.7 hours
- Dimensions: 1,274' (Length) x 55' (Width) x 4.0' (Depth)

Surface Infiltration Basin (SWM-B2)
Design storm:

- Design Purposes:
  - Water Quality, Quantity, and Recharge
  - 1.25 inches in 2 hours;
    Max WSE: 598.46
    Drain Time: 0.8 hours
  - 2-year storm in 24 hours (3.24 inches)
    Max WSE: 598.82
    Drain Time: 2.4 hours
  - 10-year storm in 24 hours (4.73 inches)
    Max WSE: 599.26
    Drain Time: 3.7 hours
  - 100-year storm in 24 hours (7.51 inches)
    Max WSE: 600.77
    Drain Time: 6.2 hours
- Dimensions: 12' (Length) x 12' (Width) x 8.38' (Depth)

Surface Infiltration Basin (SWM-D)
Design storm:

- Design Purposes:
  - Water Quality, Quantity, and Recharge
  - 1.25 inches in 2 hours;
    Max WSE: 599.41
    Drain Time: 1.7 hours
  - 2-year storm in 24 hours (3.24 inches)
    Max WSE: 600.54
    Drain Time: 5.1 hours
  - 10-year storm in 24 hours (4.73 inches)
    Max WSE: 601.84
    Drain Time: 7.7 hours
  - 100-year storm in 24 hours (7.51 inches)
    Max WSE: 604.11
    Drain Time: 12.5 hours
- Dimensions: 249' (Length) x 95' (Width) x 7.0' (Depth)

Surface Infiltration Basin (SWM-G1)
Design storm:

- Design Purposes:
  - Water Quality, Quantity, and Recharge
  - 1.25 inches in 2 hours;
    Max WSE: 597.21
    Drain Time: 2.0 hours
  - 2-year storm in 24 hours (3.24 inches)
    Max WSE: 598.13
    Drain Time: 6.1 hours
  - 10-year storm in 24 hours (4.73 inches)
    Max WSE: 599.14
    Drain Time: 9.4 hours
  - 100-year storm in 24 hours (7.51 inches)
    Max WSE: 600.64
    Drain Time: 15.7 hours
- Dimensions: 322' (Length) x 32 (Width) x 5.0' (Depth)

Surface Infiltration Basin (SWM-H)
Design storm:

- Design Purposes:
  - Water Quality, Quantity, and Recharge
  - 1.25 inches in 2 hours;
    Max WSE: 596.75
    Drain Time: 1.2 hours
  - 2-year storm in 24 hours (3.24 inches)
    Max WSE: 597.36
    Drain Time: 3.7 hours
  - 10-year storm in 24 hours (4.73 inches)
    Max WSE: 598.16
    Drain Time: 5.7 hours
  - 100-year storm in 24 hours (7.51 inches)
    Max WSE: 599.63
    Drain Time: 9.7 hours
- Dimensions: 771' (Length) x 52' (Width) x 4.0' (Depth)

4. PREVENTATIVE AND CORRECTIVE MAINTENANCE ACTION PLAN

Preventative Maintenance Actions

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
Monthly	Trim grass and vegetation to maintain a neat and orderly appearance. Inspect for unwanted tree and shrub growth. Inspect bottom of basins and remove sediment and debris as required.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Quarterly	Inspect inflow points, manholes, cleanouts, structure interior, and structural integrity. Trash and debris should be removed immediately as required. Also applies after major storms in excess of 1 inch of rainfall.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Bi-Annually	Inspect vegetation for health, density and desired diversity. If 50% of the vegetation is substandard the entire basin shall be re-vegetated. Inspect vegetated areas for evidence of scour and erosion, repair and necessary. Inspect all components for	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H

	cracking subsidence erosion, deterioration. Make necessary repairs or corrective action.	
Quarterly	Inspect all components for clogging and excessive debris and sediment accumulation. Sediment removal should take place when the drywell is thoroughly dry. Trash and debris should be removed immediately and disposed of at the proper sites.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Annually	Inspect components for cracking, subsidence, spalling, erosion and deterioration	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Bi-Annually	Inspect components expected to receive or trap debris for clogging.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Seasonal	Grass within the swale should be maintained to fall within the required grass height range of 3 to 6 inches. Moving and trimming should be performed on a regular schedule based on site conditions. Grass clippings should be removed or maintain small to avoid the facilitation of mosquito breeding.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Quarterly	Remove weeds and other unwanted vegetation growth in accordance with the landscape plan included with the development drainage for the project site.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Annually	Inspect outflow for evidence of scour and erosion, repair as necessary. Inspect for unwanted vegetative growth. Inspect all structural components for cracking, subsidence, spalling, erosion, and deterioration. Make necessary repairs or corrective action. Inspect discharge location (overflow) and ensure stability of grate and remove trash/debris.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Quarterly	Inspect each storm water inlet for trash, sediment and debris. Remove as necessary. Ensure roof leader drains are functioning properly.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Annually	Inspect inlet for structural integrity and make any necessary repairs as required.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H
Unscheduled	Quick inspection after every 1" rain	
All Times	No heavy equipment all be permitted on the basin surface.	SWM-A, SWM-B1, SWM-B2,SWM-D, SWM-G1, SWM-H

Corrective Maintenance Actions

Potential Corrective Maintenance Actions	Stormwater Management Measures/No.
Repair/ Replacement of outlet structure: The maximum 'allotted time' for a detention system to drain is 72 hours. If at any time the systems fail to drain within the 'allotted time', immediate corrective measures shall be employed.	SWM-B1

- The roof leader drain collection system should be inspected semi-annually to confirm proper operation during storm conditions; check for clogging.
- Vegetation health should be inspected biweekly during the first growing season or until vegetation is established. Once, established, these inspections should be continued at least twice annually. Vegetative cover should be maintained at 85%, and if the area vegetation has greater than 50% damage, the area should be reestablished in accordance with the original specifications. All vegetation deficiencies should be addressed without the use of fertilizers and pesticides whenever possible. At least one full growing season should have elapsed prior to strip functioning as part of the stormwater management system.

5. INSPECTION AND LOGS OF ALL PREVENTATIVE AND CORRECTIVE MAINTENANCE

Inspection Checklists in the Field Manual for the stormwater management measures on this site include:

- Surface Detention Basin Field Manual

The logs of all inspections, and both preventative and corrective maintenance performed should be attached in the "Maintenance Logs and Inspection Records" section. See Part II of the Maintenance Plan

6. MAINTENANCE PERSONNEL, EQUIPMENT, TOOLS, AND SUPPLIES

Maintenance Personnel/Equipment/Tools/Supplies

Personnel/Equipment/Tools Name	Quantity
Access cover lifting tool	2
Gloves and safety shoes	2 per employee
Flashlight	2
Safety Cones and/or caution tape	10
Hard Hats and Safety Glasses	1 per employee
Proper Safety Equipment for confined space entry	As needed

7. COST ESTIMATE

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

Cost Type	Cost Per Task	No. Time/Year	No. of Components	Total Yearly Cost Estimate
Trim and Mow Grass and Vegetation in stormwater management areas	$500	8	1	$4,000
Inspect basin outlets control structures, inlets, manufactured treatment device, and cleanouts for trash, debris, and sediment (clean/remove as necessary)	$1,600	4	6	$6,400
Inspect roof leaders and gutters for trash, debris, and sediment (clean/remove as necessary)	$450	Approx. 12	1	$5,400

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

The frequency of large storm events that require routine maintenance varies from year to year. Therefore, it is possible that the estimated quantities of tasks shown above will vary. In these cases, the 'Cost per Task' column may be used to estimate single unscheduled tasks.

8. SAFETY MEASURES AND PROCEDURES

As per NJDEP BMP Manual, procedures and equipment are required to protect the safety of inspection and maintenance personnel.

Qualification for Performing Maintenance in Special Circumstances

Maintenance tasks that require the entry of inlet/outlet structures, manholes, or MTDs are required to be performed by qualified personnel that have the necessary Occupational Safety and Health Administration (OSHA) Confined-Space Entry training and certification.

Safety Procedures

Maintenance personnel shall follow all other procedures required by local, state, and federal laws and regulations, and the safety instructions provided by the equipment or device manufacturers.

Training Plan and Records

As per NJDEP BMP Manual Ch. 8 (February 2004), maintenance training begins with a basic description of the purpose and function of the overall stormwater management measure and its major components. Such understanding will enable maintenance personnel to provide more effective component maintenance and more readily detect maintenance-related problems. Depending on the size, character, location, and components of each stormwater management measure, maintenance personnel may also require training in specialized inspection and maintenance tasks and/or the operation and care of specialized maintenance equipment. Training should also be provided in the need for and use of all required safety equipment and procedures.

Safety Training

Types of Training:

- Mandatory Stormwater Management Basic Training and Field Manual Usage Training for new maintenance crews
- Occupational Safety Training
- Subcontractor training, if applicable

Content of Training:

- Stormwater Management Basic Training - Purposes and Functions of BMPs. Example Training Material:
    - NJDEP Stormwater BMP Manual, Chapter Nine: Structural Stormwater Management Measures
        - Chapter 9.1 Detention Systems
        - Chapter 9.2 Constructed Wetlands
        - Chapter 9.3 Dry Wells
        - Chapter 9.4 Extended Detention Basins
        - Chapter 9.5 Infiltration Basins
        - Chapter 9.6 Manufactured Treatment Devices
        - Chapter 9.7 Pervious Paving Systems
        - Chapter 9.8 Rooftop Vegetated Cover
        - Chapter 9.9 Sand Filters
        - Chapter 9.10 Vegetative Filter Strips
        - Chapter 9.11 Wet Ponds
        - Chapter 9.12 Grass Swales
        - Chapter 9.13 Subsurface Gravel Wetlands

    More training information is available at NJ Stormwater.org (http://www.nj.gov/dep/stormwater/training.htm)

- Vegetation Care. Example Training Material:

- NJDEP Stormwater BMP Manual, Chapter Seven: Landscaping (provides information on vegetation and landscaping for stormwater management measures)
- Other

- Field Manual Usage Training. Example Training Material:
  - Field Manuals attached to this Maintenance Plan
  - Other
- Equipment and Tools Operation Training. Example Training Material:
  - Equipment or tool manufacturer's Operation & Maintenance Manual
  - Other
- Occupational Safety Training. Example Training Material:
  - OSHA Training
  - Equipment or tool manufacturer's Operation & Maintenance Manual
  - Other

9. TRAINING PLAN AND RECORDS

I. Training Plan

Types of Training

- Mandatory Stormwater Management Basic Training and Field Manual Usage Training for new maintenance crews
- Occupational Safety Training
- Subcontractor training, if applicable

Content of Training

- Stormwater Management Basic Training
  - Purposes and Functions of BMPs

    Example Training Material
    - NJDEP Stormwater BMP Manual, Chapter Nine: Structural Stormwater Management Measures
      - Chapter 9.4 Extended Detention Basins
      - Chapter 9.7 Pervious Paving Systems
      - Chapter 9.10 Vegetative Filter Strips
      - Chapter 9.12 Grass Swales

More training information is available at NJ Stormwater.org (http://www.nj.gov/dep/stormwater/training.htm)

  - Vegetation Care

    Example Training Material
    - NJDEP Stormwater BMP Manual, Chapter Seven: Landscaping

    (provides information on vegetation and landscaping for stormwater management measures)
    - Other

- Field Manual Usage Training

  Example Training Material
  - Field Manuals attached to this Maintenance Plan
  - Other

- Equipment and Tools Operation Training

  Example Training Material
  - Equipment or tool manufacturer's Operation & Maintenance Manual
  - Other

- Occupational Safety Training

  Example Training Material
  - OSHA Training
  - Equipment or tool manufacturer's Operation & Maintenance Manual
  - Other

II. Training Records

Training attendance sheets should be attached by the responsible party after each training.

10. ANNUAL EVALUATION OF THE EFFECTIVENESS OF THE PLAN

Per N.J.A.C. 7:8-5.8(g), the Responsible Party designated at the beginning of this report shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan as needed.

The Responsible Party shall evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The following items shall be evaluated at a minimum:

- Whether inspections have been performed as scheduled;
- Whether preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost;
- Whether inspection, maintenance, and repair records have been kept.

If actual performance of these items has deviated from the maintenance plan, the Responsible Party should find the causes and implement solutions in a revised maintenance plan.

The following shall be provided to the township engineer prior to April 1st of each year:

- All inspection reports of prior years,
- Description of all maintenance performed on all components of SWM system during prior year.

Annual Evaluation Records

Evaluator(s)	Date of Evaluation	Decision

11. DOCUMENTS

The following documents shall be attached prior to issuance of Certificate of Occupancy:

Transfer Agreement

As per N.J.A.C. 7:8-5.8(b), if the maintenance plan identifies a person other than the developer as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.

Deed

As per N.J.A.C. 7:8-5.8(d), if the person responsible for maintenance is not a public agency, the maintenance plan and any future revisions shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.

As-Built Drawings with Drainage Plans

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), as-built construction plans of the stormwater management measure and copies of pertinent construction documents, such as laboratory test results, permits, and completion certificates should be included in this Maintenance Plan.

Landscaping Plan for the Stormwater Management Measures

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), if there is a Landscaping Plan for the stormwater management measures, it should be included in this Maintenance Plan.

Permeability Test/Infiltration Test Report

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), if a permeability test or infiltration test is required and available, the reports for pre-construction and post-construction testing should be included in this Maintenance Plan.

Groundwater Mounding Analysis

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), if a groundwater mounding analysis is required and the groundwater mounding analysis was performed, a copy of the analysis should be included in this Maintenance Plan.

Soil Boring Logs

As per NJDEP BMP Manual Ch.8 (Feb., 2004), if any soil borings were taken prior to construction, a copy of the soil boring logs should be included in this Maintenance Plan.

Local, State, Federal Permits

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), local, state, or federal permits related to the stormwater management measures for this development should

be included in this Maintenance Plan. See Cost Estimate Section of This Maintenance Plan for more information.
The requirement to obtain State permits depends on specific circumstances, such as, but not limited to, the specific design of the stormwater management measures, the maintenance actions, the access and disturbance, the disposal methods, the location of disposal, the method to empty a basin, the method to dredge the basin, the pollutants in the basin, the damages to the basin, and the method to repair the basin.

Check Maintenance Guidance in NJDEP Stormwater Management Website for details and links to the relevant permits and program areas (http://www.njstormwater.org).

Safety Regulations and Requirements

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), all local ordinances and state and federal regulations regarding occupational safety should be included in this Maintenance Plan.

Devices/Tools/Equipment Operation and Maintenance Manual and Warranties

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), maintenance, repair, and replacement instructions for specialized, proprietary, and nonstandard equipment, tools, supplies, manufacturers' product instructions, and user manuals should be included in this Maintenance Plan.

PART II - FIELD MANUALS

Attachment of Field Manuals for Stormwater Management Measures on this Site

As per N.J.A.C. 7:8-5.8(b)&(e), preventative and corrective maintenance shall be performed to maintain the function of stormwater management measures, including repair or replacement of the structure; removal of sediment, debris or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; repair or replacement of non-vegetated linings, and removal of rodent/wildlife and repair/restoration to damaged affected areas caused by them.

Each Field Manual attached to this Maintenance Plan is a separate document pertaining to one specific stormwater management measure, and should be used by inspections and maintenance crews in order to carry out the maintenance work required by N.J.A.C. 7:8-5.8(e). Design engineers should prepare the field manuals in accordance with the design of each measure and the specific requirements of the site. See the sample field manuals for further guidance.

Field Manual for Surface Infiltration Basin (SWM-A)
Field Manual for Surface Infiltration Basin (SWM-B1)
Field Manual for Surface Infiltration Basin (SWM-B2)
Field Manual for Surface Infiltration Basin (SWM-D)
Field Manual for Surface Infiltration Basin (SWM-G1)
Field Manual for Surface Infiltration Basin (SWM-H)

Maintenance Logs and Inspection Records

As per N.J.A.C. 7:8-5.8(e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure(s), including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.

As per N.J.A.C. 7:8-5.8(f), the person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

The responsible party shall maintain a record of all maintenance actions performed, including:

- Inspection checklists from each performed inspection
- Preventative maintenance logs
- Corrective maintenance logs, including work orders
- Other maintenance records

SURFACE INFILTRATION BASIN FIELD MANUAL : SWM-A

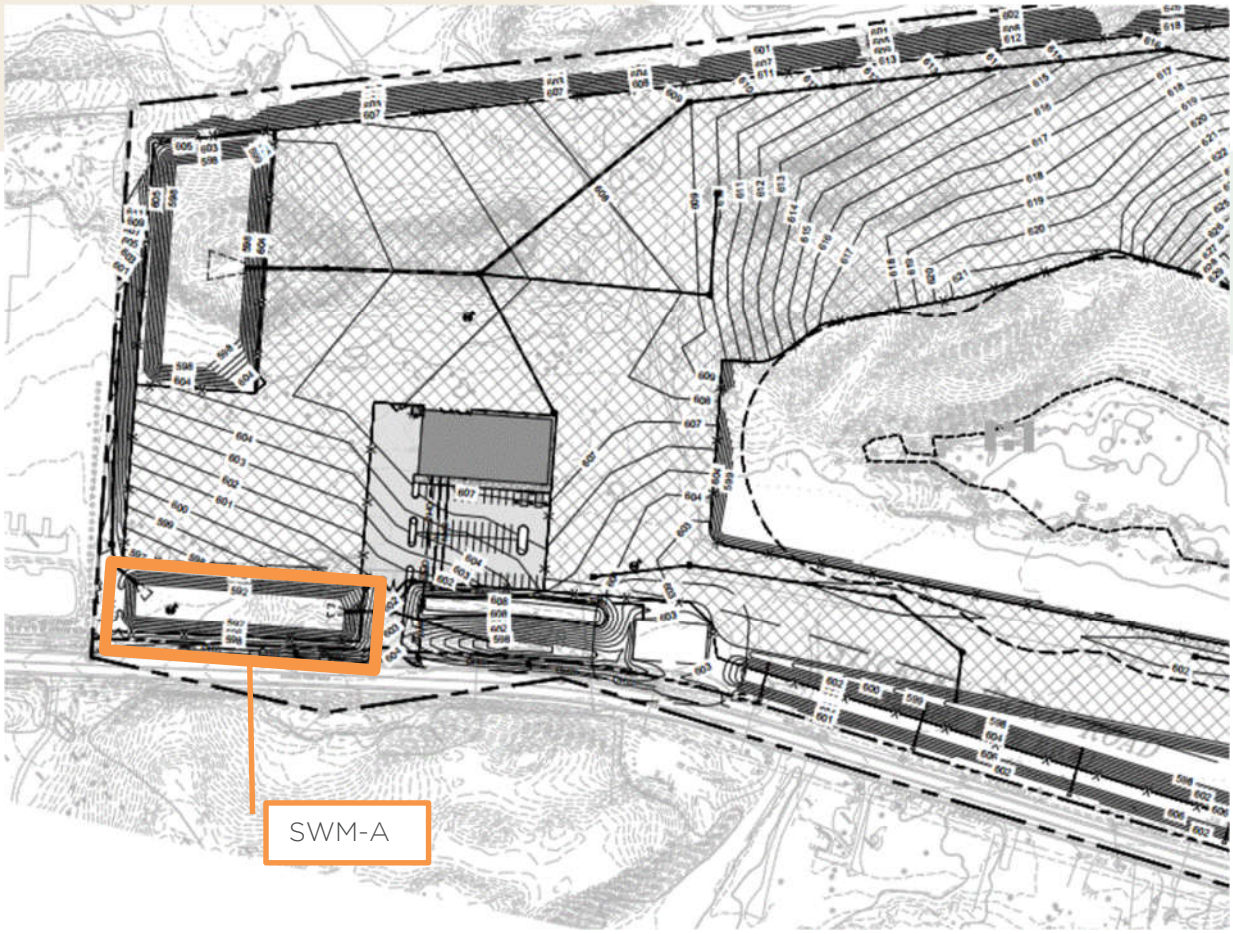
Development Name: 248 Stickles Pond Road

Township, County: Andover Township, Sussex County, New Jersey

Location of Basin: E(X): 419,229.886; N(Y):797,322.43

Location Description: Southern Section of Site

Location Map



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1. SURFACE INFILTRATION BASIN OVERVIEW

Functionality
An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration Only
An infiltration basin is a type of ***dry*** basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

This surface infiltration basin is designed for **infiltration only** and is **not** designed for extended detention.

2. BASIN DESIGN INFORMATION

Hydrology Design Targets:

1. This basin is designed with a subsoil permeability rate of 5.0 inches/hour (pre-construction) and _____ inches/hour (post-construction)
2. The design drain time is:
    a. 1.2 hours hours (Water Quality Storm)
    b. 3.5 Hours (2 Year Storm)
    c. 5.2 Hours (10 Year Storm)
    d. 8.5 Hours (100 Year Storm)

3. The elevation of the seasonal high-water table of this basin was observed on 10/15/2019 and it was below the basin bottom surface, at EL. greater than 588.86 feet.
4. This basin will be discharged to the subsoil through exfiltration.

Hydraulic Design Targets:

1. This basin is designed to infiltrate the runoff from the 100-Year Design storm, which generates 84,372 cubic feet of runoff.
2. The water surface elevation is at EL. 592.76 feet.
3. The 100-year storm water surface elevation is at EL. 595.05
4. The emergency spillway is at EL. 596.25 feet.

Basin Configuration Targets:

1. The basin bottom is covered by a sand layer.
    - The depth of the sand layer is 6 inches, which requires a volume of 5,318.5 cubic feet of sand.
    - The invert elevation of the sand layer is EL. 591.50 feet
    - The sand layer is designed to be replaced every 24 months.

2. Vegetation
    - The top of sand bed has been designed to have no vegetation. The side slopes of the basin are to be seeded

Critical Maintenance Features:

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clipping shall be collected from the basin and properly disposed.

3. VISUAL AID FOR DRY TYPE STORMWATER BASIN INSPECTION


Courtesy of NJDOT

Issue:	The inlet is not properly drained, assuming it has not rained within 72 hours.
Corrective Action:	Clear and remove sediment. Check whether the water table is at or above the bottom of the forebay. Also check the permeability of the underlying soil, if necessary.
Preventative Action:	Routine inspections and removal of sediment from the forebay.

Issue: The Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.

Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.
Corrective Action:	Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.
Preventative Action:	Routine inspection and removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	Eroded inflow apron.
Corrective Action:	Repair apron.
Preventative Action:	Routine inspection and rehabilitation, if necessary.

Courtesy of NJDOT

Issue:	The vegetation loss and the blackish soil may indicate frequent inundation.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and tilling/aeration, if necessary.

Issue:	The low flow channel has excessive accumulation of sediment and debris. The outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and cleaning.

Issue:	Trash rack is damaged.
Corrective Action:	Repair the trash rack.
Preventative Action:	Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.

A well-maintained detention basin

4. REFERENCE DOCUMENTS

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs

5. INSPECTION CHECKLIST / MAINTENANCE ACTIONS FOR SURFACE INFILTRATION BASIN

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
A Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y___ N___	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup. Replace the sand layer. Work Order #
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y___ N___	Clean pretreatment system. Remove silt, sediment, and trash. Work Order # _____
	3	Erosion or channelization is present	Y___ N___	Check whether the flow bypass or diversion device is clogged. Re-grade the infiltration bed. Work Order # _____
	4	Animal burrows/rodents are present	Y___ N___	Pest control. Work Order # _____
	5	Uneven bed	Y___ N___	Use light equipment to resurface the bed. Work Order # _____
	6	Evidence of sinkholes or subsidence	Y___ N___	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
B Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
C Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y___ N___	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Re-stabilize the bank Work Order # _____
E Emergency Spillway	1	Trees or excessive vegetation present	Y___ N___	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y___ N___	Repair Work Order #_____
F Miscellaneous	1	Fence: broken or eroded parts	Y___ N___	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y___ N___	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

6. PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal **Sediment removal should be taken place when the basin is thoroughly dry**	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	C – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ 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 stormwater management measure. The fertilizer applied is _____, and _____ is applied _____.

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____
(name/ signature)

Supervisor: _____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

7. CORRECTIVE MAINTENANCE RECORD

1. Work Order # _____
   Date Issued _____

2. Issue to be resolved:

3. The issue was from Corresponding Checklist ___, Component No. ___, Inspection Item No. ___.

4. Required Actions

Actions	Planned Date	Date Completed

5. Responsible person(s):

_____

6. Special requirements
   - Time of the season or weather condition _____
   - Tools/equipment:
     _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

SURFACE INFILTRATION BASIN FIELD MANUAL: SWM-B1

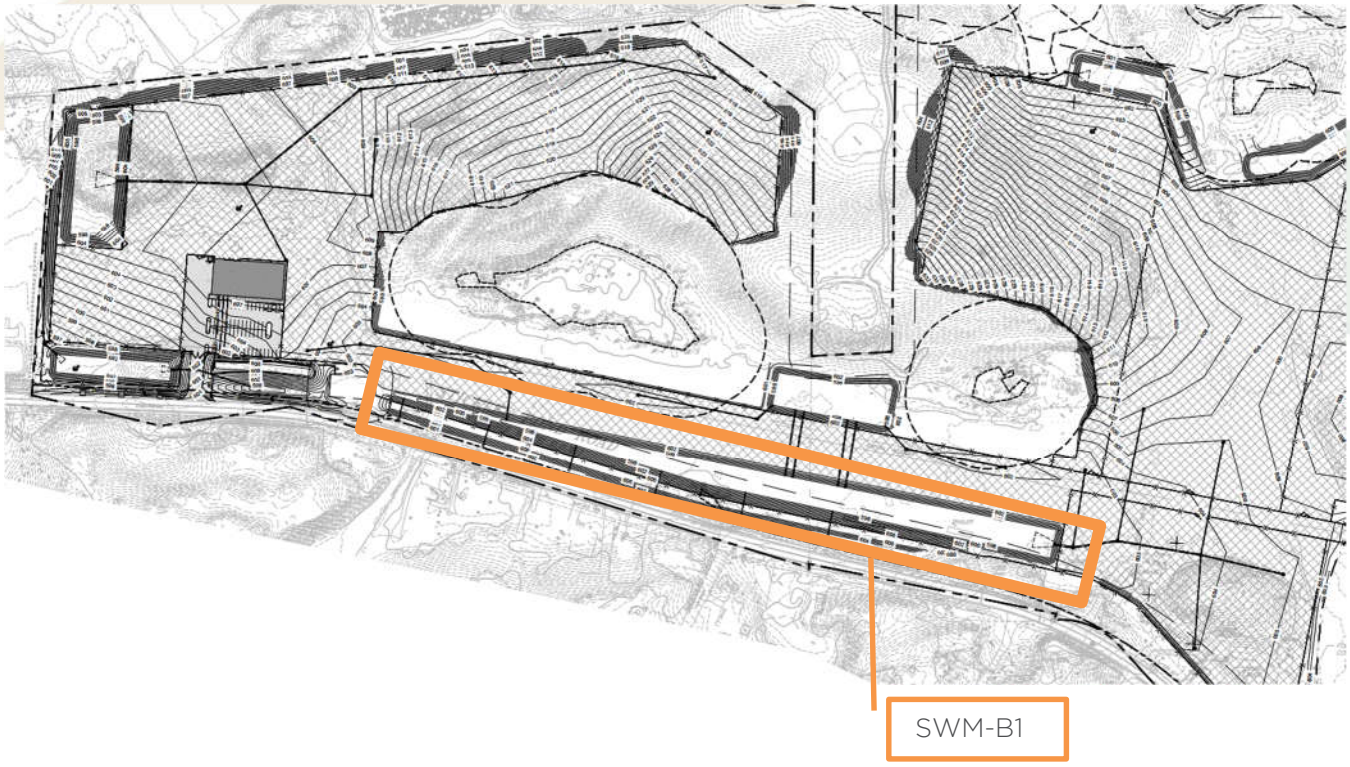
Development Name: 248 Stickles Pond Road

Township, County: Andover Township, Sussex County, New Jersey

Location of Basin: E(X): 420,540.19; N(Y):798,325.44

Location Description: MIddle Section of Site

Location Map



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1. SURFACE INFILTRATION BASIN OVERVIEW

Functionality
An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration Only
An infiltration basin is a type of *dry* basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

This surface infiltration basin is designed for infiltration only and is not designed for extended detention.

2. BASIN DESIGN INFORMATION

Hydrology Design Targets:

1. This basin is designed with a subsoil permeability rate of 5.0 inches/hour (pre-construction) and _____ inches/hour (post-construction)
2. The design drain time is:
    a. 1.1 hours hours (Water Quality Storm)
    b. 3.6 Hours (2 Year Storm)
    c. 5.7 Hours (10 Year Storm)
    d. 9.7 Hours (100 Year Storm)

3. The elevation of the seasonal high-water table of this basin was observed on 10/15/2019 and it was below the basin bottom surface, at EL. greater than 596.21 feet.
4. This basin will be discharged to the subsoil through exfiltration.

Hydraulic Design Targets:

1. This basin is designed to infiltrate the runoff from the 100-Year Design storm, which generates 495,143 cubic feet of runoff.
2. The water surface elevation is at EL. 598.62 feet.
3. The 100-year storm water surface elevation is at EL. 601.18
4. The basin has been designed to work as an interconnected pond with the downstream basin SWM-B2, connected through a set of pipes at 0.0% slopes.

Basin Configuration Targets:

1. The basin bottom is covered by a sand layer.
    - The depth of the sand layer is 6 inches, which requires a volume of 30,629 cubic feet of sand.
    - The invert elevation of the sand layer is EL. 597.50 feet
    - The sand layer is designed to be replaced every 24 months.

2. Vegetation
    - The top of sand bed has been designed to have no vegetation. The side slopes of the basin are to be seeded

Critical Maintenance Features:

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clipping shall be collected from the basin and properly disposed.

3. VISUAL AID FOR DRY TYPE STORMWATER BASIN INSPECTION

Issue:	The inlet is not properly drained, assuming it has not rained within 72 hours.
Corrective Action:	Clear and remove sediment. Check whether the water table is at or above the bottom of the forebay. Also check the permeability of the underlying soil, if necessary.
Preventative Action:	Routine inspections and removal of sediment from the forebay.

Issue: The Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.

Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.
Corrective Action:	Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.
Preventative Action:	Routine inspection and removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	Eroded inflow apron.
Corrective Action:	Repair apron.
Preventative Action:	Routine inspection and rehabilitation, if necessary.

Courtesy of NJDOT

Issue:	The vegetation loss and the blackish soil may indicate frequent inundation.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and tilling/aeration, if necessary.

Issue:	The low flow channel has excessive accumulation of sediment and debris. The outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and cleaning.

Issue:	Trash rack is damaged.
Corrective Action:	Repair the trash rack.
Preventative Action:	Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.

A well-maintained detention basin

4. REFERENCE DOCUMENTS

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs

5. INSPECTION CHECKLIST / MAINTENANCE ACTIONS FOR SURFACE INFILTRATION BASIN

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
A Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y___ N___	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup. Replace the sand layer. Work Order #
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y___ N___	Clean pretreatment system. Remove silt, sediment, and trash. Work Order # _____
	3	Erosion or channelization is present	Y___ N___	Check whether the flow bypass or diversion device is clogged. Re-grade the infiltration bed. Work Order # _____
	4	Animal burrows/rodents are present	Y___ N___	Pest control. Work Order # _____
	5	Uneven bed	Y___ N___	Use light equipment to resurface the bed. Work Order # _____
	6	Evidence of sinkholes or subsidence	Y___ N___	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
B Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
C Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y___ N___	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Re-stabilize the bank Work Order # _____
E Emergency Spillway	1	Trees or excessive vegetation present	Y___ N___	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y___ N___	Repair Work Order #_____
F Miscellaneous	1	Fence: broken or eroded parts	Y___ N___	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y___ N___	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

6. PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal **Sediment removal should be taken place when the basin is thoroughly dry**	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	C – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ 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 stormwater management measure. The fertilizer applied is _____, and _____ is applied _____.

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____
(name/ signature)

Supervisor: _____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

7. CORRECTIVE MAINTENANCE RECORD

1. Work Order # _____
   Date Issued _____

2. Issue to be resolved:

3. The issue was from Corresponding Checklist ___, Component No. ___, Inspection Item No. ___.

4. Required Actions

Actions	Planned Date	Date Completed

5. Responsible person(s):

_____

6. Special requirements
   - Time of the season or weather condition _____
   - Tools/equipment:
     _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

SURFACE INFILTRATION BASIN FIELD MANUAL: SWM-B2

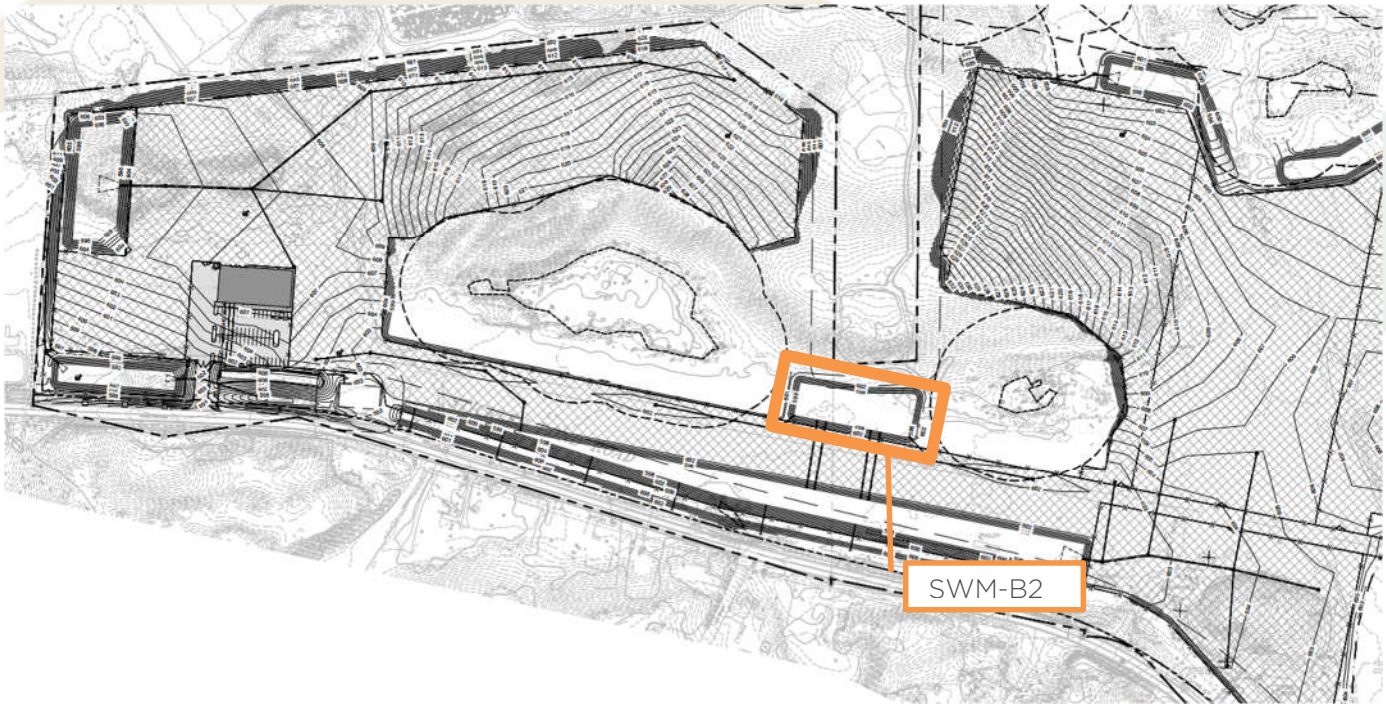
Development Name: 248 Stickles Pond Road

Township, County: Andover Township, Sussex County, New Jersey

Location of Basin: E(X): 420,387.26; N(Y):798,476.15

Location Description: Middle Section of Site

Location Map



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E&LP

1. SURFACE INFILTRATION BASIN OVERVIEW

Functionality
An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration Only
An infiltration basin is a type of *dry* basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

This surface infiltration basin is designed for infiltration only and is not designed for extended detention.

2. BASIN DESIGN INFORMATION

Hydrology Design Targets:

1. This basin is designed with a subsoil permeability rate of 5.0 inches/hour (pre-construction) and _____ inches/hour (post-construction)
2. The design drain time is:
    a. 0.8 hours hours (Water Quality Storm)
    b. 2.4 Hours (2 Year Storm)
    c. 3.7 Hours (10 Year Storm)
    d. 6.2 Hours (100 Year Storm)

3. The elevation of the seasonal high-water table of this basin was observed on 10/15/2019 and it was below the basin bottom surface, at EL. greater than 596.21 feet.
4. This basin will be discharged to the subsoil through exfiltration.

Hydraulic Design Targets:

1. This basin is designed to infiltrate the runoff from the 100-Year Design storm, which generates 109,871 cubic feet of runoff.
2. The water surface elevation is at EL. 598.46 feet.
3. The 100-year storm water surface elevation is at EL. 600.77
4. The basin has been designed to work as an interconnected pond with the upstream basin SWM-B1, connected through a set of pipes at 0.0% slopes.
5. The emergency spillway elevation is at EL. 601.50

Basin Configuration Targets:

1. The basin bottom is covered by a sand layer.
    - The depth of the sand layer is 6 inches, which requires a volume of 10,592 cubic feet of sand.
    - The invert elevation of the sand layer is EL. 597.50 feet
    - The sand layer is designed to be replaced every 24 months.

2. Vegetation
    - The top of sand bed has been designed to have no vegetation. The side slopes of the basin are to be seeded

Critical Maintenance Features:

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clipping shall be collected from the basin and properly disposed.

3. VISUAL AID FOR DRY TYPE STORMWATER BASIN INSPECTION

Issue:	The inlet is not properly drained, assuming it has not rained within 72 hours.
Corrective Action:	Clear and remove sediment. Check whether the water table is at or above the bottom of the forebay. Also check the permeability of the underlying soil, if necessary.
Preventative Action:	Routine inspections and removal of sediment from the forebay.

Issue: The Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.

Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.
Corrective Action:	Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.
Preventative Action:	Routine inspection and removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	Eroded inflow apron.
Corrective Action:	Repair apron.
Preventative Action:	Routine inspection and rehabilitation, if necessary.

Courtesy of NJDOT

Issue:	The vegetation loss and the blackish soil may indicate frequent inundation.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and tilling/aeration, if necessary.

Issue:	The low flow channel has excessive accumulation of sediment and debris. The outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and cleaning.

Issue:	Trash rack is damaged.
Corrective Action:	Repair the trash rack.
Preventative Action:	Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.

A well-maintained detention basin

4. REFERENCE DOCUMENTS

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs

5. INSPECTION CHECKLIST / MAINTENANCE ACTIONS FOR SURFACE INFILTRATION BASIN

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
A Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y___ N___	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup. Replace the sand layer. Work Order #
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y___ N___	Clean pretreatment system. Remove silt, sediment, and trash. Work Order # _____
	3	Erosion or channelization is present	Y___ N___	Check whether the flow bypass or diversion device is clogged. Re-grade the infiltration bed. Work Order # _____
	4	Animal burrows/rodents are present	Y___ N___	Pest control. Work Order # _____
	5	Uneven bed	Y___ N___	Use light equipment to resurface the bed. Work Order # _____
	6	Evidence of sinkholes or subsidence	Y___ N___	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
B Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
C Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y___ N___	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Re-stabilize the bank Work Order # _____
E Emergency Spillway	1	Trees or excessive vegetation present	Y___ N___	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y___ N___	Repair Work Order #_____
F Miscellaneous	1	Fence: broken or eroded parts	Y___ N___	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y___ N___	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

6. PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal **Sediment removal should be taken place when the basin is thoroughly dry**	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	C – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ 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 stormwater management measure. The fertilizer applied is _____, and _____ is applied _____.

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____
(name/ signature)

Supervisor: _____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

7. CORRECTIVE MAINTENANCE RECORD

1. Work Order # _____
   Date Issued _____

2. Issue to be resolved:

3. The issue was from Corresponding Checklist ___, Component No. ___, Inspection Item No. ___.

4. Required Actions

Actions	Planned Date	Date Completed

5. Responsible person(s):

_____

6. Special requirements
   - Time of the season or weather condition _____
   - Tools/equipment:
     _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

SURFACE INFILTRATION BASIN FIELD MANUAL: SWM-D

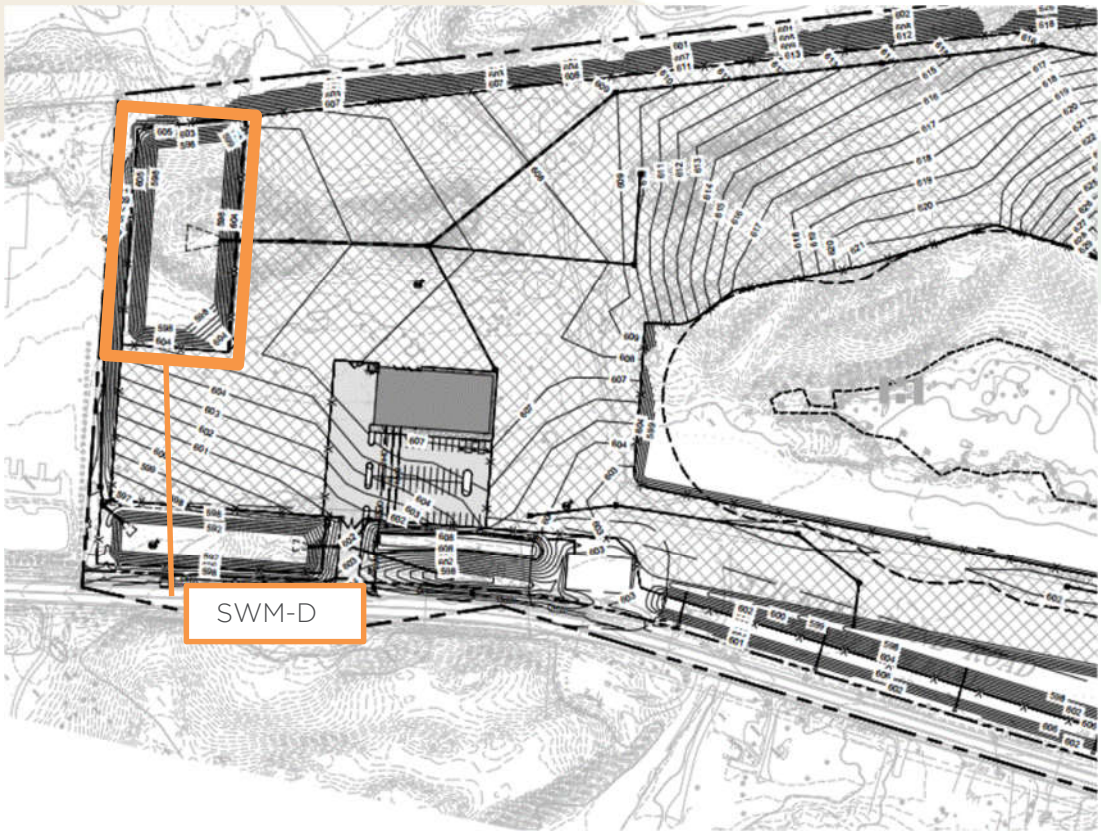
Development Name: 248 Stickles Pond Road

Township, County: Andover Township, Sussex County, New Jersey

Location of Basin: E(X): 418,911.61; N(Y):797,593.22

Location Description: Southwestern Section of Site

Location Map



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1. SURFACE INFILTRATION BASIN OVERVIEW

Functionality
An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration Only
An infiltration basin is a type of *dry* basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

This surface infiltration basin is designed for infiltration only and is not designed for extended detention.

2. BASIN DESIGN INFORMATION

Hydrology Design Targets:

1. This basin is designed with a subsoil permeability rate of 5.0 inches/hour (pre-construction) and _____ inches/hour (post-construction)
2. The design drain time is:
    a. 1.7 Hours (Water Quality Storm)
    b. 5.1 Hours (2 Year Storm)
    c. 7.7 Hours (10 Year Storm)
    d. 12.5 Hours (100 Year Storm)

3. The elevation of the seasonal high-water table of this basin was observed on 10/15/2019 and it was below the basin bottom surface, at EL. greater than 589.59 feet.
4. This basin will be discharged to the subsoil through exfiltration.

Hydraulic Design Targets:

1. This basin is designed to infiltrate the runoff from the 100-Year Design storm, which generates 339,491 cubic feet of runoff.
2. The water surface elevation is at EL. 599.41 feet.
3. The 100-year storm water surface elevation is at EL. 604.11
4. The emergency spillway elevation is at EL. 604.50

Basin Configuration Targets:

1. The basin bottom is covered by a sand layer.
    - The depth of the sand layer is 6 inches, which requires a volume of 11,884 cubic feet of sand.
    - The invert elevation of the sand layer is EL. 597.50 feet
    - The sand layer is designed to be replaced every 24 months.

2. Vegetation
    - The top of sand bed has been designed to have no vegetation. The side slopes of the basin are to be seeded

Critical Maintenance Features:

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clipping shall be collected from the basin and properly disposed.

3. VISUAL AID FOR DRY TYPE STORMWATER BASIN INSPECTION


Courtesy of NJDOT

Issue:	The inlet is not properly drained, assuming it has not rained within 72 hours.
Corrective Action:	Clear and remove sediment. Check whether the water table is at or above the bottom of the forebay. Also check the permeability of the underlying soil, if necessary.
Preventative Action:	Routine inspections and removal of sediment from the forebay.

Issue: The Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.

Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.
Corrective Action:	Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.
Preventative Action:	Routine inspection and removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	Eroded inflow apron.
Corrective Action:	Repair apron.
Preventative Action:	Routine inspection and rehabilitation, if necessary.

Courtesy of NJDOT

Issue:	The vegetation loss and the blackish soil may indicate frequent inundation.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and tilling/aeration, if necessary.

Issue:	The low flow channel has excessive accumulation of sediment and debris. The outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and cleaning.

Issue:	Trash rack is damaged.
Corrective Action:	Repair the trash rack.
Preventative Action:	Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.

A well-maintained detention basin

4. REFERENCE DOCUMENTS

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs

5. INSPECTION CHECKLIST / MAINTENANCE ACTIONS FOR SURFACE INFILTRATION BASIN

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
A Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y___ N___	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup. Replace the sand layer. Work Order #
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y___ N___	Clean pretreatment system. Remove silt, sediment, and trash. Work Order # _____
	3	Erosion or channelization is present	Y___ N___	Check whether the flow bypass or diversion device is clogged. Re-grade the infiltration bed. Work Order # _____
	4	Animal burrows/rodents are present	Y___ N___	Pest control. Work Order # _____
	5	Uneven bed	Y___ N___	Use light equipment to resurface the bed. Work Order # _____
	6	Evidence of sinkholes or subsidence	Y___ N___	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
B Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
C Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y___ N___	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Re-stabilize the bank Work Order # _____
E Emergency Spillway	1	Trees or excessive vegetation present	Y___ N___	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y___ N___	Repair Work Order #_____
F Miscellaneous	1	Fence: broken or eroded parts	Y___ N___	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y___ N___	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

6. PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal **Sediment removal should be taken place when the basin is thoroughly dry**	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	C – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ 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 stormwater management measure. The fertilizer applied is _____, and _____ is applied _____.

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____
(name/ signature)

Supervisor: _____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

7. CORRECTIVE MAINTENANCE RECORD

1. Work Order # _____
   Date Issued _____

2. Issue to be resolved:

3. The issue was from Corresponding Checklist ___, Component No. ___, Inspection Item No. ___.

4. Required Actions

Actions	Planned Date	Date Completed

5. Responsible person(s):

_____

6. Special requirements
   - Time of the season or weather condition _____
   - Tools/equipment:
     _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

SURFACE INFILTRATION BASIN FIELD MANUAL: SWM-B2

Development Name: 248 Stickles Pond Road

Township, County: Andover Township, Sussex County, New Jersey

Location of Basin: E(X): 420,353.378; N(Y):799,480.665

Location Description: Northern Section of Site

Location Map

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6. Preventative Maintenance Record 16
7. Corrective Maintenance Record 17

1. SURFACE INFILTRATION BASIN OVERVIEW

Functionality
An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration Only
An infiltration basin is a type of *dry* basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

This surface infiltration basin is designed for infiltration only and is not designed for extended detention.

2. BASIN DESIGN INFORMATION

Hydrology Design Targets:

1. This basin is designed with a subsoil permeability rate of 5.0 inches/hour (pre-construction) and _____ inches/hour (post-construction)
2. The design drain time is:
    a. 2.0 Hours (Water Quality Storm)
    b. 6.1 Hours (2 Year Storm)
    c. 9.4 Hours (10 Year Storm)
    d. 15.7 Hours (100 Year Storm)

3. The elevation of the seasonal high-water table of this basin was observed on 10/15/2019 and it was below the basin bottom surface, at EL. greater than 592.64 feet.
4. This basin will be discharged to the subsoil through exfiltration.

Hydraulic Design Targets:

1. This basin is designed to infiltrate the runoff from the 100-Year Design storm, which generates 160,626 cubic feet of runoff.
2. The water surface elevation is at EL. 597.21 feet.
3. The 100-year storm water surface elevation is at EL. 600.64
4. The emergency spillway elevation is at EL. 600.70

Basin Configuration Targets:

1. The basin bottom is covered by a sand layer.
    - The depth of the sand layer is 6 inches, which requires a volume of 5,469.5 cubic feet of sand.
    - The invert elevation of the sand layer is EL. 595.50 feet
    - The sand layer is designed to be replaced every 24 months.

2. Vegetation
    - The top of sand bed has been designed to have no vegetation. The side slopes of the basin are to be seeded

Critical Maintenance Features:

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clipping shall be collected from the basin and properly disposed.

3. VISUAL AID FOR DRY TYPE STORMWATER BASIN INSPECTION


Courtesy of NJDOT

Issue:	The inlet is not properly drained, assuming it has not rained within 72 hours.
Corrective Action:	Clear and remove sediment. Check whether the water table is at or above the bottom of the forebay. Also check the permeability of the underlying soil, if necessary.
Preventative Action:	Routine inspections and removal of sediment from the forebay.

Issue: The Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.

Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.
Corrective Action:	Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.
Preventative Action:	Routine inspection and removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	Eroded inflow apron.
Corrective Action:	Repair apron.
Preventative Action:	Routine inspection and rehabilitation, if necessary.

Courtesy of NJDOT

Issue:	The vegetation loss and the blackish soil may indicate frequent inundation.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and tilling/aeration, if necessary.

Issue:	The low flow channel has excessive accumulation of sediment and debris. The outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and cleaning.

Issue:	Trash rack is damaged.
Corrective Action:	Repair the trash rack.
Preventative Action:	Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.

A well-maintained detention basin

4. REFERENCE DOCUMENTS

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs

5. INSPECTION CHECKLIST / MAINTENANCE ACTIONS FOR SURFACE INFILTRATION BASIN

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
A Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y___ N___	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup. Replace the sand layer. Work Order #
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y___ N___	Clean pretreatment system. Remove silt, sediment, and trash. Work Order # _____
	3	Erosion or channelization is present	Y___ N___	Check whether the flow bypass or diversion device is clogged. Re-grade the infiltration bed. Work Order # _____
	4	Animal burrows/rodents are present	Y___ N___	Pest control. Work Order # _____
	5	Uneven bed	Y___ N___	Use light equipment to resurface the bed. Work Order # _____
	6	Evidence of sinkholes or subsidence	Y___ N___	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
B Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
C Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y___ N___	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Re-stabilize the bank Work Order # _____
E Emergency Spillway	1	Trees or excessive vegetation present	Y___ N___	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y___ N___	Repair Work Order #_____
F Miscellaneous	1	Fence: broken or eroded parts	Y___ N___	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y___ N___	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

6. PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal **Sediment removal should be taken place when the basin is thoroughly dry**	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	C – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ 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 stormwater management measure. The fertilizer applied is _____, and _____ is applied _____.

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____
(name/ signature)

Supervisor: _____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

7. CORRECTIVE MAINTENANCE RECORD

1. Work Order # _____
   Date Issued _____

2. Issue to be resolved:

3. The issue was from Corresponding Checklist ___, Component No. ___, Inspection Item No. ___.

4. Required Actions

Actions	Planned Date	Date Completed

5. Responsible person(s):

_____

6. Special requirements
   - Time of the season or weather condition _____
   - Tools/equipment:
     _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

SURFACE INFILTRATION BASIN FIELD MANUAL: SWM-G1

Development Name: 248 Stickles Pond Road

Township, County: Andover Township, Sussex County, New Jersey

Location of Basin: E(X): 420,896.96; N(Y):799,928.706

Location Description: Northern Section of Site

Location Map

E&LP

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1. SURFACE INFILTRATION BASIN OVERVIEW

Functionality
An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration Only
An infiltration basin is a type of ***dry*** basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

This surface infiltration basin is designed for **infiltration only** and is **not** designed for extended detention.

2. BASIN DESIGN INFORMATION

Hydrology Design Targets:

1. This basin is designed with a subsoil permeability rate of 5.0 inches/hour (pre-construction) and _____ inches/hour (post-construction)
2. The design drain time is:
    a. 1.2 Hours (Water Quality Storm)
    b. 3.7 Hours (2 Year Storm)
    c. 5.7 Hours (10 Year Storm)
    d. 9.7 Hours (100 Year Storm)

3. The elevation of the seasonal high-water table of this basin was observed on 10/15/2019 and it was below the basin bottom surface, at EL. greater than 589.44 feet.
4. This basin will be discharged to the subsoil through exfiltration.

Hydraulic Design Targets:

1. This basin is designed to infiltrate the runoff from the 100-Year Design storm, which generates 324,029 cubic feet of runoff.
2. The water surface elevation is at EL. 596.75 feet.
3. The 100-year storm water surface elevation is at EL. 599.63.
4. The emergency spillway elevation is at EL. 599.75

Basin Configuration Targets:

1. The basin bottom is covered by a sand layer.
    - The depth of the sand layer is 6 inches, which requires a volume of 17,863 cubic feet of sand.
    - The invert elevation of the sand layer is EL. 595.50 feet
    - The sand layer is designed to be replaced every 24 months.

2. Vegetation
    - The top of sand bed has been designed to have no vegetation. The side slopes of the basin are to be seeded

Critical Maintenance Features:

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clipping shall be collected from the basin and properly disposed.

3. VISUAL AID FOR DRY TYPE STORMWATER BASIN INSPECTION


Courtesy of NJDOT

Issue:	The inlet is not properly drained, assuming it has not rained within 72 hours.
Corrective Action:	Clear and remove sediment. Check whether the water table is at or above the bottom of the forebay. Also check the permeability of the underlying soil, if necessary.
Preventative Action:	Routine inspections and removal of sediment from the forebay.

Issue: The Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.

Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.
Corrective Action:	Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.
Preventative Action:	Routine inspection and removal of sediment and unwanted vegetation.

Courtesy of NJDOT

Issue:	Eroded inflow apron.
Corrective Action:	Repair apron.
Preventative Action:	Routine inspection and rehabilitation, if necessary.

Courtesy of NJDOT

Issue:	The vegetation loss and the blackish soil may indicate frequent inundation.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and tilling/aeration, if necessary.

Issue:	The low flow channel has excessive accumulation of sediment and debris. The outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.
Preventative Action:	Routine inspection and cleaning.

Issue:	Trash rack is damaged.
Corrective Action:	Repair the trash rack.
Preventative Action:	Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.

A well-maintained detention basin

4. REFERENCE DOCUMENTS

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs

5. INSPECTION CHECKLIST / MAINTENANCE ACTIONS FOR SURFACE INFILTRATION BASIN

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):
Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):
Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
A Infiltration Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y___ N___	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup. Replace the sand layer. Work Order #
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y___ N___	Clean pretreatment system. Remove silt, sediment, and trash. Work Order # _____
	3	Erosion or channelization is present	Y___ N___	Check whether the flow bypass or diversion device is clogged. Re-grade the infiltration bed. Work Order # _____
	4	Animal burrows/rodents are present	Y___ N___	Pest control. Work Order # _____
	5	Uneven bed	Y___ N___	Use light equipment to resurface the bed. Work Order # _____
	6	Evidence of sinkholes or subsidence	Y___ N___	Monitor for sinkhole development
Note:				

	For Inspector			For Maintenance Crew
B Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost Check Landscaping plan for guidance (if available) Work Order # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
Note:				

	For Inspector			For Maintenance Crew
C Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y___ N___	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Re-stabilize the bank Work Order # _____
E Emergency Spillway	1	Trees or excessive vegetation present	Y___ N___	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y___ N___	Repair Work Order #_____
F Miscellaneous	1	Fence: broken or eroded parts	Y___ N___	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y___ N___	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____
Note:				

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	Signature	Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

6. PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____
Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal **Sediment removal should be taken place when the basin is thoroughly dry**	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A – Basin Bed	
	C – Basin Embankment and Side Slopes	
	C – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ 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 stormwater management measure. The fertilizer applied is _____, and _____ is applied _____.

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____
(name/ signature)

Supervisor: _____/_____ Date: _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

7. CORRECTIVE MAINTENANCE RECORD

1. Work Order # _____
   Date Issued _____

2. Issue to be resolved:

3. The issue was from Corresponding Checklist ___, Component No. ___, Inspection Item No. ___.

4. Required Actions

Actions	Planned Date	Date Completed

5. Responsible person(s):

_____

6. Special requirements
   - Time of the season or weather condition _____
   - Tools/equipment:
     _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ Date _____
(name/signature)

Verification of completion by _____/_____ Date _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.