

Standard Guidelines for Operation and Maintenance of Stormwater BMPs

FEBRUARY 2019



**Standard Guidelines for
Operation and Maintenance of Stormwater BMPs**

**DNREC
Sediment and Stormwater Program**

Effective February 2019

PREAMBLE

This guidance document consists of material extracted from the Post Construction Stormwater BMP Standards & Specifications. All of the material contained in the document has been reviewed and approved by DNREC staff and by the Regulatory Advisory Committee (RAC). The distinction between mandatory and voluntary language has been made pursuant to the ruling of the Court in *Baker v. DNREC*. Pursuant to the Court's ruling, all standards and criteria and other provisions of the former Technical Guidance Document that mandate compliance have been incorporated into the official Regulations. These provisions appear in **bold** font here for the convenience of users, together with the supporting advisory materials in regular font.

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1.0 Infiltration Practices

Typical Maintenance Items and Frequency for Infiltration Practices

Frequency	Maintenance Items
As needed	<ul style="list-style-type: none"> • Replace topsoil and top surface filter fabric (when clogged). • Mow vegetated filter strips as necessary and remove the clippings.
Quarterly	<ul style="list-style-type: none"> • Ensure that the contributing drainage area, inlets, and facility surface are clear of debris. • Ensure that the contributing drainage area is stabilized. Perform spot-reseeding if where needed. • Remove sediment and oil/grease from inlets, pretreatment devices, flow diversion structures, and overflow structures. • Repair undercut and eroded areas at inflow and outflow structures.
Semi-annual inspection	<ul style="list-style-type: none"> • Check inspection ports 3 days after a storm event in excess of 1/2 inch in depth. Standing water observed in the observation port after three days is a clear indication of clogging. • Inspect pretreatment devices and diversion structures for sediment build-up and structural damage. • Remove trees that start to grow in the vicinity of the infiltration facility that may drop leaf litter, fruits and other vegetative materials that could clog the infiltration device.
Annually	<ul style="list-style-type: none"> • Clean out accumulated sediments from the pretreatment cell.

2.0 Bioretention

Typical Maintenance Items and Frequency for Bioretention

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none"> Inspect the site after storm event that exceeds 0.5 inches of rainfall. Stabilize any bare or eroding areas in the contributing drainage area including the bioretention perimeter area Fertilizer application should be kept to a minimum during establishment. Supplemental fertilizer applications shall consist of a 0% phosphorus formulation only as needed to maintain plant vigor. Water trees and shrubs planted in the bioretention planting bed during the first growing season. In general, water every 3 days for first month, and then weekly during the remainder of the first growing season (April - October), depending on rainfall.
Quarterly or after major storms (>1 inch of rainfall)	<ul style="list-style-type: none"> Remove debris and blockages Repair undercut, eroded, and bare soil areas
Twice a year	<ul style="list-style-type: none"> Mowing of the bioretention vegetated perimeter area and banks (as directed in approved O&M plan)
Annually	<ul style="list-style-type: none"> Cleanup to remove trash, debris and floatables A full maintenance review Check condition of outlet structure Repair broken mechanical components, if needed
One time –during the second year following construction	<ul style="list-style-type: none"> Bioretention planting bed replacement/reinforcement plantings
Every 5 to 7 years	<ul style="list-style-type: none"> Forebay sediment removal (as applicable) Flush underdrain system (as applicable)
From 5 to 25 years	<ul style="list-style-type: none"> Repair pipes, outlet structure and spillway, as needed Remove any accumulated sediment within facility, as needed

3.0 Permeable Pavement

Typical Maintenance Items and Frequency for Permeable Pavement

Frequency ¹	Maintenance Items
After installation	<ul style="list-style-type: none"> For the first 6 months following construction, the practice and CDA should be inspected at least twice and after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.
As needed during the growing season	<ul style="list-style-type: none"> Mow grass in grid paver applications
As needed	<ul style="list-style-type: none"> Stabilize the contributing drainage area to prevent erosion Remove any soil or sediment deposited on pavement. Replace or repair any necessary pavement surface areas that are degenerating or spalling
2-4 times per year (depending on use)	<ul style="list-style-type: none"> Vacuum pavement with a standard street sweeper to prevent clogging
Annually	<ul style="list-style-type: none"> Conduct a maintenance inspection Spot weeding of grass applications
Once every 2 to 3 years	<ul style="list-style-type: none"> Remove any accumulated sediment in pretreatment cells and inflow points
If clogged	<ul style="list-style-type: none"> Conduct maintenance using a regenerative street sweeper Replace any necessary joint material
As needed	<ul style="list-style-type: none"> Locate snow storage piles in adjacent grassy areas so that sediments and pollutants in snowmelt are deposited before they reach the permeable pavement
As needed	<ul style="list-style-type: none"> Do not apply sand or cinders over permeable pavement drainage area

¹ Required frequency of maintenance will depend on pavement use, traffic loads, and surrounding land use.

4.0 Vegetated Roofs

Typical Maintenance Items and Frequency for Vegetated Roofs

Frequency	Maintenance Items
As Needed	<ul style="list-style-type: none">• Water to promote plant growth and survival.• Replace dead or dying vegetation (may include transplantation, new plant installation, or distribution of seed or cuttings..)
Semi-Annually	<ul style="list-style-type: none">• Inspect the waterproof membrane flashings for leaking or cracks.• Fertilization (annually, or semi-annually, based on soil test.• Hand weeding to remove invasive plants (no digging or using pointed tools).• Check roof drains, scuppers and gutters to ensure they are not overgrown or have organic matter deposits. Remove any accumulated organic matter or debris.• Replace any dead or dying vegetation.

5.0 Rainwater Harvesting

Typical Maintenance Items and Frequency for Rainwater Harvesting

Frequency	Maintenance Items
Twice a year	<ul style="list-style-type: none">• Keep gutters, downspouts, and conveyance pipes free of leaves and other debris
Four times a year	<ul style="list-style-type: none">• Inspect and clean pretreatment devices
Once a year	<ul style="list-style-type: none">• Inspect and clean cistern lids, paying special attention to vents and screens on inflow and outflow spigots.• Check mosquito screens and patch holes or gaps immediately
Once a year	<ul style="list-style-type: none">• Inspect condition of overflow pipes, overflow filter path and/or secondary stormwater treatment practices
Every third year	<ul style="list-style-type: none">• Inspect cistern for sediment buildup
Every third year	<ul style="list-style-type: none">• Check integrity of backflow preventer
Every third year	<ul style="list-style-type: none">• Inspect structural integrity of cistern, pump, pipe and electrical system
As needed	<ul style="list-style-type: none">• Replace damaged or defective system components
As needed	<ul style="list-style-type: none">• Clear overhanging vegetation and trees over impervious surface

6.0 Restoration Practices

Maintenance of Restoration Practices varies depending on the site conditions, vegetation and other design factors. Projects including Restoration Practices typically include a site specific Operations and Maintenance Plan. The DNREC Sediment & Stormwater Program should be contacted for further guidance in cases where an O&M Plan was not developed.

7.0 Rooftop Disconnection

Maintenance of Rooftop Disconnection areas involves the regular lawn or landscaping maintenance in the filter path from the rooftop to the street. In some cases, runoff from a Rooftop Disconnection may be directed to a more natural, undisturbed setting (i.e., where lot grading and clearing is “fingerprinted” and the proposed filter path is protected).

The rooftop disconnection area shall be maintained in a stabilized vegetative condition.

Ensure that downspouts remain disconnected and pervious filtering/infiltrating areas are not converted to impervious surface.

8.0 Vegetated Channels

Typical Maintenance Items and Frequency for Vegetated Channels

Frequency	Maintenance Items
As needed	<ul style="list-style-type: none"> • Mow vegetated channels during the growing season to maintain minimum grass height of 4".
Quarterly	<ul style="list-style-type: none"> • Ensure that the contributing drainage area, inlets, and facility surface are clear of debris. • Ensure that the contributing drainage area is stabilized. Perform spot-reseeding if and where needed. • Remove accumulated sediment and oil/grease from inlets, pretreatment devices, flow diversion structures, and overflow structures. • Repair undercut and eroded areas at inflow and outflow structures.
Annual inspection	<ul style="list-style-type: none"> • Add reinforcement planting to maintain 90% vegetative cover. Reseed any salt-killed vegetation. • Remove any accumulated sand or sediment deposits behind check dams. • Inspect upstream and downstream of check dams for evidence of undercutting or erosion and remove trash or blockages at weep holes. • Examine channel bottom for evidence of erosion, braiding, excessive ponding, or dead grass. • Check inflow points for clogging and remove any sediment. • Inspect side slopes and pretreatment areas for evidence of any rill or gully erosion and repair. • Look for any bare soil or sediment sources in the contributing drainage area and stabilize immediately.

9.0 Sheet Flow to Vegetated Filter Strip or Vegetated Open Space

Typical Maintenance Items and Frequency for Sheet Flow to Filter Strips or Open Space

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none"> • Inspect the site after storm event that exceeds 0.5 inches of rainfall. • Stabilize any bare or eroding areas • Water trees and shrubs during the first growing season. In general, water every 3 days for first month, and then weekly during the remainder of the first growing season (April - October), depending on rainfall.
Quarterly or after major storms (>1 inch of rainfall)	<ul style="list-style-type: none"> • Repair-eroded, and/or bare soil areas
Twice a year	<ul style="list-style-type: none"> • Mowing of the grassed filter strip or grassed open space • Inspect and treat for invasive species as needed
Annually	<ul style="list-style-type: none"> • Remove trash and debris • A full maintenance review

10.0 Detention Practices

Typical Maintenance Items and Frequency for Detention Practices

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none"> • Water Dry Detention Pond and Dry ED Basin side slopes and bottom area to promote vegetation growth and survival
Quarterly or after major storms (>1 inch of rainfall)	<ul style="list-style-type: none"> • Remove sediment and oil/grease from inlets, pre-treatment devices, flow diversion structures, storage practices and overflow structures. • Ensure that the contributing drainage area, inlets, and facility surface are clear of debris. • Ensure that the contributing drainage area is stabilized. Perform spot-reseeding where needed. • Repair undercut and eroded areas at inflow and outflow structures.
Annually	<ul style="list-style-type: none"> • Measure sediment accumulation levels in forebay. Remove sediment when 50% of the forebay capacity has been lost. • Inspect the condition of stormwater inlets for material damage, erosion or undercutting. Repair as necessary. • Inspect the banks of upstream and downstream channels for evidence of sloughing, animal burrows, boggy areas, woody growth, or gully erosion that may undermine pond embankment integrity. • Inspect outfall channels for erosion, undercutting, rip-rap displacement, woody growth, etc. • Inspect condition of principal spillway and riser for evidence of spalling, joint failure, leakage, corrosion, etc. • Inspect condition of all trash racks, flashboard risers, and other appurtenances for evidence of clogging, leakage, debris accumulation, etc. • Inspect maintenance access to ensure it is free of debris or woody vegetation, and check to see whether valves, manholes and locks can be opened and operated. • Inspect internal and external side slopes of Dry Detention Ponds for evidence of sparse vegetative cover, erosion, or slumping, and make needed repairs immediately. • Monitor the growth of trees and shrubs planted in Dry Detention Ponds. Remove invasive species and replant vegetation where necessary to ensure dense coverage.

11.0 Stormwater Filtering Systems

Typical Maintenance Items and Frequency for Stormwater Filtering Systems

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none"> • Inspect the site after storm event that exceeds 0.5 inches of rainfall. • Stabilize any bare or eroding areas in the contributing drainage area including the Stormwater Filtering System perimeter area
Quarterly or after major storms (>1 inch of rainfall)	<ul style="list-style-type: none"> • Remove debris and blockages • Repair undercut, eroded, and bare soil area
Twice a year	<ul style="list-style-type: none"> • Mowing of the Stormwater Filtering System vegetated perimeter area as applicable
Annually	<ul style="list-style-type: none"> • Cleanup to remove trash, debris and floatables • A full maintenance review • Review condition of structural components • Repair broken mechanical components, if needed
Every 5 to 7 years	<ul style="list-style-type: none"> • Forebay sediment removal (as applicable) • Flush underdrain system (as applicable)
From 5 to 25 years	<ul style="list-style-type: none"> • Repair pipes and structural components as needed • Remove any accumulated sediment within facility, as needed

12.0 Constructed Wetlands

Typical Maintenance Items and Frequency for Constructed Wetlands

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none"> • Stabilize any bare or eroding areas in the contributing drainage area, wetland buffer and in wetland cells. • Water trees and shrubs planted in the buffer and on wetland islands during the first growing season. In general, water every 3 days for first month, and then weekly during the remainder of the first growing season (April - October), depending on rainfall. • Provide reinforcement plantings as needed. • Noxious plants and undesired invasive plants should be dealt with as soon as they begin to colonize the wetland. As a general rule, control of noxious weeds and undesirable invasive species (e.g., cattails and Phragmites) should commence as soon as they are spotted and before their coverage exceeds more than 5% of a wetland cell area. Herbicides must be applied by a Certified aquatic pesticide applicator through the Department of Agriculture and be aquatic safe (i.e., Glyphosate-based products). Extended periods of dewatering may also work because early manual removal provides only short-term relief from invasive species.
Annually, On-Going	<ul style="list-style-type: none"> • Regular mowing operations only need to occur along maintenance access ways and should occur at minimum twice a year. • Reference the Landscape Plan for additional requirements; some upland meadow areas may also require occasional mowing.
Every 2 years	<ul style="list-style-type: none"> • Remove woody species on or near the embankment, structural components such as inflow and outflow pipes, and maintenance access areas
Every 5 to 7 years	<ul style="list-style-type: none"> • Thinning or harvesting of excess forest growth will be needed periodically to guide the forested wetland into a more mature state and prevent it from becoming overgrown. • Sediment removal in the pretreatment forebays occur when 50% of total forebay capacity has been lost. • The Department or the Delegated Agency shall be notified before a Constructed Wetland is drained.

13.0 Wet Ponds

Typical Maintenance Items and Frequency for Wet Ponds

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none"> • Inspect the site after storm event that exceeds 0.5 inches of rainfall. • Stabilize any bare or eroding areas in the contributing drainage area including the Wet Pond perimeter area • Water trees and shrubs planted in the Wet Pond vegetated perimeter area during the first growing season. In general, water every 3 days for first month, and then weekly during the remainder of the first growing season (April - October), depending on rainfall.
Quarterly or after major storms (>1 inch of rainfall)	<ul style="list-style-type: none"> • Remove debris, trash and blockages • Repair undercut, eroded, and bare soil areas
Twice a year	<ul style="list-style-type: none"> • Mowing of the Wet Pond vegetated perimeter area and embankment
Annually	<ul style="list-style-type: none"> • Shoreline cleanup to remove trash, debris and floatables • A full maintenance review <ul style="list-style-type: none"> ▪ Open up the riser to access and test the valves ▪ Repair broken mechanical components, if needed
Every 5 to 7 years	<ul style="list-style-type: none"> • Forebay sediment removal
From 5 to 25 years	<ul style="list-style-type: none"> • Repair pipes, riser, spillway, and embankment as needed • Remove sediment from Wet Pond area outside of forebays

14.0 Soil Amendments

Typical Maintenance Items and Frequency for Soil Amendments

Frequency	Maintenance Items
During establishment, as needed (first year)	<ul style="list-style-type: none">• Inspect the site after storm event that exceeds 0.5 inches of rainfall.• Stabilize any bare or eroding areas in the contributing drainage area and the Soil Amendment area.• Water trees and shrubs planted in the Soil Amendment area. In general, water every 3 days for first month, and then weekly during the remainder of the first growing season (April - October), depending on rainfall.• Conduct weed and invasive plant control
Quarterly or after major storms (>1 inch of rainfall)	<ul style="list-style-type: none">• Repair eroded and bare soil areas• Conduct weed and invasive plant control

15.0 Proprietary Practices

In order to ensure effective and long-term performance of a Proprietary Practice, regular maintenance tasks and inspections are recommended. **All Proprietary Practices shall be inspected and maintained in accordance with the manufacturer's instructions and recommendations.**

16.0 Source Controls

The Delaware Nutrient Management Law requires any person who owns, leases, or otherwise controls 10 acres to which nutrients are applied to develop a nutrient management plan for those lands. Nutrient management plans must be updated every three years or when significant alterations to the nutrient application occurs. In addition the Law requires anyone who applies nutrients to lands or water in excess of 10 acres to have certification endorsed by the Delaware Nutrient Management Commission. **To receive nutrient management pollutant reduction performance credits, sites must fully comply with the requirements of the Delaware Nutrient Management Law through implementation of a nutrient management plan.**

The ability of Street Sweeping to measurably reduce pollutant loadings is highly dependent on its frequency. The assumption is that there is a nitrogen, phosphorus, and sediment reduction when the same section of a street is swept approximately every two weeks, or 25 times a year. When a street is swept periodically and less than every two weeks, the accumulated matter can be mobilized and moved into the stream system with any rainfall.

17.0 Afforestation

Typical Maintenance Items and Frequency for Afforestation

Frequency	Maintenance Items
During establishment, Year 1	<ul style="list-style-type: none"> • Conduct weed and invasive plant control prior to planting • Mow once during first year; twice second year • Assess monthly for watering need during growing season • Assess survivability during September 1 – September 30 • Perform reinforcement planting the following Spring if survival rate falls below 65%
Year 2	<ul style="list-style-type: none"> • Mow twice to control weeds and competing undergrowth • Assess to determine if target 200 live trees per acre 6” or higher has been achieved • Perform reinforcement planting the following Spring if target has not been met
Annually, after Year 2	<ul style="list-style-type: none"> • Mow as needed to control weeds and competing undergrowth • Control invasive plants using appropriate methods
Year 7	<ul style="list-style-type: none"> • Assess to determine if target 100 trees per acre with 50% having 2” DBH has been achieved • If target has not been met, use adaptive management techniques to maximize survivability of existing trees and add reinforcement plantings as needed
Year 15	<ul style="list-style-type: none"> • Assess to determine if target 100 trees per acre with 2” DBH has been achieved • If target has not been met, re-evaluate afforestation plan and adjust as needed

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Maintenance Review Checklists

NOTE: Fillable PDF Forms are available for all Maintenance Review Checklists.
Contact DNREC, Sediment & Stormwater Program for additional information.

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1.0 Infiltration Practices

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Basin
- Trench
- Other _____

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
Control of erosion				
Upland drainage area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Trench basin area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
BMP outlet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
BMP bottom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Other Notes:

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
Control of sediment accumulation				
Forebay /Pretreatment inlet areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Forebay /Pretreatment inlet pipes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Trench/Basin area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Condition of the riprap at BMP outlet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Other Notes:

Noxious weeds/unwanted trees

Notes

None

Phragmites

% coverage _____

Cattail

% coverage _____

Trees

% coverage _____

Other

% coverage _____

Other Notes:

Trash & litter in BMP?

No

Yes (where):

Is seeding required?

No

Yes (where):

Is the mowing height too low?

No

Yes (where):

Recommended mowing height _____

Forebay /Pretreatment area trapping sediment?

No

Yes

Forebay >50% of storage volume remaining?

No

Yes

Surface of aggregate clean?

No

Yes

Trench dewater between storms?

No

Yes

Undetermined

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

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2.0 Bioretention

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Traditional Bioretention
- In-Situ (Rain Garden)
- Stormwater Planter
- Other: _____

Configuration:

- Underdrain
- Infiltrating

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Drainage Area to Bioretention Cell				
Control of Trash / Debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition of Vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Control of Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition of Inflow Pipes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition of Outlet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition of Underdrain and Cleanouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of the Pretreatment Practices				
Stone Diaphragm Level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Stone Diaphragm clogged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Grass filter Strip Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Evidence of Short Circuiting, rills/gullies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

Trash & litter in BMP

- No
- Yes (where):

Plant composition according to plans

- No
- Yes
- Undetermined

Additional Plantings required

- No
- Yes (where):

Mulched as per the Plan?

- No
- Yes

Ponding more than 2 days after rain

- No
- Yes
- Undetermined

Other Notes:

Note: A qualified professional must treat disease plants. Deficient stakes or wires must be replaced. Dead plants or plants beyond treatment must be replaced by plants meeting original specifications. New plants must be watered every day for the first 14 days after planting

Noxious weeds/unwanted trees

Notes

- None
- Phragmites % coverage _____
- Cattail % coverage _____
- Trees % coverage _____
- Other % coverage _____

Other Notes:

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

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3.0 Permeable Pavement Systems

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Porous Asphalt
- Pervious Concrete
- Interlocking Concrete Pavers
- Concrete Grid Pavers
- Plastic Grid Pavers

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Erosion and sedimentation				
Control of erosion entering permable surface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Stabilization of surrounding area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Control of sediment at pre-treatment cells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
General condition of surface due to sweeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Control/Condition of Vegetation				
Vegetation control for non-vegetated practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition of vegetation for vegetated practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Grass filter strip erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Underdrains and cleanouts (if applicable)				
Evidence of subsurface clogging? _____				
Condition of observation ports and observations of ponding water: _____				

• Overflow (if applicable)				
Type of device: _____				
Condition of device: _____				

Other Observations:

Check each box below that applies and provide observations for each.

Evidence of:

- Sealing products applied to the permeable surface
- Power washing
- Storage of materials on the surface, ie, soils, plowed snow, sand, mulch
- Any type of construction staging on the surface
- Re-surfacing over the permeable surface
- General wear of the surface
- Areas of water ponding
- Excessive petroleum products
- Other _____

Other Observations:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
Overall BMP Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Required Corrective Action(s) Compiled from the notes within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

4.0 Vegetated Roofs

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Shallow growing (Extensive)
- Deep growing (Intensive)

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Roof Drains				
Control of organic deposits in drains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Gutters are clear of debris/trash/overgrowth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Vegetation				
General condition of plantings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Control of weeds/invasive species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Plant composition consistent with the Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Soil media depth consistent with the Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Roof Membrane				
Evidence of subsurface clogging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

5.0 Rainwater Harvesting

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Seasonal System
- Continuous Use
- Other: _____

Location:

- Above ground
- Below ground

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

Nature of Problem

Good

Fair

Poor

Notes

• Rooftop conveyance				
Conveyance free of debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition of gutters/downspouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Integrity of the tank top, spigots, screens, and vents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
General integrity of the tank, pump, pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

- Sediment in tank (if accessible) _____
- Presence of overhanging trees over the rooftop _____

Other Notes:

These proprietary systems generally require a qualified inspector as determined by the manufacturer. The following observations compile the limitations of this review. The owner is responsible for the system maintenance review of all the components conducted at the frequency prescribed by the manufacturer. The maintenance review conducted by a qualified inspector must be submitted to the local Delegated Agency and/or DNREC.

Observations:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
Overall BMP Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Required Corrective Action(s) Compiled from the notes within the report: The observations section cites the limits of this maintenance review.

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

7.0 Rooftop Disconnection

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____



<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Erosion control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Condition of vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Control of compaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

- Seeding Required?
 - No
 - Yes (where)

- Ponding evident in the infiltration/filtration area?
 - No
 - Yes (where)

- Unauthorized impervious area located inside the rooftop disconnection BMP?
 - No
 - Yes (where)

Additional Notes:

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes and observations within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

8.0 Vegetated Channels

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Bioswale
- Grassed Channel

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____



<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Erosion Control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Condition of Vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

- Seeding Required?
 - No
 - Yes (where): _____Recommended species: _____
- Ponding evident in channel?
 - No
 - Yes (where): _____
- Presence of Trash/debris?
 - No
 - Yes (where): _____

- Mowing height too low?
 No
 Yes (where): _____
Recommended mowing height: _____

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes and observations within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

- Mowing height too low?

No

Yes (where): _____

Recommended mowing height: _____

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
Overall BMP Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Required Corrective Action(s) Compiled from the notes and observations within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

10.0 Detention Practices

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Dry Detention Pond
- Dry Extended Detention Pond
- Underground Detention Facility

Pond Code 378 Type:

- Embankment
- Combination
- Excavated
- N/A

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Access				
Min. 10' access to facility (condition)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Access to inlets/outlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Sediment set aside area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of erosion				
Top of slope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Side slope and buffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Inlet structures or channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Outlet channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Emergency spillway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of sediment accumulation				
Pond bottom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Forebay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Inlet structures or channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Outlet structures or channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Side slope and buffers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of riprap				
Outlet channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Inlet channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Concrete riser and trash rack (if applicable)				
Spalling/Cracking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Exposed reinforcing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Debris deposit on trash rack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Metal riser and trash rack (if applicable)				
Rusting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Leaking joint(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Debris deposit on trash rack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

Trash & litter in BMP

- No
- Yes (where):

Additional vegetative stabilization needed

- No
- Yes (where):

Animal burrows or trees creating potential stability problems

- No
- Yes (where):

Buffer being maintained (if applicable)

- No
- Yes

Other Notes:

- Noxious weeds/unwanted trees

Notes

- None
- Phragmites % coverage _____
- Cattail % coverage _____
- Trees % coverage _____
- Other % coverage _____

Other Notes:

Embankment Ponds Only

- Condition of embankment

Notes

- No issues
- Longitudinal cracks _____
- Transverse cracks _____
- Local depression or bulges _____
- Settlement _____
- Misalignment _____
- Seepage at toe of slope _____
- Boils at toe of slope _____

Other Notes:

Underground Detention Practices Only

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Access				
Manholes/Catch basins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Access to upstream catch basins/manholes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Sediment/trash/debris accumulation				
Catch basin(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Manhole(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Isolator row or similar structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Accumulation in observation ports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

- Structural issues related to catch basin/weir, manhole, chambers,headers or observation ports

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

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11.0 Stormwater Filtering Systems

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Non-Structural Sand Filter
- Surface Sand Filter
- 3 Chamber Underground Sand Filter
- Perimeter (inc. Delaware Modular) Sand Filter

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
<ul style="list-style-type: none"> • Erosion control 				
Drainage area to sand filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> • Control of sediment accumulation 				
Outlet/overflow spillway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> • Control of trash & litter in BMP 				
<input type="checkbox"/> No				
<input type="checkbox"/> Yes (where):				

Other Notes:

Sedimentation Chamber

Water at normal pool level
 No Observations: _____
 Yes

Evidence of cracks or spawls?
 No
 Yes Observations: _____

Depth of sediment is _____ (Maintenance if > 1/2 full) Maintenance required?
 No
 Yes Observations: _____

Evidence of mosquito breeding?

No

Yes Observations: _____

Grates need replacement?

No

Yes Observations: _____

Sand Bed

Depth of sand discoloration _____

Evidence of clogging?

No

Yes (where): _____

Oil or grease present?

No

Yes (where): _____

Ponded water on sand bed?

No

Yes (where): _____

Cracks or spalls present?

No

Yes (where): _____

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
Overall BMP Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Required Corrective Action(s) Compiled from the notes and observations within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

12.0 Constructed Wetlands

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Traditional Constructed Wetland
- Wetland Swale
- Ephemeral Constructed Wetland
- Submerged Gravel Wetland

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

Nature of Problem

Good

Fair

Poor

Notes

- Inlets and drainage area stabilization

Condition of inlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Control of erosion in drainage area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Control of trash/debris accumulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Other Notes:

- Structural components (if applicable)

Condition of outlet/overflow device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Control of trash/debris accumulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Facility function				
Condition of vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Control of surface erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Control of trash/debris accumulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
General appearance of the water level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
Overall BMP Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Required Corrective Action(s) Compiled from the notes and observations within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

13.0 Wet Ponds

Project ID _____ County _____

Site name: _____

General Location of BMP _____

Ownership:

- Private
- Public

BMP Variant:

- Wet Quantity Management Pond
- Wet Extended Detention Pond

Pond Code 378 Type:

- Embankement
- Combination
- Excavated

Type of Site:

- Residential
- Commercial
- Industrial
- State

Other site notes:

Review date _____ Review time _____ Reviewer _____

Post Construction Verification Docs available: Y N Date of last review _____

<u>Nature of Problem</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Access				
Min. 10' access to facility (condition)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Access to inlets/outlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Sediment set aside area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of erosion				
Top of slope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Side slope and buffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Inlet structures or channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Outlet channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Emergency spillway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of sediment accumulation				
Pond bottom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Forebay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Inlet structures or channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Outlet structures or channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Side slope and buffers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Notes</u>
• Control of riprap				
Outlet channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Inlet channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Concrete riser and trash rack (if applicable)				
Spalling/Cracking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Exposed reinforcing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Debris deposit on trash rack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
• Metal riser and trash rack (if applicable)				
Rusting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Leaking joint(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Debris deposit on trash rack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other Notes:

Trash & litter in BMP

- No
- Yes (where):

Additional vegetative stabilization needed

- No
- Yes (where):

Animal burrows or trees creating potential stability problems

- No
- Yes (where):

Buffer being maintained (if applicable)

- No
- Yes

Other Notes:

- Noxious weeds/unwanted trees

Notes

- None
- Phragmites % coverage _____
- Cattail % coverage _____
- Trees % coverage _____
- Other % coverage _____

Other Notes:

Embankment Ponds Only

- Condition of embankment

Notes

- No Issues
- Transverse cracks _____
- Local depression or bulges _____
- Settlement _____
- Misalignment _____
- Seepate at toe of slope _____
- Boils at toe of slope _____

Other Notes:

Overall BMP Condition Good Fair Poor

Required Corrective Action(s) Compiled from the notes within the report:

Action To Be Completed By (Date): _____

Reviewer's Signature: _____

