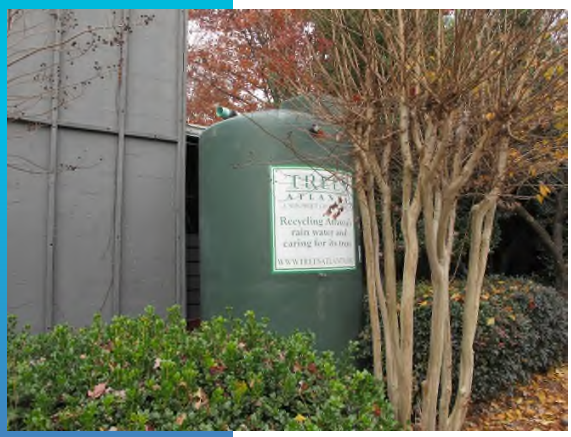
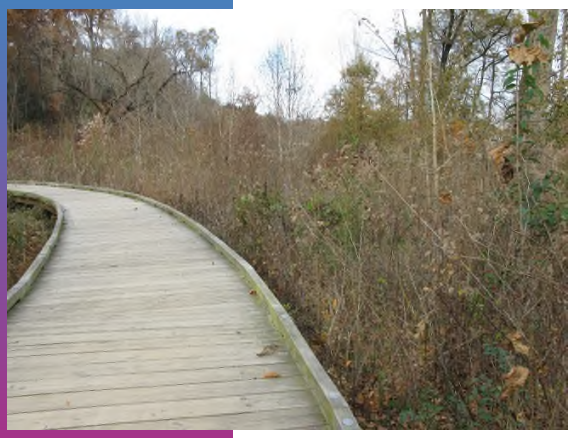
Operations & Maintenance Guidance Document





Georgia Stormwater Management Manual
Appendix E

Sponsored by:
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Table of Contents

Introduction

The purpose of this Operation and Maintenance (O&M) Guidance Document is to define a Stormwater Best Management Practice (also called a BMP or a practice), explain the importance of BMPs, show the components of a typical BMP, and offer direction and information to keep the practice operational.

BMPs are structural practices designed to store or treat stormwater runoff to prevent or reduce pollution from entering surface waters in the State of Georgia. They improve water quality by treating, detaining, and retaining stormwater runoff. Detaining water is accomplished by creating a basin that holds the water for a short period of time to allow some of the water to exfiltrate into the ground and the remainder of the water to release slowly over a period of time. Retaining stormwater is similar to detaining stormwater; however, the difference is the length of time the water is held. Retaining the water extends the period of time the water is held.

In order for a BMP to work properly, it must be maintained. BMPs generally require annual inspections, but more frequent routine inspections, such as after major storm events, may be required based on the site conditions, past maintenance issues, or risk associated with safety due to non-performance of a structure. The key to the long-term success of a BMP is routine inspection and maintenance.

Why are BMPs important?

When an area is being developed, the property or portions of the property often change from grassed or wooded areas to paved areas. Grassed or wooded areas are pervious, which means that rainwater can infiltrate into the ground. Paved areas, on the other hand, are impervious, which means that rainwater cannot infiltrate into the ground. Because impervious areas cannot infiltrate water, increasing the amount of impervious area during development results in higher volumes of stormwater runoff. This can cause flooding and stormwater pollution, if not controlled through BMPs or other stormwater control measures. BMPs designed to retain or infiltrate stormwater help recharge the ground water and create a pervious area for the stormwater to infiltrate in the ground that has otherwise been altered by development. BMPs can also help reduce erosion and habitat loss in streams caused by excessive runoff and can reduce flooding and potentially make areas that are prone to flooding safer.

In addition, BMPs improve the quality of stormwater runoff from developed areas by removing pollutants that can contaminate the surrounding streams, rivers, lakes, etc. which, in turn, may contaminate our drinking water and food. Building BMPs in new developments, small business parks, or an individual residential lot or residential subdivisions, provides opportunities to remove the pollutants generated by the development. Example stormwater pollutants include sediment, excess nutrients, trash, fecal coliform, and metals.

An operational BMP will include some variation of the following components as shown in Figure 1.

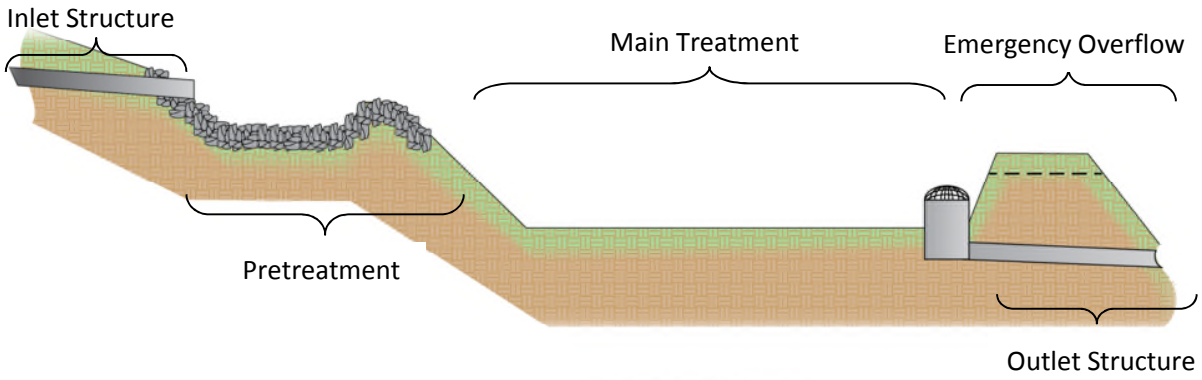

Figure 1 – Components of a BMP

The purpose and function of the main components of a BMP are described below:

- **Inlet structure** – This component brings water into the practice. The picture to the right shows an example of an inlet structure. Another example of an inlet structure would be a catch basin.
- **Pretreatment** – Pretreatment is designed to act as the first layer of protection for the main treatment area. Protection is provided by removing debris and coarse sediment, which reduces the frequency of clogging in the main treatment area. The pretreatment area is designed to be somewhat sacrificial so that it can be cleaned (or even replaced) before the main treatment area of the practice. This provides two maintenance benefits: ease of maintenance and less cost to maintain. Because of this, maintenance on this section is critical. The picture to the left shows a forebay, a type of pretreatment device. Other types of pretreatment devices include filter strips or grassy areas, grass channels, or rock lined plunge pools.

- **Main treatment** – The main treatment area is where the majority of the stormwater treatment takes place by removing sediment, nutrients, pollutants, etc. It is also the area where stormwater is contained, either through detention or retention, so that the water can be discharged at a controlled rate. Therefore, it is important that this section is routinely inspected and maintained to ensure the practice is functioning properly. The picture to the right shows an example of the main treatment area of a dry enhanced swale. Main treatment areas treat stormwater runoff through different methods including vegetated conveyance, infiltration, filtration, and settling. For example, the main treatment area of a pond treats stormwater runoff primarily through settling, and the main treatment area of a sand filter treats runoff through filtration. Specific maintenance concerns within a treatment area are

based on the method of treatment in a BMP. Examples of specific maintenance concerns for each treatment method include the following:

- Vegetated Conveyance – Erosion
- Infiltration – Media clogging and clogging the underdrain
- Filtration – Media clogging and clogging the underdrain
- Settling – Excessive sediment, embankment failure, and debris or other issues at the outlet structure.

- **Emergency overflow** – An emergency overflow is necessary for rain events that are larger than the practice was designed to treat. This component will keep the area surrounding the practice from flooding by allowing water to continue to flow into a nearby drainage system or water body. Usually an emergency overflow is an elevated grass or paved channel that provides a way for stormwater to leave the BMP in an extreme rain event. It should be noted that other types of emergency overflow exist, and sometimes the emergency overflow and outflow structure can be combined.

- **Outlet structure** –The outlet structure allows treated water to exit the practice. It is important that this component has regular maintenance because if the outlet structure is clogged, flooding will occur within the practice. The picture on the right shows an example of an outlet structure. Other examples of outlet structures include open pipes and underdrains.

Importance of Inspection

Once the BMP is built, routine inspection is very important to keep the practice working properly and catch potential problems before they become major problems (such as financial problems, legal problems, or both). Another benefit of routine inspection is it allows you to see the area surrounding the site and observe possible pollutants. For example, inspecting a BMP provides the opportunity to discover an unstable or eroding area upstream of the BMP that may be providing excessive sediment to the BMP, which could clog the practice quickly.

Items to check during routine inspections include, but are not limited to, the following:

- Structural problems
- Excessive ponding
- Unhealthy or undesirable vegetation
- Erosion
- Stability of the surrounding ground
- Clogging in the inlet or outlet structures or practice (from sediment, debris, or animals)
- Deterioration of pipes (or observation wells)

- New pollutant sources
- Infiltration rate by completing soil testing
- Monitoring water levels in observation wells

Some BMPs require an underground system, making inspection difficult to conduct. Generally these underground systems can be inspected by looking in the observation well. Sometimes, however, maintenance requires an individual who is certified in Occupational Safety and Health Administration (OSHA) confined space entry. Should there be a situation where a safety concern arises, the inspection should stop and the safety concern addressed. Once the concern is addressed, the inspection can continue. Signs indicating a potential maintenance problem with the underground system include the following:

- Ponding water or water remaining in the observation well longer than the design time
- Excessive sediment built up
- Damage to the structure through compaction or settling

Maintenance Agreements

Oftentimes BMPs are covered by a maintenance agreement between the owner and local city or county or other jurisdiction. Be sure to follow these maintenance requirements for the practice. This guidance document provides helpful maintenance tips; however, the maintenance performed on the practice has to meet the written standards and specifications in the maintenance agreement.

General Maintenance

Proper maintenance of each BMP is important to make sure the components of the BMP are operating and functioning the way the practice was designed to work. In other words, if the structure is not properly working, this could lead to the release of sediment, debris, and potential pollutants to a receiving water. Generally, maintenance for each practice includes:

- Removing built up sediment, debris, or trash within the practice
- Removing debris from the inflow and outflow structure of the practice
- Implementing erosion and sediment control practices on portions of the BMP where vegetation is missing or in poor condition, replace vegetation
- Inspecting the BMPs regularly to ensure the structural integrity and functionality of the BMP
- Replacing the filter media (as needed)

Before and after photos are recommended as proof that maintenance has been performed.

Vegetation Maintenance

Many BMPs include vegetation within or around the practice. Vegetation is an important part of the practice and aids infiltration and filtration. In addition, vegetation keeps the soil from eroding and washing into nearby drainage systems and water bodies. Finally, planting vegetation gives the area an additional aesthetic value. General vegetation maintenance includes:

- Irrigating and weeding during the first few months to establish the vegetation
- Maintaining the vegetation to ensure the health and abundance of native species and plantings
- Mowing, trimming, or pruning annually to prevent unwanted plants from growing in the practice
- Removing grass clippings or dead leaves from the practice to prevent clogging
- Minimize use of fertilizers and herbicides

When to Call a Professional

It is unlikely that a lawn care (or similar) company will know how to properly inspect or maintain a BMP. Therefore, a qualified licensed professional is recommended to perform inspections and maintain the practice. Sources for potential assistance include the following:

- Local stormwater authority
- Professional Engineer
- Landscape architect
- Extension service office

If it is decided that a licensed professional is not required to perform routine inspection and maintenance, there are times where one will be necessary for major problems. Examples of when to call a licensed professional include, but are not limited to, the following:

- Significant damage to the structure
- Significant sediment build-up
- Excessive ponding of water
- Abnormal odor
- Signs of water seepage on the downstream side of a dam
- Excessive erosion
- Signs of pollutants other than sediment, such as chemical spills

Additional Resources

Although most BMPs are similar in that they improve water quality or control quantity, they differ through site conditions, purpose, and function. Even two of the same type of BMP may require different maintenance due to site conditions. BMPS are designed to remove pollutants from stormwater which means they must be cleaned out periodically or they will cease to function. Since each BMP is unique there

is no “one size fits all” approach to maintaining them. Some BMPs may also have more complicated maintenance requirements that require special skills, tools, or equipment. When in doubt about the proper way to test and maintain a BMP the owner should seek additional assistance.

The following is a list of suggested resources for inspection and maintenance of a BMP:

- Georgia Stormwater Management Manual, Volumes 1 and 2
- Georgia Department of Transportation Stormwater System Inspection and Maintenance Manual
- Louisville Kentucky Metropolitan Sewer District Design Manual (Chapter 18.7)
- City of Philadelphia Green Stormwater Infrastructure Maintenance Manual
- North Carolina Division of Energy, Mineral and Land Resources Stormwater BMP Manual and BMP Forms
- West Virginia Stormwater Manual
- Post Construction Manual Managing Stormwater in Your Community
- Local stormwater authority
- Local Cooperative Extension Service office
- Manufacturer’s Guidelines (if applicable)

Within individual sections of this document, there may be references to certain tests such as soil infiltration and pH testing. It is recommended that testing for infiltration or pH be performed periodically on certain BMPs. In those cases it is recommended that a professional is consulted to ensure that the proper test is being performed in accordance with accepted procedures. The following is a list of suggestions for finding a professional:

- Local stormwater authority
- Local Cooperative Extension Service office
- Local Professional Engineer
- US Department of Agriculture Natural Resources Conservation Service

Bioretention Areas

A bioretention area is a shallow stormwater basin or landscaped area with well-draining soils, generally composed of sand, fines, and organic matter, and vegetation to capture and treat stormwater runoff. The basin or main treatment area of the bioretention area includes plants to aid in the filtration and infiltration of the stormwater flowing through the practice. An underdrain may be placed in the bioretention area to collect runoff that has filtered through the soil layers and pipe it to the storm sewer system or a nearby water body.

There are some common problems to be aware of when maintaining a bioretention area. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Establishing vegetation within the bioretention area
- Clogging the underdrain (if applicable)
- Mosquitoes breeding in the practice
- Ant mounds
- Maintaining the proper pH levels for plants
- Pruning and weeding to maintain appearance

Routine maintenance should be performed on the bioretention areas to ensure that the structure is functioning properly. Note that during the first year the bioretention area is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice.

In addition to routine maintenance, bioretention areas have seasonal and intermittent maintenance requirements. For example, the following are maintenance activities and concerns specific to winter months. Planting material should be trimmed during the winter, when the plants are dormant. In the event of snow, ensure that snow does not pile up in the bioretention area. Accumulated snow adds additional weight and may compact the bioretention area soil, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

Bioretention areas should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate into the ground. Note that it might take longer for the water to infiltrate into the ground during the winter months and early spring. Mulch the practice

as needed to keep a thickness of 3-4 inches. Shredded hardwood mulch is preferred, and care should be taken to keep the mulch from piling on the stems of the plants. For more information on vegetation in bioretention areas, see Appendix D: Planting and Soil Guidance.

If the bioretention area is not draining properly, check for clogging of the inflow and outflow structures as well as the infiltration rate of the soil media. If the soil is not draining properly, it could be clogged or over-compacted. In a bioretention area, the media is likely to become clogged at the mulch or upper layer of the soil first. If the media is clogged or over-compacted, then the media should be replaced. Potential sources of excessive sediment that could clog the media include ant mounds and unstable soil upstream of the practice. Possible sources of compaction are vehicles, such as tractors, traveling through the practice. If the practice includes an underdrain, a structural repair or cleanout to unclog the underdrain may be necessary.

In order to keep the water that exits the bioretention area clean, fertilizers should only be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the bioretention area is important, the primary purpose of a bioretention area is to act as a water quality device and introducing fertilizers into the bioretention area introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, bioretention areas should already be a nutrient rich environment that does not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

If designed correctly, there is no danger of bioretention areas becoming a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the larvae to develop and become an adult. By having a bioretention area that drains properly, it is unlikely that a bioretention area would provide a habitat that could become a breeding area for mosquitoes. Should the bioretention area become a breeding ground for mosquitoes, the problem is likely with the soil media or the overflow structure which may need to be addressed.

The table below shows a schedule for when different maintenance activities should be performed on the bioretention area.

Bioretention Area Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Prune and weed to maintain appearance. • Dissipate flow when erosion is evident. • Remove trash and debris. • Remove sediment and debris from inlets and outlets. • Remove and replace dead or damaged plants. • Mow around the bioretention area as necessary, ensuring grass clippings are not placed in the practice. • Observe infiltration rates after rain events. Bioretention areas should have no standing water within 24 hours of a storm event. • Inspect for evidence of animal activity.	As needed or 4 times during growing season

Activity	Schedule
• Inspect for erosion, rills, or gullies and repair. • Inspect filter strip/grass channel for erosion or gullying, if applicable. Re-seed or sod as necessary. • Inspect trees and shrubs to evaluate their health, and remove and replace any dead or severely diseased vegetation. • Obtain a mulch depth of at least 3 to 4 inches should be inspected and obtained. Additional mulch should be added as necessary.	Semi-annually in spring and fall
• Trim planting material. • Inspect for snow accumulation.	As needed or during winter months
• Test the planting soils for pH levels. Consult with a qualified licensed Professional to determine and maintain the proper pH levels.	Annually
• Replace/repair inlets, outlets, scour protection or other structures as needed. • Implement plant maintenance plan to trim and divide perennials to prevent overcrowding and stress. • Check soil infiltration rates to ensure the bioretention area soil is draining the water at a proper rate. Re-aerate or replace soil and mulch layers as needed to achieve infiltration rate of at least 0.5 inches per hour.	2 to 3 years

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Bioretention Area					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment.					
Weir – area is free of trash, debris, and sediment is less than 25% of the total depth of the weir.					
Filter Strip or Grass Channels – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Rock Lined Plunge Pools – area is free of trash debris and sediment. Rock thickness in pool is adequate.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					

Bioretention Area					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Mulching depth of 3-4 inches is maintained. Comment on mulch depth.					
Native plants were used in the practice according to the planting plan.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Results					
Overall condition of Bioretention Area:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Bioslopes

Bioslopes are linear BMPs with a permeable media that allows stormwater runoff to infiltrate and filter through the practice before exiting through an underdrain. High flows bypass the bioslope in the form of sheet flow running over the bioslope. Generally, a filter strip is placed before the bioslope for pretreatment where it captures sediment and debris and prevents premature clogging of the bioslope. If the space available for the bioslope is limited, a grass shoulder or pea gravel diaphragm may be used as an alternate method of pretreatment.

There are some common problems to be aware of when maintaining a bioslope. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure as well as the underdrain
- Undesirable vegetation
- Erosion
- Mowing the grass filter strip
- Compaction

Typically bioslopes are indistinguishable from the surrounding areas, so it is recommended that GPS co-ordinates of the bioslope location be obtained and the BMP be staked with markers. If markers are used, they should be placed at both ends at the toe of the slope and every 50 feet.

Routine inspection and maintenance should be performed on the bioslope to ensure that the practice is functioning properly. Generally maintenance will consist of removing debris and trash that could accumulate on the practice and cause clogging. Other routine maintenance includes mowing the bioslope and removing grass clippings. Mowing and landscaping crews should be alerted not to access the bioslope during wet conditions to avoid damaging or rutting the area.

Inspect the bioslope after a large rainstorm. Keep drainage paths (both to and from the BMP) clean to promote sheet flow and allow stormwater runoff to be routed in the intended direction.

In addition to routine maintenance, bioslopes have seasonal and intermittent maintenance requirements. For example, during the winter months, the bioslope should be inspected after a snow event (this is specific to northern areas of Georgia). Accumulated snow adds additional weight and may compact the media, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further

pollution. Also, note that it might take longer for the water to infiltrate into the ground during the winter months and early spring.

If the bioslope is not draining properly, it may be necessary to repair or unclog the underdrain as well as the inflow and outflow structures. Another possible reason the bioslope is not draining properly could be due to clogged or over-compacted bioslope media. If the mix becomes clogged or over-compacted, then it should be replaced. The degree of required media removal and replacement can vary depending on the characteristics of the contributing drainage area and the consistency of regular maintenance. For example, it is likely that removal and replacement of the top two to five inches of media will be necessary every three to five years for low sediment applications. Media replacement may be needed more often for areas of high sediment yield or high oil and grease.

The table below shows a schedule for when different maintenance activities should be performed on the bioslopes.

Bioslope Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Clear debris in inlets and outlets. • Mow and stabilize the area surrounding the bioslope. Remove grass clippings. • Ensure that activities in the drainage area minimize oil/grease and sediment entry to the system. • Remove trash and debris.	As needed or 4 times during growing season
• Stabilize eroded areas on the bioslope. • Ensure that flow is not bypassing the facility. • Ensure that no noticeable odors are detected outside the facility. • Mow the bioslope grass using a retractable arm mower to avoid compaction. Grass height should be mowed to a height of 6 to 15 inches. Remove grass clippings.	Monthly
• Ensure that gravel spreader or other structural elements of the bioslope are in good condition and free of debris. • Test the permeability of the bioslope media using a hydraulic conductivity test. Replace the media as needed. • Flow test the cleanouts to look for signs indicating the underdrain system is clogged. • Evaluate sediment accumulation and remove once it reaches or exceeds a depth of 3 inches.	Annually

Bioslope					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet.					
Water is going through the bioslope (i.e. no evidence of water going around the BMP).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment					
Area is free of trash debris and sediment.					
Area has been mowed and grass clippings are removed. Grass seems healthy and there are no bare areas or dying grass.					
No evidence of erosion or gullies.					
Area is free of undesirable vegetation.					
No standing water in the practice.					
No sediment accumulation within in the pretreatment area.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
No evidence of erosion of gullies within the bioslope.					
No evidence of long-term ponding or standing water in the practice (examples include: stains, odors, mosquito larvae, etc).					
Practice seems to be working properly. No settling around the structure. Comment on overall condition of practice.					

Bioslope					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
No undesirable vegetation within the bioslope.					
Area has been mowed at a height of 6-15 inches. Grass clippings are removed.					
Cleanout caps for underdrain are not damaged or missing.					
Flow testing has been performed on bioslope to determine if underdrain is clogged.					
Observation well has no signs of standing water.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet pipe is not damaged or clogged and is in good condition.					
Results					
Overall condition of Bioslope:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Downspout Disconnects

A downspout disconnect is a method to spread rooftop runoff from individual downspouts across lawns and other pervious areas, where it is slowed, filtered and allowed to infiltrate into the native soils. Downspout disconnects can be used in conjunction with other BMPs such as bioretention areas, enhanced swales, and vegetated filter strips. If the downspout disconnect is used in conjunction with another BMP, then that BMP will need to be inspected and maintained as well.

Common problems that can occur when maintaining a downspout disconnect include, but are not limited to, the following:

- Clogged gutters or downspouts
- Loose gutters or downspouts
- Water not draining away from buildings
- Poorly draining soils
- Poorly functioning splash blocks
- Cracks within the downspout extension

Routine maintenance should be performed on the downspout disconnects to ensure that the practice is properly functioning to ensure that a water problem is not created for neighbors. Ensure that there is no erosion occurring at the base of the downspout. Other specific maintenance items depend on where the downspout has been disconnected from the storm or sanitary sewer and where the flow has been redirected.

Inspect the downspout disconnect after a large rainstorm. Make sure that there is no evidence of a leak in the gutters or downspouts, and ensure that rooftop runoff is directed through the system. During the winter months, downspouts should be inspected for cracks caused by water freezing in the downspout.

The table below shows a schedule for when different maintenance activities should be performed routine maintenance activities typically associated with downspout disconnects.

Downspout Disconnect Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Pervious areas located below simple downspout disconnections should be watered to promote plant growth and survival. • Inspect the pervious areas located below simple downspout disconnections following rainfall events. Plant replacement vegetation in any eroded areas.	As Needed (Following Construction)

Activity	Schedule
• Inspect pervious area located below simple downspout disconnection. Maintain vegetation (e.g., mow, prune, trim) as needed. • Remove accumulated trash and debris in pervious area located below the simple downspout disconnection.	Regularly (Monthly)
• Inspect gutters and downspouts. Remove any accumulated leaves or debris. • Inspect the pervious areas located below simple downspout disconnections for erosion and the formation of rills and gullies. Plant replacement vegetation in any eroded areas. • Inspect the pervious areas located below simple downspout disconnections for dead or dying vegetation. Plant replacement vegetation as needed.	Annually (Semi-Annually During First Year)

Downspout Disconnects

Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Access to the site is adequately maintained for inspection and maintenance.					
Gutters are clean. No sediment, debris, or trash to clog the system.					
Downspouts are properly fastened to convey water from the roof.					
Downspouts are free of trash, debris, and sediment and conveying water properly.					
No evidence of leaks at joints or other components of downspouts.					
Erosion control mats are present on site to prevent erosion on pervious area below downspout disconnects.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Vegetation is in place and is healthy. No bare or dying areas.					
Unwanted vegetation is trimmed and removed.					
No evidence of erosion, scour, or flooding.					
Results					
Overall condition of Downspout Disconnects:					
Additional Comments					

Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.

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Dry Detention Basins

A dry detention basin is a storage basin designed to provide water quantity control through detention of stormwater runoff. The purpose of detention is to allow some of the water to exfiltrate into the ground and the remainder of the water to release slowly over a period of time to reduce downstream water quantity impacts. Dry detention basins are designed to completely drain following a storm event and are normally dry between rain events. They provide limited pollutant removal benefits and are not intended for water quality treatment alone.

There are some common problems to be aware of when maintaining a dry detention basin. They include, but are not limited to, the following:

- Sediment build-up
- Trash, litter, and debris accumulation
- Clogging and structural repairs in the inlet and outlet structures
- Establishing vegetation within the dry detention basin
- Erosion
- Mowers compacting and rutting the basin bottom
- Mosquitoes breeding in the practice
- Ant mounds

Routine maintenance should be performed on the dry detention basins to ensure that the structure is properly functioning. Note that during the first year the dry detention basin is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice. In the event of snow, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

Dry detention basins should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate into the ground. Note that it might take longer for the water to infiltrate into the ground during the winter months and early spring. If the dry detention basin is not draining properly, check for clogging of the inflow and outflow structures.

If the forebay or dry detention basin has received a significant amount of sediment over a period of time, then the sediment at the bottom of the forebay or dry detention basin may need to be removed. Accumulated sediment in the practice decreases the available storage volume and affects the basin's ability to function as it was designed.

If designed and maintained correctly, dry detention basins should not become a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the egg to develop and become an adult. By having a dry detention basin that drains properly, it is unlikely that a dry detention basin would provide a habitat that could become a breeding area for mosquitoes. Should the dry detention basin become a breeding ground for mosquitoes, the problem is likely with the overflow structure which may need to be addressed.

The table below shows a schedule for when different maintenance activities should be performed on the dry detention basins.

Dry Detention Basin Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Remove debris from basin surface to minimize outlet clogging and improve aesthetics. • Note erosion of detention basin banks or bottom • Inspect for damage to the embankment. • Monitor for sediment accumulation in the facility and forebay. • Examine to ensure that inlet and outlet devices are free of debris and operational.	Annually and following significant storm events
• Remove sediment buildup. • Repair and revegetate undercut and/or eroded areas. • Perform structural repairs to inlet and outlets. • Repair undercut or eroded areas. • Mow side slopes. • Seed or sod to restore dead or damaged ground cover.	As needed based on inspection
• Mow to limit unwanted vegetation. • Litter/ Debris Removal.	Routine

Dry Detention Basin					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Inlet pipe is in good condition and is not clogged.					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (forebay)					
Area is free of trash, debris, and sediment.					
Sediment accumulation is less than 50% of the forebay volume.					
No undesirable vegetation within the forebay. Weeds are removed to prevent clogging.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc.).					

Dry Detention Basin

Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Basin seems to be working properly. No settling around the basin. Comment on overall condition of basin.					
Vegetation within and around practice is maintained. Grass clippings are removed.					
Sediment accumulation within dry detention basin is less than 3 inches.					
No standing water within the basin.					
No evidence of use of fertilizer on grass (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
No shrubs or trees growing on embankment.					
No signs of seepage on the downstream face.					
No signs of animal activity.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
All moveable components are operational.					
Results					
Overall condition of Dry Detention Basin:					
Additional Comments					

Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.

Dry Enhanced Swales/Wet Enhanced Swales

An enhanced swale is a vegetated open channel designed to capture and treat stormwater runoff within dry or wet cells formed by check dams or other means. Enhanced swales are generally shallow, wide, and vegetated to help slow and filter stormwater runoff.

There are two different types of enhanced swales. The first is a dry swale which includes a filter bed of prepared soil that overlays an underdrain system. They are designed to let stormwater be filtered or infiltrated through the bottom of the swale. Because they are dry most of the time, they are often the preferred option in residential settings. The second type of enhanced swale is a wet swale. Wet swales are designed to retain water or marshy conditions that support wetland vegetation. Because this practice is meant to retain water, they are generally used in areas with a high water table or poorly drained soils. Wet swales achieve pollutant removal both from sediment accumulation and biological removal.

There are some common problems to be aware of when maintaining an enhanced swale. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Establishing vegetation
- Clogging in the underdrain (if applicable)
- Mosquitoes breeding in the practice
- Ant mounds
- Maintaining the proper pH levels for plants
- Pruning and weeding to maintain appearance

Routine inspection and maintenance should be performed on the dry or wet enhanced swale to ensure that the practice is properly functioning. Note that during the first year the enhanced swale is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice. For more information on vegetation within a swale, see Appendix D: Planting and Soil Guidance. Enhanced swales should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly flow in and out of the practice.

In addition to routine maintenance, dry or wet enhanced swales have seasonal and intermittent maintenance requirements. For example, during the winter months, the enhanced swale should be inspected after a snow event (this is specific to northern areas of Georgia). Accumulated snow adds

additional weight and may compact the dry enhanced swale soil, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution. Note that it might take longer for the water to infiltrate into the ground during the winter months and early spring.

If the dry enhanced swale is not draining properly, check for clogging in the inflow and outflow structures. Another consideration would be the permeable soil layer, which could be clogged or over-compacted. In a dry enhanced swale, the media is likely to become clogged at the upper layer of the soil first. Potential sources of excessive sediment that could clog the media include ant mounds and unstable soil upstream of the practice. Possible sources of compaction are vehicles, such as tractors, traveling through the practice. If the media is clogged or over-compacted, then the media should be replaced. If the practice includes an underdrain, a structural repair or cleanout to unclog the underdrain may be necessary.

In order to keep the water that exits the dry or wet enhanced swale clean, fertilizers should only be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the enhanced swale is important, the primary purpose of an enhanced swale is to act as a water quality device, and introducing fertilizers into the enhanced swale introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, enhanced swales should already be nutrient rich environments that do not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

If designed and maintained correctly, there is no danger of dry enhanced swales becoming a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the egg to develop and become an adult. By having a dry enhanced swale that drains properly (within 24-48 hours), it is unlikely that a dry enhanced swale would provide a habitat that could become a breeding area for mosquitoes. Should the dry enhanced swale become a breeding ground for mosquitoes, the problem is likely with the soil media or the overflow structure which may need to be addressed.

The table below shows a schedule for when different maintenance activities should be performed on an enhanced swale.

Enhanced Swale Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Prune and weed to maintain appearance. • Dissipate flow when erosion is evident. • Remove trash and debris. • Remove sediment and debris from inlets and outlets. • Remove sediment build-up within the bottom of the swale once it has accumulated to 25% of the original design volume. • Remove and replace dead or damaged plants.	As needed or 4 times during growing season

Activity	Schedule
• Mow the dry enhanced swale as necessary to maintain a grass height of 4-6 inches, ensuring grass clippings are not placed in the practice. • Observe infiltration rates after rain events. Dry enhanced swales should have no standing water within 48 hours of a storm event (though 24 hours is more desirable). • Inspect for evidence of animal activity.	
• Inspect for erosion, rills, or gullies and repair. • Replant wetland species (for wet swale) if not sufficiently established. • Test the planting soils for pH levels. Consult with a qualified licensed Professional to determine and maintain the proper pH levels. • Inspect pea gravel diaphragm for clogging.	Annually (Semi-annually the first year)
• Trim planting material. • Inspect for snow accumulation.	As needed or during winter months
• Replace/repair inlets, outlets, scour protection or other structures as needed. • Implement plant maintenance plan to trim and divide perennials to prevent overcrowding and stress. • Check soil infiltration rates to ensure the dry enhanced swale soil is draining the water at a proper rate. Roto-till or cultivate the surface of the sand/soil bed of dry swales if the swale does not draw down within 48 hours.	2 to 3 years

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Dry Enhanced Swale/Wet Enhanced Swale					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed (for dry enhanced swale).					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment.					
Weir – area is free of trash, debris, and sediment is less than 25% of the total depth of the weir.					
Filter Strip or Grass Channels – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Rock Lined Plunge Pools – area is free of trash debris and sediment. Rock thickness in pool is adequate.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
For dry enhanced swale, no evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
Plants were used in the practice according to the planting plan.					

Dry Enhanced Swale/Wet Enhanced Swale					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
No evidence of undesirable vegetation.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
No evidence of erosion around the sides of the check dam.					
Cleanout caps are in place and in good condition (for dry enhanced swale).					
The underdrain appears to be unclogged evidenced by water exiting the practice freely (for dry enhanced swale).					
Pea gravel diaphragm or other flow spreader is clean and working properly.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Results					
Overall condition of Enhanced Swale:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

Dry Extended Detention Basins

A dry extended detention basin provides temporary storage of stormwater runoff to control the peak rate of runoff by allowing the stored water to release slowly over a period of time. This practice is mostly used to control water quantity, although some water quality benefits can be obtained by the settling of floatables and sediment. This extended version of a dry detention basin is designed to maximize water quality benefits.

There are some common problems to be aware of when maintaining a dry extended detention basin. They include, but are not limited to, the following:

- Sediment build-up
- Trash, litter, and debris accumulation
- Clogging in the inlet and outlet structures
- Erosion
- Structural repairs to inlets and outlets
- Mowers compacting and rutting the basin bottom
- Clogging in the emergency spillway
- Mosquitoes breeding in the practice

Routine maintenance should be performed on dry extended detention basins to ensure that the structure is properly functioning. Note that during the first year the dry extended detention basin is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice. In the event of snow, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

Inspect the dry extended detention basin after a large rainstorm. Keep drainage paths (both to and from the BMP) clean so that the water can properly flow into the basin. If the dry extended detention basin is not draining properly, check for clogging of the inflow and outflow structures.

If the forebay or dry detention basin has received a significant amount of sediment over a period of time, then the sediment at the bottom of the forebay or dry detention basin may need to be removed. Accumulated sediment in the practice decreases the available storage volume and affects the basin's ability to function as it was designed.

The table on the next page shows a schedule for when different maintenance activities should be performed on the dry extended detention basin.

Dry Extended Detention Basin Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Remove trash, sediment, and debris from forebay and inlet and outlet structures. • Mow the embankment and maintenance access. Periodically mow along maintenance rights-of-ways and the embankment. Remove grass clippings.	Monthly or as needed
• Repair and re-vegetate eroded areas. • Remove and dispose of vegetation that may hinder the operation of the pond. • Perform structural repairs to pond, outlet structures, embankments, control gates, valves, or other mechanical devices.	As needed
• Remove sediment when volume of pond is significantly reduced.	As needed (roughly every 20-50 years, but will vary based on the characteristics of the drainage area and amount of sediment entering the practice)

Dry Extended Detention Basin					
Inspection Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet/Outlet Structure					
Drainage ways to and from the practice is free of trash, debris, large branches, etc.					
Area around the inlet/outlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet/outlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
No signs of significant sediment accumulation.					
Concrete is in good condition. No signs of cracks.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Vegetation seems healthy. No signs of bare spots or dead vegetation.					
No signs of undesirable vegetation growth.					
No signs of excessive sedimentation.					
No signs of pollution draining into the practice (oil sheens, discolored or unnatural water, odor, etc.).					
Embankment and Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No signs of animal activity in embankment.					
No signs of seepage on downstream side of embankment.					

Dry Extended Detention Basin					
Inspection Item	**Condition**				**Comment**
	Good	**Marginal**	**Poor**	**N/A***	
No signs structural deformation of embankment.					
No obstructions in spillway.					
Results					
Overall condition of Dry Extended Detention Basin:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

Dry Wells

Dry wells are located below the surface of development sites, and consist of shallow excavations, typically filled with stone, that are designed to intercept and temporarily store post-construction stormwater runoff until it infiltrates into the underlying and surrounding soils. If properly designed, they can provide significant reductions in post-construction stormwater runoff rates, volumes, and pollutant loads on development sites.

There are some common problems to be aware of when maintaining a dry well. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the gutters, pipes, and downspouts

Routine inspection and maintenance should be performed on the dry wells to ensure that the structure is functioning properly. Dry wells should be inspected after a large rainstorm. Keep gutters, pipes, and downspouts draining to the dry well clean and free of trash and debris. Every dry well should include an observation well to observe the draw down time of the dry well following a storm event. This is important to determine if clogging is occurring within the dry well.

If water is not draining to the dry well properly, check for clogging in the gutters, pipes, and downspouts. If the dry well is not draining properly the filter fabric may be clogged. The filter fabric lines the top and sides of the dry well. In addition, if the soil is not draining properly, the soil may be over-compacted. In a dry well, the media is likely to become clogged at the upper layer of the soil first. If the media is clogged or over-compacted, then the filter fabric and media should be replaced.

The table below shows a schedule for when different maintenance activities should be performed on the dry well.

Dry Well Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• If applicable, water to promote plant growth and survival within landscaped area over the top of the dry well. • If applicable, inspect vegetative cover on the surface of the dry well following rainfall events. Plant replacement vegetation in any eroded areas.	As Needed
• If applicable, inspect gutters and downspouts. Remove any accumulated leaves or debris. • Inspect dry well following rainfall events. Check observation well to	Annually (Semi-Annually During First Year)

Activity	Schedule
ensure that complete drawdown has occurred within 24 hours after the end of a rainfall event. Failure to drawdown within this timeframe may indicate dry well failure. • If applicable, inspect pretreatment devices for sediment accumulation. Remove accumulated trash and debris. • Inspect top layer of filter fabric for sediment accumulation. Remove and replace if clogged.	
• Perform total rehabilitation of the dry well, removing dry well stone and excavating to expose clean soil on the sides and bottom of the well.	Upon Failure

Dry Well					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean around the practice (trash, debris, grass clippings, etc. removed).					
Gutters, pipes, and downspouts to the dry well are free of trash, debris, leaves, etc.					
No evidence of structural deficiencies or settling around the structure.					
Main treatment area is free of trash, debris, and sediment.					
Sediment has not accumulated and clogged filter fabric.					
Preatreatment is in place if dry well does not receive roof top runoff. Pretreatment is in good condition.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
The observation well is capped and locked when not in use.					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Results					
Overall condition of Dry Well:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

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Grass Channel

Grass channels are vegetated open channels designed to enhance water quality by settling suspended solids through filtration, infiltration, and biofiltration. This practice offers a method to manage pollution while also conveying stormwater runoff. Grass channels are well suited to a number of applications and land uses, including treating runoff from roads and highways and pervious surfaces. Grass channels are broad and shallow channels that are generally positioned parallel to roadways or other impervious areas. They can also be used as a single BMP, a pretreatment to another BMP, or as a link between other BMPs.

There are some common problems to be aware of when maintaining a grass channel. They include, but are not limited to, the following:

- Trash, litter, and debris accumulation
- Watering the practice during dry periods
- Establishing vegetation within the grass channel
- Clogging in the inlet and outlet pipes
- Ant mounds
- Erosion

Routine inspection and maintenance should be performed on the grass channels to ensure that the practice is functioning properly. Routine maintenance tasks include removing trash from the grass channel and ensuring that grass clippings and other debris are removed from the channel.

In order to keep the water that exits the grass channel clean, fertilizers should only be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the grass channel is important, a primary purpose of a grass channel is to act as a water quality device and introducing fertilizers into the grass channel introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

The table on the following page show routine maintenance activities typically associated with grass channels.

Grass Channel Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Mow grass to maintain a height of 3 to 4 inches. Remove grass clippings. • Repair eroded or bare spots. • Remove accumulated sediment, trash, and debris. • Water the practice during dry condition while vegetation is establishing.	As needed
• Inspect grass alongside slopes for erosion and formation of rills or gullies and correct. • Remove sediment from bottom of channel once sediment is 25% of the original design volume. • Remove trash and debris accumulated in the inflow forebay. • Inspect and correct erosion problems in the sand/soil bed of dry swales. • Based on inspection, plant an alternative grass species if the original grass cover has not been successfully established. • Inspect pea gravel diaphragm for clogging and correct the problem.	Annually (Semi-annually the first year and then annually thereafter)

Grass Channel					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet.					
No signs of clogging or damage around the inlet.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment.					
Filter Strip or Grass Channels – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
No evidence of erosion in the practice.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
No undesirable vegetation located within the practice.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, blackened roots, etc.).					
Grass within and around practice is maintained at the proper height (3-4 inches). Grass clippings are removed.					
Grass cover seems healthy with no bare spots or dying grass.					

Grass Channel					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
No accumulating sediment within the grass channel.					
Outlet					
Outlet is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding.					
Results					
Overall condition of Grass Channel:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Gravity (Oil-Grit) Separators

Gravity (oil-grit) separators are designed to treat stormwater runoff by removing settleable solids, oil and grease, debris and floatables from stormwater runoff through gravitational settling and trapping of pollutants. Typically these systems are underground and installed at inlet structures. Gravity (oil-grit) separators come in different shapes and sizes ranging from small to large systems that have multiple chambers that use gravity to separate sediment, floatables, and oil/grease from stormwater runoff.

There are some common problems to be aware of when maintaining gravity (oil-grit) separators. They include, but are not limited to, the following:

- Clogging in the inlet and outlet structure
- Sediment and oil/grease build-up
- Inability to remove dissolved or emulsified oils and pollutants such as coolants, soluble lubricants, glycols and alcohols

Routine inspection and maintenance should be performed on the gravity separator to ensure that the structure is functioning properly. Typical maintenance will include removing accumulated sediment and pressure washing the system to remove blockage. Additional maintenance may be necessary if a spill occurs upstream of the system and drains into the practice. The contributing drainage areas should be maintained to limit the amount of trash and debris that enter the practice.

Gravity (oil-grit) separators should be inspected after a large rainstorm. It may be necessary to make repairs to the inlets, outlets, and other structural components. Check with the manufacturer's guidelines for recommended maintenance on the system. In addition, it is required that a maintenance plan be developed and implemented.

The table below shows a schedule for when different maintenance activities should be performed on gravity (oil-grit) separators.

Gravity (Oil-Grit) Separators Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Keep contributing drainage area free of trash, chunks of sediment, and debris. • Cleanout if spill occurs and enters the system. • Repair structural components. • Check to make sure practice is draining properly.	As needed (quarterly or after a large rain storm event)

Activity	Schedule
• Check maintenance plan and/or manufacturer's guidelines for additional maintenance needs. • Check system to make sure no blockage or significant sediment accumulation is occurring in the system.	Quarterly
• Cleanout system with vacuum or boom trucks. • Remove sediment and oil from chambers	Annually

Gravity (Oil-Grit) Separator

Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Contributing drainage area is clean (trash, debris, grass clippings, etc. removed).					
Inlet and outlet pipes are clean; stormwater can enter and exit the practice without being blocked.					
Overflow structure is in good condition and clean.					
Maintenance is being performed according to manufacturer's guidelines.					
Maintenance is being performed according to maintenance plan.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Results					
Overall condition of Gravity (Oil-Grit) Separator:					
Additional Comments					

Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.

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Green Roofs

Green roofs represent an alternative to traditional impervious roof surfaces. They typically consist of underlying waterproofing and drainage materials and an overlying engineered growing media that is designed to support plant growth. Stormwater runoff is captured and temporarily stored in the engineered growing media, where it is subjected to evaporation and transpiration before being conveyed back into the storm drain system. This allows green roofs to provide measurable reductions in post-construction stormwater runoff rates, volumes and pollutant loads on development sites. There are two different types of green roof systems, intensive and extensive. Intensive green roofs have a thick layer of soil, can support a diverse plant community, and may include trees. Extensive green roofs have a much thinner layer of soil that is comprised primarily of drought tolerant vegetation. Plants chosen for a green roof should be compatible for warmer temperatures found on rooftops.

There are some common problems to be aware of when maintaining a green roof. They include, but are not limited to, the following:

- Clogging in the outlet structure
- Establishing vegetation within the green roof
- Clogging the drainage layer
- Maintaining the proper pH levels for plants
- Pruning and weeding to maintain appearance and prevent roots from potentially compromising the waterproof membrane

Routine inspection maintenance should be performed on green roofs to ensure that the system is functioning properly. Note that during the first year the green roof is built, inspection and maintenance will be required at a higher frequency to ensure the proper establishment of vegetation in the practice. Frequent watering and weed germination during establishment is key to maintaining a healthy green roof and preventing more long-term maintenance problems. For more information on green roof vegetation, see Appendix D: Planting and Soil Guidance.

Green roofs should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly flow to the plants and keep the vegetation healthy. Impaired drainage can cause damage to the roofing system and add structural loads beyond the building's design limits; this could lead to structural failure. Note that it might take longer for the water to infiltrate into the system during the winter months and early spring.

In order to keep the water that exits the green roof clean, fertilizers should be used only be used sparingly and during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the green roof is important, the primary purpose of a green roof is to act as a water quality device and introducing fertilizers into the green roof introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, after initial vegetation establishment, green roofs should already be a nutrient rich environment that does not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

The table below shows a schedule for when different maintenance activities should be performed on a green roof.

Green Roofs Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Water to promote plant growth and survival. • Inspect green roof for dead or dying vegetation. Dead vegetation should be removed along with any woody vegetation. Plant replacement vegetation as needed. • Mow and remove grass clippings. • Remove trash, debris, and other pollutants from the rooftop • Observe infiltration rates after rain events, the roof should drain in 24 hours of rain event.	As Needed
• Inspect waterproof membrane for leaks. Repair as needed. • Inspect outflow and overflow areas for trash, debris, and sediment accumulation. Remove any accumulated sediment or debris. • Inspect vegetation for signs of stress. If vegetation begins showing signs of stress, including drought, flooding, disease, nutrient deficiency or insect attack, treat the problem or replace the vegetation. • Weed and prune vegetation.	Semi-Annually (Quarterly During First Year)
• Test the planting soils for pH levels. Consult with a qualified licensed Professional to determine and maintain the proper pH levels.	Annually

Green Roof					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet and outlet pipes are free of trash, debris, etc.					
Inspect waterproof membrane.					
No signs of structural deficiency or settling. Comment on overall condition of roof.					
Water can flow freely in the drainage routes, no obstructions.					
Native plants were used in the practice according to the landscaping plan. Plants seem to be in good condition. Comment on condition of plants.					
No unwanted vegetation in the practice.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
No evidence of long-term ponding or standing water (examples include: stains, odors, mosquito larvae, etc).					
Results					
Overall condition of Green Roof:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

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Infiltration Practice

An infiltration practice is a shallow excavation, typically filled with stone or an engineered soil mix, which is designed to temporarily hold stormwater runoff until it infiltrates into the surrounding soils. Infiltration practices are able to reduce stormwater quantity, recharge the groundwater, and reduce pollutant loads.

There are some common problems to be aware of when maintaining infiltration practices. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Clogging the underdrain (if applicable)
- Mosquitoes breeding in the practice

Routine maintenance should be performed on infiltration practices to ensure that the practice is functioning properly. Infiltration practices should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate into the ground. Note that it might take longer for the water to infiltrate into the ground during the winter months and early spring.

In order to limit the sediment that enters the infiltration practice, infiltration practices should always be designed with adequate pretreatment (e.g., vegetated filter strip, sediment forebay). Routine maintenance of the pretreatment device, such as removing accumulated sediment, trash, and debris, decreases the amount of maintenance required on the infiltration practice as well as its likelihood of clogging and failing. Infiltration trenches can have either exposed aggregate at the surface of the practice which provides sediment removal and additional pretreatment upstream of the infiltration trench and can be easily removed and replaced when it becomes clogged.

If the infiltration practice is not draining properly, check for clogging of the inflow structure or underdrain. To help ensure that larger storm events are able to safely bypass the infiltration practice a perforated pipe (e.g., underdrain) is sometimes placed near the top of the stone reservoir or planting bed. This provides additional conveyance of stormwater runoff after the infiltration trench or basin has filled. Another consideration is the infiltration rate of the soil media. If the soil is not draining properly, the filter fabric could be clogged or the soil could be clogged or over-compacted. In an infiltration practice, the filter fabric is likely to be clogged along the top and sides of the infiltration practice. If the filter fabric becomes clogged, the practices will need to be dug up, cleaned, and the fabric replaced. The media is likely to become clogged at the upper layer of the soil first. If the media is clogged or over-compacted, then the media should be replaced. Potential sources of excessive sediment that could clog the media include ant mounds and unstable soil upstream of the practice. Possible sources of

compaction are tractors or maintenance vehicles traveling through the practice. If the practice includes an underdrain, a structural repair or cleanout to unclog the underdrain may be necessary.

If designed and maintained correctly, there is no danger of infiltration practices becoming a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the egg to develop and become an adult. By having an infiltration practice that drains properly, it is unlikely that it would provide a habitat that could become a breeding area for mosquitoes. Should the infiltration practices become a breeding ground for mosquitoes, the problem is likely with the soil media or the overflow structure which may need to be addressed.

The table below shows a schedule for when different maintenance activities should be performed on the infiltration practice.

Infiltration Practice Typical Routine Maintenance Activities and Schedule

Maintenance Activity	Schedule
• Inspect to ensure that contributing drainage area and infiltration practice are clear of sediment, trash and debris. Remove any accumulated sediment and debris. • Ensure that the contributing drainage area is stabilized. Plant replacement vegetation as needed. • Check observation well to ensure that infiltration practice is properly dewatering after storm events.	Monthly
• Inspect pretreatment devices for sediment accumulation. Remove accumulated sediment, trash and debris. • Inspect top layer of filter fabric and pea gravel or landscaping for sediment accumulation. Remove and replace if clogged. • Inspect the practice for damage, paying particular attention to inlets, outlets and overflow spillways. Repair or replace any damaged components as needed. • Inspect the practice following rainfall events (specifically large rainfall events). Check observation well to ensure that complete drawdown has occurred within 72 hours after the end of a rainfall event. Failure to drawdown within this timeframe may indicate infiltration practice failure.	Semi-Annually during first year and Annually thereafter
• Remove aggregate and install clean, washed trench aggregate • It may be necessary to replace piping, filter fabric, etc.	Upon Failure

Infiltration Practice					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc. Drainage ways are in good condition.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or underdrain) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment.					
Forebay – No undesirable vegetation.					
Forebay – No signs of erosion, rills, or gullies. Erosion protection is present on site.					
Forebay – No signs of standing water.					
Filter Strip– area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion or sediment accumulation.					
Filter Strip – No signs of unhealthy grass, bare or dying grass. Grass height is maintained to a height of 6 – 15 inches.					
Filter Strip– No signs of erosion, rills, or gullies. Erosion protection is present on site.					
Filter Strip – No undesirable vegetation.					
Filter Strip – No signs of standing water (examples include: stains, odors, mosquito larvae, etc).					

Infiltration Practice					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
No signs of ponding water more than 48 hours after a rain storm event (examples include: stains, odors, mosquito larvae, etc).					
No undesirable vegetation growing within the practice.					
Native plants were used in the practice according to the landscaping plan.					
Observation well is capped and locked when not in use					
Flow testing has been performed on infiltration practice to determine if underdrain is clogged.					
Emergency Overflow and Outlet Structure					
Area is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
No signs of sediment accumulation.					
Grass height of 6 – 15 inches is maintained.					
Results					
Overall condition of Infiltration Practice:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Multi-Purpose Detention Basins

Multi-purpose detention basins are facilities designed primarily for another purpose, such as a parking lot or roof top, that also provide water quantity control through detention of stormwater runoff. The temporary storage provided by multi-purpose detention basins reduces downstream water quantity impacts. Multi-purpose detention areas are normally dry between rain events, and by their very nature must be useable for their primary function the majority of the time.

There are some common problems to be aware of when maintaining a multi-purpose detention basin. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structures
- Establishing vegetation within the multi-purpose detention basin
- Erosion
- Structural repairs to inlets and outlets
- Clogging in the emergency spillway

Routine inspection and maintenance should be performed on a multi-purpose detention basin to ensure that the structure is properly functioning. In addition to routine maintenance, multi-purpose detention basins may have seasonal and intermittent maintenance requirements. For example, if vegetation is included in the practice, trim the planting material during the winter, when the plants are dormant.

The table below shows routine maintenance activities typically associated with multi-purpose detention basins.

Multi-Purpose Detention Basin Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Remove debris from ponding area to minimize outlet clogging and improve aesthetics.	Annually and following significant storm events
• Remove sediment buildup. • Repair and revegetate eroded areas. • Perform structural repairs to inlet and outlets.	As needed based on inspection
• Perform additional maintenance activities specific to the type of facility.	As required

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Multi-Purpose Detention Basin					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure and Pretreatment					
Drainage ways (overland flow, pipes or preteatment) to the practice are free of trash, debris, large branches, etc.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Emergency Overflow and Outlet Structure					
Area is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					

Multi-Purpose Detention Basin					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Results					
Overall condition of Multi-Purpose Detention Basin:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

Organic Filter

Organic filters, a design variant of the surface sand filter with organic materials as the filter media, are multi-chamber structures designed to treat stormwater runoff through filtration. An organic filter consists of a pretreatment chamber, and one or more filter cells. Each filter bed contains a layer of leaf compost or a peat/sand mixture, followed by an underdrain system. Maintenance frequency on organic filters is typically high due to clogging.

Common problems to be aware of when maintaining an organic filter include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Clogging the underdrain
- Mosquitoes breeding in the practice
- Ant mounds

Routine inspection and maintenance should be performed on the organic filters to ensure that the structure is functioning properly. Note that if the organic filter includes topsoil and vegetation, maintenance may be required at a higher frequency during the first year the organic filter is built to ensure the proper establishment of vegetation in the practice.

Inspect the organic filter after a large rainstorm. Keep drainage paths (both to and from the BMP) clean so that the water can properly infiltrate into the ground. If the organic filter is not draining properly, check for clogging at the inflow and outflow structures as well as the infiltration rate of the filter bed. In an organic filter, the filter bed is likely to become clogged at the upper layer of the filter (top 2-3 inches) and will need to be removed and replaced. If the filter becomes clogged or over-compacted, then the media should be replaced. In order to determine if maintenance is necessary, a record should be kept of the dewatering time for an organic filter. Typically the filter bed is designed to drain in 40 hours or less, if it the practice takes longer to drain, maintenance may be required for the practice.

For organic filters with vegetation, to keep the water that exits the organic filter clean, fertilizers should only be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the organic filter is important, the primary purpose of an organic filter is to act as a water quality device and introducing fertilizers into the organic filter introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, organic filters should already be a nutrient rich environment that does not require

fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

Potential sources of excessive sediment that could clog the media include ant mounds and unstable soil upstream of the practice. Possible sources of compaction are maintenance vehicles traveling through the practice. If the underdrain does not work properly, a structural repair or cleanout to unclog the underdrain may be necessary.

In the event of snow, ensure that the snow does not pile up in the organic filter. Accumulated snow adds additional weight and may compact the organic filter soil, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

If designed and maintained correctly, there is no danger of organic filters becoming a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the egg to develop and become an adult. By having an organic filter that drains properly, it is unlikely that an organic filter would provide a habitat that could become a breeding area for mosquitoes. Should the organic filter become a breeding ground for mosquitoes, the problem is likely with the soil media or the overflow structure which may need to be addressed. This is not applicable to the perimeter organic filter which has a permanent pool.

The table below shows a schedule for when different maintenance activities should be performed on the organic filter.

Organic Filter Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Check to see that the filter bed is clean of sediment, and the sediment chamber is not more than 50% full or 6 inches, whichever is less, of sediment (also check after moderate and major storms). Remove sediment as necessary. • Make sure that there is no evidence of deterioration, spalling or cracking of concrete. • Inspect grates (perimeter Organic Filter). • Inspect inlets, outlets and overflow spillway to ensure good condition and no evidence of erosion. • Repair or replace any damaged structural parts. • Stabilize any eroded areas. • Ensure that flow is not bypassing the practice. • Ensure that no noticeable odors are detected outside the BMP.	Monthly
• Ensure that contributing area, organic filter, inlets and outlets are clear of trash and debris. • Ensure that the contributing area is stabilized and mowed, with clippings removed. • Prune and weed to maintain appearance, if applicable. • Ensure that activities in the drainage area minimize oil/grease and sediment entry to the system. • If permanent water level is present (perimeter Organic Filter), ensure that the chamber does not leak, and normal pool level is retained.	As needed or 4 times during growing season

Activity	Schedule
• If filter bed is clogged or partially clogged, manual manipulation of the surface layer of sand may be required. Remove the top few inches of sand, roto-till, or otherwise cultivate the surface, and replace media with sand meeting the design specifications. • Replace any filter fabric that has become clogged.	Annually
• Remove and replace the top 2-3 inches of sand in the filter.	Every 3-5 years or as needed

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Organic Filter					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Area is free of signs of erosion.					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment. Area is free of undesirable vegetation.					
Sedimentation Chamber – area is free of trash, debris, and sediment.					
Perforated stand-pipe is free of trash, debris, and sediment. Surrounding vegetation is trimmed back so that there is no potential to restrict flow. Pipe is in good working order.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					

Organic Filter					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Undesirable vegetation within and around practice is trimmed and removed.					
Significant sediment accumulation is not occurring within the filter bed.					
Grass cover is healthy and there are no bare areas or dying grass.					
No evidence of leaks at joints or other components of the practice.					
Underdrain cleanout caps are not missing or damaged.					
Observation well does not have standing water.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
No evidence of animal activity.					
No evidence of seepage on the downstream face of the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet structure does not appear to be blocked.					
Results					
Overall condition of Organic Filter:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Permeable Bricks/Blocks

Permeable bricks/blocks are pavers with void areas areas between the bricks or blocks that are generally filled with pervious materials such as small pieces of gravel, or top soil if a grid is used. Beneath the bricks/blocks is a base layer of aggregate that acts as a holding area for stormwater runoff while still providing structural support for the road. This practice provides enough structural support so that cars can drive over them or they can be used in parking lots. Permeable brick/blocks are not recommended in areas with high traffic volume or heavy trucks. These systems provide water quality benefits in addition to groundwater recharge and a reduction in stormwater volume.

There are some common problems to be aware of when maintaining permeable bricks/blocks. They include, but are not limited to, the following:

- Sediment build-up and clogging between bricks/blocks
- Settling
- Bricks/blocks cracking or splitting

There are four basic types of permeable bricks/blocks that are used. They are bricks, concrete blocks, concrete grid, and articulated concrete block. The concrete grid can be filled with grass or gravel. Routine maintenance should be performed on the permeable bricks/blocks to ensure that the structure is functioning properly. Permeable bricks/blocks should be cleaned with a street vacuum or low pressure washer to remove debris and sediment monthly, or as needed, and all vegetation between bricks/blocks should be mowed and clippings removed to reduce clogging. Cleaning the bricks will help keep the water permeating through the pavers. After cleaning, the bricks/blocks may need to be filled in with additional aggregate or top soil to replace anything that may have been removed during cleaning.

In addition to routine maintenance, permeable bricks/blocks have seasonal and intermittent maintenance requirements. In the winter months permeable bricks/blocks can be plowed similarly to any other unpaved road by lifting the blade a few inches above the road or by using a beveled plow. Deicing materials such as sand, ash, or salt should be avoided if possible. They can potentially harm the bricks/blocks and may cause clogging. Non-toxic, organic deicers are recommended.

Permeable bricks/blocks should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate into the ground. Note that it might take longer for the water to permeate into the ground during the winter months and early spring.

If the permeable bricks/blocks are not draining properly, check for clogging between the bricks or blocks or at the upper layer of the aggregate, directly below the bricks/blocks. If clogging occurs, then the stones between the blocks/bricks should be replaced. In addition, the top layer of soil under the bricks/blocks may also need to be cleaned and replaced. Some areas of the blocks/bricks may need additional maintenance due to potential sources of clogging which include unstable soil upstream of the practice, leaves from trees, low points in blocks/bricks, trash, and debris from vehicle traffic. Another reason for the bricks/blocks not draining properly is settling. If major settling occurs, then the bricks/blocks should be removed, cleaned, and replaced.

Permeable bricks/blocks may also include an underdrain. If the practice includes an underdrain, additional maintenance will be required. Periodic testing will need to be done on the system to make sure that the underdrain is not clogged. This is done by pouring water into cleanout and observing how the water exits the practice. The observation well should be checked to make sure water is draining out of the practice.

The table below shows a schedule for when different maintenance activities should be performed on the permeable bricks/blocks.

Permeable Bricks/Blocks Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Keep the permeable bricks/blocks free of trash, debris, and sediment. • Make sure that there is no standing water in the bricks/blocks between storms. • Remove weeds and grass growing between the bricks/blocks (unless concrete grid pavers are being used). • Mow grass within the bricks/blocks (only for concrete grid with grass) • Mow / trim grass or vegetation near the bricks/blocks and remove clippings from area. • Visually inspect the bricks/blocks after large storms to ensure the overflow drainage system is working. • Inspect the bricks/blocks for damage and repair. • Vacuum sweep permeable brick/block surface to keep free of sediment. • After cleaning, additional aggregate may need to be added between the pavers. Replace aggregate between pavers as necessary.	Monthly during warm weather
• Keep the contributing drainage area and surface of the bricks/blocks clear of debris, trash, and sediment. • Ensure that the areas surrounding the practice are stabilized and mowed, remove grass clippings.	As needed, based on inspection

Activity	Schedule
• If the pavers are installed in an area that is subject to high amounts of sediment, leaves, or low point (i.e. large trucks traveling on the bricks/blocks daily) additional cleaning may be necessary. • Replace any joint material that has eroded or washed away. • Observe the system during a rain event. • Areas should be routinely inspected for settling and loss of water flow through the system.	Semi-annually in Spring and Fall
• Organic deicers may be used to melt ice and snow. • Snow plows may be used when necessary under the following conditions: o The edges of the plows are beveled. o The blade of the snow plow is raised 1-2 inches. o The snow plow is equipped with snow shoes which allow the blade to glide across uneven surfaces.	As needed in winter
• Inspect the surface for deterioration or breaking into fragments. • Flush the underdrain system to check for clogging (if applicable).	Annually
• Remove the permeable bricks/blocks; include the top and base layers of the practice. Clean bricks/blocks and base aggregate, and replace as needed.	Upon failure

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Permeable Bricks/Blocks					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, leaves, etc. removed).					
Area around the practice is mowed and grass clippings are removed. No signs of bare or dead grass.					
No evidence of gullies, rills, or erosion around the practice.					
Water is permeating the bricks/blocks (i.e. no evidence of water going around the practice).					
Bricks/blocks are structurally sound. No signs of cracks or splitting.					
Aggregate between the bricks/blocks is reasonable.					
No evidence of long-term ponding or standing water in the practice.					
Grass in the concrete grid is healthy, no dead grass or bare spots.					
Grass in the concrete grid is mowed and grass clippings are removed.					
Structure seems to be working properly. No signs of the bricks/blocks settling. Comment on overall condition of bricks/blocks.					
Vegetation within and around practice is maintained. Grass clippings are removed.					
No exposed soil near the bricks/blocks that could cause sediment accumulation within the practice.					
Cleanout caps are present and not missing (if applicable).					
The underdrain system has been flushed properly and there is no sign of clogging (if applicable).					
Results					
Overall condition of Permeable Bricks/Blocks:					

Permeable Bricks/Blocks					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Additional Comments					

Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.

Pervious Concrete

Pervious concrete is a special mixture with a high void space that allows water to infiltrate into the subsoil through the pavement surface and base layers. This aggregate base layer acts as both a structural layer and a container to temporarily hold stormwater runoff until it can infiltrate into the subsoil or drainage system.

There are some common problems to be aware of when maintaining pervious concrete. They include, but are not limited to, the following:

- Sediment build-up on surface
- Settling
- Cracking

Routine maintenance should be performed on pervious concrete to ensure that the area is functioning properly. Pervious concrete should be observed monthly to ensure the practice is functioning properly. Maintenance activities including street vacuum or low pressure washer to remove debris and sediment should be conducted at least annually, or as needed.

In addition to routine maintenance, pervious concrete has seasonal and intermittent maintenance requirements. In the winter months pervious concrete can be plowed, however, the snow plow should be equipped with snow shoes which can allow the blade to glide across uneven surfaces. Deicing materials such as sand, ash, salt, or other products should be avoided if possible. They will harm the concrete and other materials and may cause clogging. Organic deicers are recommended.

Pervious concrete should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate through the concrete and into the ground. Note that it might take longer for the water to infiltrate into the ground during the winter months and early spring.

If the pervious concrete is not draining properly, check for clogging at the top of the concrete. If clogging occurs, then the concrete should be cleaned by vacuuming or jet washing the area. Potential sources of clogging include unstable soil, leaves from trees, trash, and debris from vehicle traffic. The concrete could also not be draining properly due to settling or structural failure. If this happens, then the concrete should be removed and replaced. Settling or structural failure is most likely to occur in areas with high volumes of traffic or in areas with heavy traffic, such as large trucks.

The surface of the concrete should be inspected for deterioration. If the concrete fails, then the concrete should be resurfaced. Pervious concrete is intended for areas of low traffic; constant traffic and heavy equipment will cause the pavement to deteriorate more quickly.

Pervious concrete may also include an underdrain or a trench outlet. If the practice includes an underdrain or a trench, additional maintenance will be required. Periodic testing may be necessary to make sure that the underdrain or trench is not clogged. The underdrain or trench can be tested by pouring water into cleanout and observing how the water exits the practice. The observation well for the underdrain should be checked to make sure water is draining out of the practice.

The table below shows routine maintenance activities typically associated with pervious concrete.

Pervious Concrete Typical Routine Maintenance Activities and Schedule

Maintenance Activity	Schedule
• Ensure that contributing area, facility, inlets and outlets are clear of debris. • Ensure that the contributing area is stabilized and mowed, with clippings removed. • Remove trash and debris. • Check to ensure that the pavement surface is not clogging (also check after moderate and major storms). • Ensure that activities in the drainage area minimize oil/grease and sediment entry to the system.	As needed
• Make sure that there is no evidence of deterioration or cracking of the concrete. • Inspect inlets, outlets and overflow spillway to ensure good condition and no evidence of erosion. • Repair or replace any damage to the asphalt. • Ensure that flow is not bypassing the facility.	Monthly
• Vacuum sweep pervious concrete surface followed by high pressure hosing to keep pores free of sediment. • Flush the underdrain system and check for signs of clogging.	Annually or based on inspection
• Utilize organic de-icers on the pavement surface	During temperatures below freezing

Pervious Concrete					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance. No signs of bare or dead grass.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
No evidence of long-term ponding or standing water in the practice (examples include: stains, odors, etc).					
Structure seems to be working properly. No signs of concrete settling or cracking. Comment on overall condition of concrete.					
Vegetation around practice is maintained. Grass clippings are removed.					
No exposed soil near the concrete.					
Cleanout caps are present and not missing (if applicable).					
The underdrain system or trench has been flushed properly and there is no sign of clogging.					
Results					
Overall condition of Pervious Concrete:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

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Porous Asphalt

In general, porous asphalt is asphalt with reduced sands or fines and larger void spaces to allow water to drain through it. Porous asphalt allows water to infiltrate into the subsoil through the paved surface and base layer. This base, aggregate layer acts as both a structural layer and container to temporarily hold water. Porous asphalt is generally used instead on sidewalks or bicycle paths or roads with low traffic volumes.

There are some common problems to be aware of when maintaining porous asphalt. They include, but are not limited to, the following:

- Sediment build-up on surface
- Settling
- Cracking

Routine maintenance should be performed on porous asphalt to ensure that the area is functioning properly. Porous asphalt should be observed monthly to ensure the practice is functioning properly. Maintenance activities including vacuuming and jet washing should be conducted at least annually, or as needed.

In addition to routine maintenance, porous asphalt has seasonal and intermittent maintenance requirements. In the winter months porous asphalt can be plowed, however, the snow plow should be equipped with snow shoes which allow the blade to glide across uneven surfaces. Deicing materials such as sand, ash, or salt should be avoided if possible because they may harm the asphalt and aggregate and may cause clogging. Non-toxic, organic deicers are recommended.

Porous asphalt should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate into the ground. Note that it might take longer for the water to infiltrate into the ground during the winter months and early spring.

If the porous asphalt is not draining properly, check for clogging at the top of the asphalt. If clogging occurs, then the asphalt should be cleaned by vacuuming or low pressure washer the area. Potential sources of clogging include upstream unstable soil, leaves from trees, trash, and debris from vehicle traffic. Asphalt could also not be draining properly due to settling or structural failure. If this happens, then the asphalt should be removed and replaced. Settling or structural failure is most likely to occur in areas with high volumes of traffic or in areas with heavy traffic, such as large trucks.

The surface of both types of porous asphalt should be inspected for deterioration. If the pavement fails, the asphalt should be resurfaced. Potholes, though uncommon, can be patched using standard measures. If the damaged area is 10% or more of the total area, consult a qualified licensed Professional Engineer for repair.

Porous asphalt may also include an underdrain. If the practice includes an underdrain, additional maintenance will be required. Periodic testing will be necessary to make sure that the underdrain is not clogged. This is done by pouring water into cleanout and observing how the water exits the practice. The observation well should be checked to make sure water is draining out of the practice.

The table below shows routine maintenance activities typically associated with porous asphalt.

Porous Asphalt Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Ensure that contributing area, facility, inlets and outlets are clear of debris. • Ensure that the contributing area is stabilized and mowed, with clippings removed. • Remove trash and debris. • Check to ensure that the pavement surface is not clogging (also check after moderate and major storms). • Ensure that activities in the drainage area minimize oil/grease and sediment entry to the system.	As needed
• Make sure that there is no evidence of deterioration, spalling or cracking of asphalt. • Inspect inlets, outlets and overflow spillway to ensure good condition and no evidence of erosion. • Repair or replace any damage to the asphalt. • Ensure that flow is not bypassing the facility.	Monthly
• Vacuum sweep pervious concrete surface followed by high pressure hosing to keep pores free of sediment. • Flush the underdrain system and check for signs of clogging.	Annually or based on inspection
• Utilize organic de-icers on the pavement surface	During temperatures below freezing

Porous Asphalt					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Filter Strip (if applicable) – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Asphalt is structurally sound. No signs of cracks or raveling (disintegration of material from surface down).					
No evidence of long-term ponding or standing water in the practice.					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Vegetation around practice is maintained. Grass clippings are removed.					
No exposed soil near the asphalt.					
Cleanout caps are present and not missing.					
The underdrain system has been flushed properly and there is no sign of clogging (if applicable).					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Results					
Overall condition of Porous Asphalt:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain what and why in the appropriate comment box.					

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Proprietary Systems

Proprietary systems are control systems available from commercial vendors designed to treat stormwater runoff and/or provide water quantity control. Typically these systems are underground and installed at inlet structures. There are many types of proprietary stormwater structural controls to provide water quality treatment and quantity control. These systems come in different shapes and sizes ranging from small systems that use a swirling vortex to a large system that has multiple chambers to separate sediment, floatables, and oil/grease from the stormwater runoff.

There are some common problems to be aware of when maintaining propriety systems. They include, but are not limited to, the following:

- Sediment and oil/grease build-up
- Clogging in the inlet and outlet structure
- Inability to remove dissolved pollutants
- Must be maintained routinely so that system does not become a potential source of pollutants

Routine inspection and maintenance should be performed on the proprietary systems to ensure that the structure is functioning properly. Typical maintenance will include removing accumulated sediment and pressure washing the system to remove blockage. It is important that the accumulated sediment and water from cleaning the proprietary system be collected and disposed of properly. This is important to keep the ground surrounding the system clean to avoid clogging.

Additional maintenance may be necessary if a spill occurs upstream of the system and drains into the practice. The contributing drainage area should be maintained to limit the amount of trash and debris that enters the practice.

Proprietary systems should be inspected after a large rainstorm. It may be necessary to make repairs to the inlets, outlets, and other structural components. Check the manufacturer's guidelines for recommended maintenance on the system. In addition, it is required that a maintenance plan is developed and implemented.

The table below shows a schedule for when different maintenance activities should be performed on proprietary systems.

Proprietary Systems Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Check to make sure practice is draining properly.	After a large rain storm event or as needed
• Keep contributing drainage area free of trash, chunks of sediment, and debris. • Cleanout if spill occurs and enters the system. • Repair structural components.	As needed

Activity	Schedule
• Check maintenance plan and/or manufacturer's guidelines for additional maintenance needs. • Check system to make sure no blockage or significant sediment accumulation is occurring in the system.	Quarterly
• Cleanout system with vacuum or boom trucks. • Remove sediment and oil from chambers	Annually

Proprietary System					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Contributing drainage area is clean (trash, debris, grass clippings, etc. removed).					
Inlet and outlet pipes are clean; stormwater can enter and exit the practice without being blocked.					
Overflow structure is in good condition and clean.					
Maintenance is being performed according to manufacturer's guidelines.					
Maintenance is being performed according to the maintenance plan.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Results					
Overall condition of Proprietary System:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

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Rainwater Harvesting

Rainwater harvesting is a common stormwater management practice used to catch rainfall and store it to be used later. Gutters and downspout systems are typically used to collect the water from roof tops. Rainwater harvesting systems can be either above or below the ground. Once captured in the storage tank, the water may be used for non-potable indoor and outdoor uses. If properly designed, rainwater harvesting systems can significantly reduce post-construction stormwater runoff rates, volumes and pollutant loads on development sites. Rainwater harvesting also helps reduce the demand on public water supplies, which in turn helps protect aquatic resources, such as groundwater aquifers, from drawdown and seawater intrusion.

There are some common problems to be aware of when maintaining a rainwater harvesting system. They include, but are not limited to, the following:

- Sediment build-up in the system
- Wear and tear on pumping equipment (if applicable)
- Clogging in the gutters or downspout connections
- Algae growing in the rainwater system

Routine maintenance should be performed on the rainwater harvesting system. A well-designed rainwater harvesting system typically consists of five major components, including the collection and conveyance system (e.g., gutter and downspout system), pretreatment devices (e.g., leaf screens, first flush diverters, roof washers), the storage tank or cistern, the overflow pipe (which allows excess stormwater runoff to bypass the storage tank or cistern) and the distribution system (which may or may not require a pump, depending on site characteristics). Each of these components should be inspected and maintained.

Generally, maintenance should be performed in the spring and fall. Before the first significant freeze, downspouts should be disconnected, and the rainwater harvesting system should be completely drained. Other maintenance includes checking the system to make sure algae is not growing in the system. Check the elements of the unit and make repairs or replace broken parts as necessary. Any vegetation that receives accumulated water from the system should be checked for signs of stress. Replace the plants as necessary.

The table below shows a schedule for when different maintenance activities should be performed on the rainwater harvesting system.

Rainwater Harvesting System Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Disconnect rainwater harvesting system from roof downspouts (this may not be necessary for all areas of the state of Georgia). • Drain aboveground cisterns and clean for winter.	Late Fall (Before major freeze)
• Connect rainwater harvesting system to roof downspouts.	Early Spring (After last major freeze)
• Empty harvesting rainwater system periodically by watering vegetation. • Examine vegetation for health/distress and determine if additional watering needs are necessary. • Inspect storage tank screens and pretreatment devices. Clean as needed.	Regularly during above freezing temperatures
• Inspect gutters and downspouts. Remove any accumulated leaves or debris. • Clean storage tank screens. • Inspect pretreatment devices for sediment accumulation. Remove accumulated trash and debris. • Inspect for tight connection at inlet and drain valve. • Verify pumping system is properly working. • Keep pipe clear of obstructions. • Inspect storage tank for algal blooms. Treat as necessary. • Inspect overflow areas for erosion and the formation of rills and gullies. Plant replacement vegetation in any eroded areas.	Semi-annually in spring and fall
• Check system for sediment. Clean out the tank when the sediment is more than 5% of the volume in the cistern.	Annually

Rainwater Harvesting

Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Gutters and downspouts are free of trash, debris, etc.					
Leaf screens are clean and in good condition.					
First flush diverter is working properly and in good condition (if applicable).					
Roof washer is working properly and in good condition (if applicable).					
Cistern inlet and downspout fits tightly.					
Cistern tank is clean and free of sediment.					
Cistern is free of indication of algal blooms.					
Plants being watered from the rainwater harvesting system seem to be healthy and in good condition. Comment on condition of plants.					
No signs of the overflow valve leaking (stains, dampness).					
Cistern is in good condition structurally, no signs of cracking or leaking.					
Performance of pump matches pumping details (if applicable).					
Results					
Overall condition of Rainwater Harvesting:					
Additional Comments					

Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.

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Regenerative Stormwater Conveyance

A regenerative stormwater conveyance (RSC) is a practice that provides treatment, infiltration, and conveyance to stormwater runoff through a combination of pools, riffles (with either cobble rocks or boulders), native vegetation, an underlying sand layer, and wood chips.

There are some common problems to be aware of when maintaining a RSC. They include, but are not limited to, the following:

- Establishing vegetation within the RSC area
- Ant mounds
- Pruning and weeding to maintain appearance
- Deterioration of riprap

Routine maintenance should be performed on RSC to ensure that the system is functioning properly. Note that during the first year the RSC is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice.

A RSC should be inspected after a large rainstorm, especially during the first six months after establishment. Keep drainage paths, both to and from the BMP, clean so that the water can properly infiltrate into the ground.

Spot fertilization may be required during the first two months to establish vegetation. After that period, however, fertilizers should not be used. While vegetation in the RSC is important, a primary purpose of a RSC is to act as a water quality device, and introducing fertilizers into the RSC introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

The table on the following page shows a schedule for when different maintenance activities should be performed on the RSC area.

Regenerative Storm Conveyance Typical Maintenance Activities and Schedule

Activity	Schedule
• Inspect two times after establishment for first 6 months after storms that exceed ½ inch of rain. • Repair any erosion, rills, or gullies that may form in the practice • Conduct any needed repairs or stabilization • Repair areas with bare or dead grass in the contributing drainage area or around the RSC. • Watering and spot fertilization may be necessary during first 2 months to establish vegetation. • Remove and replace dead, damaged, or diseased plants.	Upon establishment
• Prune and weed vegetation. • Remove trash, sediment, and debris.	Four times per year
• Add additional plants to maintain needed vegetation density. • Remove and replace any dead, damaged, or diseased plants. • Repair any eroded areas.	As Needed
• Make sure weirs, riffles, and pools are in structurally good condition and that the practice has stable water levels. • Prune trees and shrubs (when they are dormant). • Remove any invasive species. • Remove any sediment accumulation in pretreatment area and inflow points.	Annually
• Remove accumulated sediment in pools • Repair damage to weirs, riffles, pools, or other structural components.	Once every 2 to 3 years

Regenerative Stormwater Conveyance					
Inspection Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Native plants were used in the practice according to the planning plan.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					

Regenerative Stormwater Conveyance					
Inspection Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Results					
Overall condition of RSC:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

Sand Filters

Sand filters are multi-chamber structures designed to treat stormwater runoff through filtration, using a sediment forebay, a sand bed as its primary filter media, and typically an underdrain system. Sand filters can be designed in many ways; however, there are three primary sand filter system designs, surface sand filter, perimeter sand filter, and underground sand filter. A surface sand filter is a ground-level open air structure that consists of a pretreatment sediment forebay and a filter bed chamber. A perimeter sand filter is an enclosed system typically just below the ground in a vault along the edge of an impervious area such as a parking lot. Finally, an underground sand filter is for areas with limited space and high density areas and should only be considered where local communities allow this practice. Because underground sand filters require additional planning, maintenance and incorporation with the stormwater management plan, coordinate with the local community for specific maintenance concerns. Maintenance frequency on sand filters is typically high due to clogging.

There are some common problems to be aware of when maintaining a sand filter. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Clogging the underdrain
- Mosquitoes breeding in the practice
- Ant mounds

Routine inspection and maintenance should be performed on the sand filters to ensure that the structure is functioning properly. Note that if the sand filter include a grass cover or vegetation, maintenance may be required at a higher frequency during the first year the sand filter is built to ensure the proper establishment of grass cover or vegetation in the practice. For more information on vegetation in a sand filter, see Appendix D: Planting and Soil Guidance.

Inspect the sand filter after a large rainstorm. Keep drainage paths (both to and from the BMP) clean so that the water can properly infiltrate into the ground. If the sand filter is not draining properly, check for clogging at the inflow and outflow structures as well as the infiltration rate of the filter bed. In a sand filter, the filter bed is likely to become clogged at the upper layer of the filter (top 2-3 inches) and will need to be removed and replaced. If the filter becomes clogged or over-compacted, then the media should be replaced. In order to determine if maintenance is necessary, a record should be kept of the dewatering time for a sand filter. Note that sand filters are typically designed to completely drain over 40 hours.

Potential sources of excessive sediment that could clog the media include ant mounds and unstable soil upstream of the practice. Possible sources of compaction are maintenance vehicles traveling through the practice. If the underdrain does not work properly, a structural repair or cleanout to unclog the underdrain may be necessary.

In the event of snow, ensure that the snow does not pile up in the sand filter. Accumulated snow adds additional weight and may compact the sand filter, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

If designed and maintained correctly, there is no danger of sand filters becoming a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the larvae to develop and become an adult. By having a sand filter that drains properly, it is unlikely that a sand filter would provide a habitat that could become a breeding area for mosquitoes. Should the sand filter become a breeding ground for mosquitoes, the problem is likely with the sand media or the overflow structure which may need to be addressed. This is for surface sand filters, where there is open water.

The table below shows a schedule for when different maintenance activities should be performed on the sand filter.

Sand Filter Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Check to see that the filter bed is clean of sediment, and the sediment chamber is not more than 50% full or 6 inches, whichever is less, of sediment. Remove sediment as necessary. • Make sure that there is no evidence of deterioration, spalling or cracking of concrete. • Inspect grates (perimeter sand filter). • Inspect inlets, outlets and overflow spillway to ensure good condition and no evidence of erosion. • Repair or replace any damaged structural parts. • Stabilize any eroded areas. • Ensure that flow is not bypassing the BMP. • Ensure that no noticeable odors are detected outside the practice.	Monthly
• Ensure that contributing area, sand filter, inlets and outlets are clear of debris. • Prune and weed to maintain appearance (if applicable). • Ensure that the contributing area is stabilized and mowed, with clippings removed. • Ensure that activities in the drainage area minimize oil/grease and sediment entry to the system. • If permanent water level is present (perimeter sand filter), ensure that the chamber does not leak, and normal pool level is retained.	As needed or 4 times during growing season

Activity	Schedule
• If filter bed is clogged or partially clogged, manual manipulation of the surface layer of sand may be required. Remove the top few inches of sand, roto-till or otherwise cultivate the surface, and replace media with sand meeting the design specifications. • Replace any filter fabric that has become clogged.	Annually
• Remove and replace the top 2-3 inches of sand in the filter.	Every 3-5 years or as needed

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Sand Filter					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Area is free of signs of erosion.					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment. Area is free of undesirable vegetation.					
Sedimentation Chamber – area is free of trash, debris, and sediment.					
Perforated stand-pipe is free of trash, debris, and sediment. Surrounding vegetation is trimmed back so that there is no potential to restrict flow. Pipe is in good working order.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples: stains, odors, mosquito larvae, etc).					

Sand Filter					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Sand Filter seems to be working properly. No settling around the practice. Comment on overall condition of structure.					
Undesirable vegetation within and around practice is trimmed and removed.					
Significant sediment accumulation is not occurring within the filter bed.					
Grass cover is healthy and there are no bare areas or dying grass.					
No evidence of leaks at joints or other components of the practice.					
Underdrain cleanout caps are not missing or damaged.					
Observation well does not have standing water.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
No evidence of animal activity.					
No evidence of seepage on the downstream face of the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet structure does not appear to be blocked.					
Results					
Overall condition of Sand Filter:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Site Reforestation/Revegetation

Site reforestation/revegetation is a process of planting trees, shrubs and other native vegetation in disturbed pervious areas to restore the area to pre-development or better conditions. The process can be used to establish mature native plant communities, such as forests, in pervious areas that have been disturbed by clearing, grading and other land disturbing activities. These plant communities intercept rainfall and slow and filter the stormwater runoff to improve infiltration in the ground. This in turn can reduce the total amount of stormwater runoff and pollutant loads leaving the site. Areas that have been reforested or revegetated should be maintained in an undisturbed, natural state over time. These areas must be designated as conservation areas and protected in perpetuity through a legally enforceable conservation instrument (e.g., conservation easement, deed restriction).

There are some common problems to be aware of when maintaining a site reforestation/revegetation area. They include, but are not limited to, the following:

- Establishing vegetation within the area
- Watering the practice
- Erosion

Routine inspection and maintenance should be performed on the reforestation/revegetation site to ensure that the practice is functioning properly. Note that during the first year this process is implemented, maintenance may be required at a higher frequency to ensure the vegetation is properly established. Once the vegetation is established, very little maintenance is typically needed. For more information on vegetation, see Appendix D: Planting and Soil Guidance.

In order to keep the stormwater runoff that exits the site reforestation/revegetation area clean, fertilizers should only be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation growth in the site reforestation/revegetation area is important, the primary purpose of this process is to act as both a way to filter and infiltrate stormwater. Introducing fertilizers into the site reforestation/revegetation area introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

The table on the following page shows routine maintenance activities typically associated with site reforestation/revegetation areas.

Site Reforestation/Revegetation Routine Maintenance Activities and Schedule

Activity	Schedule
• Water to promote plant establishment, growth, and survival. • Inspect reforested/revegetated area following rainfall events. Plant replacement vegetation in any eroded areas. • Remove sediment from practice. • Revegetate if eroded.	As needed (Following Construction)
• Inspect reforested/revegetated area for erosion. Plant replacement vegetation in any eroded areas. • Inspect reforested/revegetated area for dead or dying vegetation. Plant replacement vegetation as needed. • Prune and care for individual trees and shrubs as needed.	Annually (Semi-Annually During First Year)

Site Reforestation/Revegetation					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
No evidence of gullies, rills, or excessive erosion.					
Area is free of trash, debris, and sediment.					
No evidence of long-term ponding or standing water (examples include: stains, odors, mosquito larvae, etc).					
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Native plants were used in the practice according to the planting plan.					
No evidence of excessive use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Results					
Overall condition of Site Reforestation/Revegetation area:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

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Soil Restoration

Soil restoration is the process of tilling and adding compost and other amendments to soils to restore them to their pre-development conditions. This improves the soil's ability to reduce post-construction stormwater runoff rates, volumes and pollutant loads. This process is ideal for areas that have been disturbed by clearing, grading and other land disturbing activities. This process is generally used in conjunction with other practices including, but not limited to, vegetated filter strips, grass channels, and simple downspout disconnections.

Restored pervious areas require some maintenance during the first few months following construction, but typically require very little maintenance after that.

In order to keep the water that exits the soil restoration area clean, fertilizers should be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation growth in the soil restoration area is important, introducing fertilizers into the soil restoration area introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

The table below shows routine maintenance activities typically associated with soil restoration areas.

Soil Restoration Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Water to promote plant growth and survival. • Inspect restored pervious area following rainfall events. Plant replacement vegetation in any eroded areas.	As Needed (Following Construction)
• Inspect restored pervious area for erosion. Plant replacement vegetation in any eroded areas. • Inspect restored pervious area for dead or dying vegetation. Plant replacement vegetation as needed.	Annually (Semi-Annually During First Year)

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Soil Restoration					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
No evidence of gullies, rills, or excessive erosion.					
No evidence of long-term ponding or standing water (examples include: stains, odors, mosquito larvae, etc).					
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Native plants were used in the practice according to the landscaping plan.					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Results					
Overall condition of Soil Restoration:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

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Stormwater Planters/Tree Boxes

Stormwater planters are similar to bioretention areas in their design purpose to detain, filter, and infiltrate stormwater. In addition stormwater planters utilize native or non-invasive flowers, shrubs, and trees to provide aesthetic qualities to the site. Planters and tree boxes receive stormwater from a variety of sources such as, roof tops and downspouts and runoff from streets.

There are some common problems when maintaining a stormwater planter. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the downspouts (only applicable of stormwater planters receive water from downspouts)
- Establishing vegetation within the stormwater planter
- Clogging the underdrain
- Maintaining the proper pH levels for plants

Routine maintenance should be performed on stormwater planters to ensure that the structure is functioning properly. Note that during the first year the stormwater planter is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice.

In addition to routine maintenance, stormwater planters have seasonal and intermittent maintenance requirements. For example, the following are maintenance activities and concerns specific to winter months. Planting material should be trimmed during the winter, when the plants are dormant. In the event of snow, ensure that snow does not pile up in the stormwater planter. Accumulated snow adds additional weight and may compact the stormwater planter soil, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

Stormwater planters should be inspected after a large rainstorm. Mulch the practice as needed to keep a thickness of 2-4 inches. Shredded hardwood mulch is preferred, and care should be taken to keep the mulch from piling on the stems of the plants. For more information on vegetation in stormwater planters, see Appendix D: Planting and Soil Guidance.

In order to keep the water that exits the stormwater planter clean, fertilizers should only be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the stormwater planter is important, the primary purpose of a stormwater planter is to act as a water quality device and introducing fertilizers into the stormwater planter introduces nutrients such as phosphorus and nitrogen that can pollute

downstream waters. In addition, stormwater planters should already be a nutrient rich environment that does not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

Invasive species should be kept out of the stormwater planters and the overall health of the plants should be maintained. If periodic observations indicate the presence of contaminants, the soil and mulch in the plants should be tested to avoid the build-up of pollutants that may harm the vegetation.

The table below shows a schedule for when different maintenance activities should be performed on a stormwater planter.

Stormwater Planters/Tree Boxes Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Water to promote plant growth and survival. • Inspect stormwater planter following rainfall events to ensure the planter is working properly.	As Needed (Following Construction)
• Prune and weed stormwater planter. • Remove accumulated trash and debris. • Remove and replace dead or damaged plants. Plant replacement vegetation as needed. • Observe infiltration rates after rain events. Planters should have no standing water within 24 hours.	As needed, or 4 times during growing season
• Inspect inflow and outflow areas for sediment accumulation. Remove any accumulated sediment or debris. • Inspect stormwater planter for erosion and the formation of rills and gullies. Plant replacement vegetation in any eroded areas. • Replace mulch. • Test the planting soils for pH levels. Consult with a qualified licensed Professional to determine and maintain the proper pH levels.	Semi-annually in spring and fall
• Implement plant maintenance plan to trim and divide perennials to prevent overcrowding and stress. • Check soil infiltration rates to ensure the soil is draining the water at a proper rate. Re-aerate or replace soil and mulch layers as needed to achieve infiltration rate of at least 0.25 inches per hour (1-2 in/hr preferred).	2 to 3 years

Stormwater Planter (Tree Box)					
Maintenance Item	Condition				Comments
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Pipes to the practice are free of trash, debris, large branches, etc.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Level spreader is in good condition with no trash, debris, or sediment accumulation (applicable if planters do not receive rooftop runoff).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
Structure seems to be working properly. No settling around the structure. Comment on overall condition of structure.					
Vegetation within the practice is maintained per landscaping plan.					
Mulching depth of 2-4 inches is maintained. Comment on mulch depth.					
Plants used in the practice are consistent with the requirements in the landscaping plan.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					

Stormwater Planter (Tree Box)					
Maintenance Item	Condition				Comments
	Good	Marginal	Poor	N/A*	
Plants seem to be healthy and in good condition. Comment on condition of plants.					
The underdrain has been flushed and there is no indication the underdrain system is clogged.					
Cleanout caps for underdrain is present and in good condition.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Results					
Overall condition of Stormwater Planter:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					

Stormwater Ponds

A stormwater pond is a constructed, shallow stormwater retention basin or landscaped area with a permanent pool of water. Stormwater runoff collected in the pool is treated through settling. In addition, the aquatic bench (fringe wetlands), safety bench, side slopes, and shallow areas of the pond include plants to aid in the filtration and infiltration of the stormwater runoff flowing through the practice.

There are some common problems to be aware of when maintaining a stormwater pond. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Establishing vegetation within the stormwater pond
- Pruning and weeding to maintain appearance
- Eutrophic conditions indicated by excessive algae growth or fish kills
- Creating a mosquito habitat

Routine inspection and maintenance should be performed on stormwater ponds to ensure that the structure is functioning properly. Note that during the first year the stormwater pond is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice. For more information on vegetation in stormwater ponds, see Appendix D: Planting and Soil Guidance.

In addition to routine maintenance, stormwater ponds have seasonal and intermittent maintenance requirements. During the winter months, the stormwater pond should be inspected after a snow event (this is specific to northern areas of Georgia) to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid further pollution. In addition, planting material should be trimmed during the winter, when the plants are dormant.

Inspect the stormwater pond after a large rainstorm. Keep drainage paths (both to and from the BMP) clean so that the water can properly flow into the stormwater pond. If the stormwater pond is not draining properly, check for clogging in the inflow and outflow structures.

If the forebay or stormwater pond has received a significant amount of sediment over a period of time, then the sediment at the bottom of the forebay or pond may need to be removed. Accumulated sediment in the practice decreases the available storage volume and affects the pond's ability to function as it was designed. A sediment marker should be placed in the forebay to determine when sediment removal is required. It important to note that sediment excavated from stormwater ponds

that does not receive stormwater runoff from stormwater hotspots are typically not considered to be toxic and can be safely disposed through either land application or landfilling. Stormwater hotspots are areas that produce higher concentrations of metals, hydrocarbons, or other pollutants than normally found in urban runoff. Examples of operations performed in potential stormwater hotspots include vehicle maintenance and repair, vehicle washing, landscaping/grounds care, and outdoor material and product storage. Check with the local development review authority to identify any additional constraints on the disposal of sediments excavated from stormwater ponds.

Periodic mowing of the pond buffer is only required along maintenance right-of-way and the embankment. The remaining buffer can be managed as a meadow (mowing every other year) or a forest.

In order to keep the water that exits the stormwater pond clean, fertilizers should be used sparingly during establishment. Once the vegetation in the practice has been established, fertlizers should not be used. While vegetation in the stormwater pond is important, the primary purpose of a stormwater pond is to act as a water quantity and quality device, and introducing fertilizers into the stormwater pond introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, stormwater ponds should already be nutrient rich environments that do not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

Stormwater ponds create a challenge for controlling mosquitos, because some types of vegetation, such as cattails, can create an environment that allows mosquitoes to breed both in the pond and along the shoreline. Keeping the practice free of trash will help the practice from becoming a mosquito habitat. Another method to control mosquitoes is to place fish, such as the mosquitofish (Gambusia affinis), in the pond to help with controlling the mosquitoes. Animals such as dragonflies, diving beetles, birds, and bats may aid on controlling mosquitoes, however it is likely that additional measures, such as chemicals, may be required to control the mosquitoes (using chemicals should be a last resort). Keeping the pond at a depth of four feet or greater can aid in mosquito control by limiting vegetation growing around the pond. If mosquitoes begin to pose a problem, consult a qualified professional.

Pond dam inspection and maintenance is also very important. The pond dam should be inspected for seepage and structural integrity. Look for saturated soil, sediment deposits, and flowing water at the base of an earthen dam and on the rear face of the dam. On concrete dams, look for seepage, cracks, leaks and rust stains, or bulges. If any signs of seepage are found, consult a Professional Engineer. Pests such as burrowing animals and fire ants can pose a major threat to dam safety. Fire ant tunnels and animal burrows can weaken the dam structure and create an undesired water pathway through the dam. In addition, tree roots are another source of potential damage and failure. Woody vegetation may not be planted on the embankment or allowed to grow within 15 feet of the toe of the embankment and 25 feet from the principal spillway structure. If you have a large dam that is subject to regulations by the state, other maintenance items may be required. Please consult a Professional Engineer for additional guidance.

Ponds can be an attractive nuisance, so security and safety should be taken into consideration. Fencing requirements are at the discretion of the local government. If security measures such as a fence and gate are present, ensure that they are functional and locked.

It is important that the embankment for a pond be inspected regularly for trees and animal activity. Trees growing on the top or sides of the embankment should be removed. The roots of trees grow into the embankment and will weaken the structure of the embankment by creating passage ways that allow water to flow through the embankment. Trees that are blown over or damaged by storms can loosen or remove soil which weakens the strength of the embankment. In the same way animals can burrow holes weakening the structure of the embankment. These holes act as a passage way for the water to travel through the embankment, increasing the potential for the embankment to fail.

Geese are attracted to open water, clean lines of sight, and grass. They can become a nuisance to stormwater ponds if they are causing damage to plants or the banks, or if they are 'loading' the pond with nutrients and bacteria. Geese can be discouraged from using a stormwater pond by planting the buffer with shrubs and native ground covers or installing an aquatic shelf, but ensure that access points are maintained.

The table below shows a schedule for when different maintenance activities should be performed on a stormwater pond.

Stormwater Ponds Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Inspect inlets, outlets and overflow spillway to ensure good condition and no evidence of erosion. • Clean and remove debris from inlet and outlet structures. • Mow side slopes. • Inspect pond dam for structural integrity. • Remove trash from the area around the pond.	Monthly
• If wetland components are included, inspect for invasive vegetation.	Semiannual Inspection
• Inspect for damage, paying particular attention to the control structure. • Check for signs of eutrophic conditions (e.g., algal blooms and fish kills). • Note signs of hydrocarbon build-up (e.g., an oil sheen), and remove appropriately. • Monitor for sediment accumulation in the facility and forebay. • Check all control gates, valves, or other mechanical devices.	Annual Inspection
• Repair undercut or eroded areas.	As Needed
• Perform wetland plant management and harvesting.	Annually (if needed)
• Remove sediment from the forebay.	5 to 7 years or after 50% of the total forebay capacity has been lost

Activity	Schedule
• Monitor sediment accumulations, and remove sediment when the pool volume has become reduced significantly, or the pond becomes eutrophic.	10 to 20 years or after 25% of the permanent pool volume has been lost

(Source: WMI, 1997)

Stormwater Pond					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Inlet pipe is in good condition, and water is going through the structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment.					
Filter Strip or Grass Channels – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Rock Lined Plunge Pools – area is free of trash debris and sediment. Rock thickness in pool is adequate.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No algal growth along or within the pond.					
Native plants were used in the practice according to the planting plan. No undesirable vegetation.					
Practice seems to be working properly. No settling around the stormwater pond.					

Stormwater Pond					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Comment on overall condition of stormwater pond.					
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
No significant sediment accumulation within the practice.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, flooding, or animal activity around the structure.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet structure does not appear to be blocked.					
No evidence of animal activity.					
No evidence of seepage on the downstream face.					
Results					
Overall condition of Stormwater Pond:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Stormwater Wetland

Stormwater wetlands are constructed wetland systems built for stormwater management purposes. They typically consist of a combination of open water, shallow marsh and semi-wet areas that are located just above the permanent water surface. As stormwater runoff flows through a wetland, it is treated, primarily through gravitational settling and biological uptake.

There are some common problems to be aware of when maintaining a stormwater wetland. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Establishing vegetation within the wetland area
- Maintaining the proper pH levels for plants
- Pruning and weeding to maintain appearance
- Mosquitoes breeding in the practice

Routine maintenance should be performed on the stormwater wetlands to ensure that the structure is properly functioning. Note that during the first year the stormwater wetland is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice. For more information on stormwater wetland vegetation, see Appendix D: Planting and Soil Guidance. Regular inspection and maintenance is crucial to the success of the wetland as an effective stormwater management practice.

In addition to routine maintenance, stormwater wetlands have seasonal and intermittent maintenance requirements. During the winter months, the stormwater pond should be inspected after a snow event (this is specific to northern areas of Georgia) to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid further pollution. In addition, planting material should be trimmed during the winter, when the plants are dormant.

Inspect the stormwater wetland after large rainstorm events. Keep drainage paths (both to and from the BMP) clean so that the water can properly flow into the stormwater wetland. If the stormwater wetland is not draining properly, check for clogging in the inflow and outflow structures.

If the forebay or stormwater wetland has received a significant amount of sediment over a period of time, then the sediment at the bottom of the forebay or wetland may need to be removed. Accumulated sediment in the practice decreases the available storage volume and affects the wetland's ability to function as it was designed. It important to note that sediment excavated from stormwater wetlands that do not receive stormwater runoff from stormwater hotspots are typically not considered to be toxic and can be safely disposed through either land application or landfilling. Stormwater

hotspots are areas that produce higher concentrations of metals, hydrocarbons, or other pollutants than normally found in urban runoff. Examples of operations performed in potential stormwater hotspots include vehicle maintenance and repair, vehicle washing, landscaping/grounds care, and outdoor material and product storage. Check with the local development review authority to identify any additional constraints on the disposal of sediments excavated from stormwater wetlands.

In order to keep the water that exits the stormwater wetland clean, fertilizers should be used sparingly around the wetland. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the stormwater wetland is important, the primary purpose of a stormwater wetland is to act as a water quantity and quality device and introducing fertilizers into the stormwater wetland introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, stormwater wetlands should already be a nutrient rich environment that does not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

It is important that the embankment for a wetland be inspected regularly for trees and animal activity. Trees growing on the top or sides of the embankment should be removed. The roots of trees grow into the embankment and will weaken the structure of the embankment by creating passage ways that allow water to flow through the embankment. Trees that are blown over or damaged by storms can loosen or remove soil which weakens the strength of the embankment. In the same way animals can burrow holes weakening the structure of the embankment. These holes act as a passage way for the water to travel through the embankment, increasing the potential for the embankment to fail.

Stormwater wetlands create a challenge for controlling mosquitos, because some types of vegetation, such as cattails, can create an environment that allows mosquitoes to breed both in the pond and along the shoreline. Keeping the practice free of trash will help the practice from becoming a mosquito habitat. Another method to control mosquitoes is to place fish, such as the mosquitofish (Gambusia affinis), in the wetland to help with controlling the mosquitoes. Animals such as dragonflies, diving beetles, birds, and bats may aid on controlling mosquitoes, however it is likely that additional measures, such as chemicals, may be required to control the mosquitoes (using chemicals should be a last resort). Keeping the wetland at a depth of four feet or greater can aid in controlling mosquitoes by limiting vegetation growing around the wetland. If mosquitoes begin to pose a problem, consult a qualified professional.

The table below shows a schedule for when different maintenance activities should be performed on a stormwater wetland.

Stormwater Wetland Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Water side slopes and buffers to promote plant growth and survival. • Inspect wetland, side slopes and buffers following major storm events. Plant replacement vegetation in any eroded areas.	As Needed (Following Construction)

Activity	Schedule
• Examine to ensure that inlet and outlet devices are free of sediment and debris and are operational. • Inspect wetland, side slopes and buffers for dead or dying vegetation. Plant replacement vegetation as needed. • Inspect wetland, side slopes and buffers for invasive vegetation and remove as needed.	Monthly
• Inspect wetland, side slopes and buffers for erosion. Plant replacement vegetation in any eroded areas. • Monitor wetland vegetation and perform replacement planting as necessary. • Harvest wetland plants that have been “choked out” by sediment build-up.	Semi-Annually (Quarterly During First Year)
• Inspect for damage, paying particular attention to the control structure and side slopes. Repair as necessary. • Examine stability of the original depth zones and microtopographical features (i.e., shallow areas with minor ridges that increase water quality, provide flood storage, and enhance the development of a more diverse vegetative community). • Inspect side slopes for erosion and undercutting and repair as needed. • Check for signs of eutrophic conditions (e.g., excessive algal growth). • Check for signs of hydrocarbon accumulation (e.g., oil sheens) and remove appropriately. • Monitor sediment markers for sediment accumulation in forebays and permanent pools. • Check all control gates, valves and other mechanical devices.	Annually
• Remove sediment, trash, and debris from inlets/forebay.	5 years or after 50% of the total forebay storage capacity has been lost
• Monitor sediment accumulation in the wetland and remove sediment when the permanent pool volume has become reduced significantly, plants are “choked” with sediment, or the wetland becomes eutrophic.	10 plus years or after 25% of the wetland storage volume has been lost

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Stormwater Wetland					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Inlet pipe is in good condition, and water is going through the structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment. Sediment accumulation in forebay is less than 50% of the storage capacity.					
Filter Strip or Grass Channels – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Rock Lined Plunge Pools – area is free of trash debris and sediment. Rock thickness in pool is adequate.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No algal growth along or within the wetland.					
Native plants were used in the practice according to the planting plan. No undesirable vegetation.					

Stormwater Wetland					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Wetland seems to be working properly. No settling around the practice. Comment on overall condition.					
No significant sediment accumulation within the practice.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, flooding, or animal activity around the structure. No evidence of seepage on the downstream face.					
No evidence of unwanted vegetation and vegetation is in good condition.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet structure does not appear to be blocked.					
Results					
Overall condition of Stormwater Wetland:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Submerged Gravel Wetlands

The submerged gravel wetland system is similar to a regular stormwater wetland; however, it is filled with crushed rock or gravel and designed to allow stormwater to flow through the root zone of the constructed wetland. The outlet from each cell is set at an elevation to keep the rock or gravel submerged. Wetland plants are rooted in the media, where they can directly take up pollutants. In addition, algae and microbes thrive on the surface area of the rocks. Mimicking the pollutant removal ability of nature, this structural control relies on the pollutant-stripping ability of plants and soils to remove pollutants from runoff.

There are some common problems to be aware of when maintaining a submerged gravel wetland. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Establishing vegetation within the wetland area
- Maintaining the proper pH levels for plants
- Pruning and weeding to maintain appearance
- Mosquitoes breeding in the practice

Routine maintenance should be performed on the submerged gravel wetlands to ensure that the structure is properly functioning. Note that during the first year the submerged gravel wetland is built, maintenance may be required at a higher frequency to ensure the proper establishment of vegetation in the practice. For more information on vegetation in submerged gravel wetlands, see Appendix D: Planting and Soil Guidance. Regular inspection and maintenance is crucial to the success of the wetland as an effective stormwater management practice.

In addition to routine maintenance, submerged gravel wetlands have seasonal and intermittent maintenance requirements. During the winter months, the stormwater pond should be inspected after a snow event (this is specific to northern areas of Georgia) to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid further pollution. In addition, planting material should be trimmed during the winter, when the plants are dormant.

Inspect the submerged gravel wetland after large rainstorm events. Keep drainage paths (both to and from the BMP) clean so that the water can properly flow into the submerged gravel wetland. If the submerged gravel wetland is not draining properly, check for clogging in the inflow and outflow

structures. If sediment buildup is preventing flow through the wetland, remove gravel and sediment from cell. Replace with clean gravel and replant vegetation.

If the forebay or submerged gravel wetland has received a significant amount of sediment over a period of time, then the sediment at the bottom of the forebay or gravel wetland may need to be removed. It is important to note that sediment excavated from submerged gravel wetlands that do not receive stormwater runoff from stormwater hotspots are typically not considered toxic and can be safely disposed through either land application or landfilling. Stormwater hotspots are areas that produce higher concentrations of metals, hydrocarbons, or other pollutants than normally found in urban runoff. Examples of operations performed in potential stormwater hotspots include vehicle maintenance and repair, vehicle washing, landscaping/grounds care, and outdoor material and product storage. Check with the local development review authority to identify any additional constraints on the disposal of sediments excavated from submerged gravel wetlands.

In order to keep the water that exits the submerged gravel wetland clean, fertilizers should be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizer should not be used. While vegetation in the submerged gravel wetland is important, the primary purpose of a submerged gravel wetland is to act as a water quantity and quality device and introducing fertilizers into the submerged gravel wetland introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. In addition, submerged gravel wetlands should already be a nutrient rich environment that does not require fertilization. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

It is important that the embankment of a submerged gravel wetland be inspected regularly for trees and animal activity. Trees growing on the top or sides of the embankment should be removed. The roots of trees grow into the embankment and will weaken the structure of the embankment by creating passage ways that allow water to flow through the embankment. Trees that are blown over or damaged by storms can loosen or remove soil which weakens the strength of the embankment. In the same way animals can burrow holes weakening the structure of the embankment. These holes act as a passage way for the water to travel through the embankment, increasing the potential for the embankment to fail.

The table below shows a schedule for when different maintenance activities should be performed on a submerged gravel wetland.

Submerged Gravel Wetlands Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Ensure that inlets and outlets to each submerged gravel wetland cell are free from debris and not clogged. • Remove any accumulated sediment and debris from inlet and outlet structures.	Monthly

Activity	Schedule
• Inspect wetland, side slopes and buffers for erosion. Replace vegetation in eroded areas. • Inspect wetland, side slopes and buffers for dead or dying vegetation. Replace vegetation as needed. • Inspect wetland, side slopes and buffers for invasive vegetation and remove as needed.	Semi-Annually (Quarterly During First Year)
• Inspect for damage to the embankment and inlet/outlet structures. Repair as necessary. • Monitor for sediment accumulation in the facility. • Examine to ensure that inlet and outlet devices are free of sediment and debris and operational. • Inspect side slopes for erosion and undercutting and repair as needed. • Check for signs of eutrophic conditions (e.g., excessive algal growth). • Check for signs of hydrocarbon accumulation and remove appropriately. • Monitor sediment markers for sediment accumulation in forebays and permanent pools. • Check all control gates, valves and other mechanical devices.	Annually
• Water side slopes and buffers to promote plant growth and survival. • Inspect wetland, side slopes, strucutres, and buffers following rainfall events. Plant replacement vegetation in any eroded areas.	As Needed
• Remove sediment, trash, and debris from inlets/forebay.	5 years or after 50% of the total forebay storage capacity has been lost
• Monitor sediment accumulation in the wetland and remove sediment when the permanent pool volume has become reduced significantly, plants are “choked” with sediment, sediment buildup is preventing flow through the wetland, or the wetland becomes eutrophic. Replace with clean gravel and replant vegetation.	10 plus years or after 25% of the wetland storage volume has been lost

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Submerged Gravel Wetlands					
Inspection Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet structure is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet structure.					
Water is going through structure (i.e. no evidence of water going around the structure).					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Forebay – area is free of trash, debris, and sediment.					
Filter Strip or Grass Channels – area is free of trash debris and sediment. Area has been mowed and grass clippings are removed. No evidence of erosion.					
Rock Lined Plunge Pools – area is free of trash debris and sediment. Rock thickness in pool is adequate.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Erosion protection is present on site (i.e. turf reinforcement mats). Comment on types of erosion protection and evaluate condition.					
No algal growth along or within the wetland.					
Native plants were used in the practice according to the landscaping plan. No undesirable vegetation.					

Submerged Gravel Wetlands					
Inspection Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Vegetation within and around practice is maintained per landscaping plan. Grass clippings are removed.					
Wetland seems to be working properly. No settling around the practice. Comment on overall condition.					
No significant sediment accumulation within the practice.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					
Plants seem to be healthy and in good condition. Comment on condition of plants.					
Emergency Overflow					
Emergency overflow is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet Structure					
Outlet structure is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding around the structure.					
Outlet structure does not appear to be blocked.					
Results					
Overall condition of Submerged Gravel Wetland:					
Additional Comments					
Notes: * If a specific maintenance item was not checked, please check N/A and explain why in the appropriate comment box.					

Underground Detention

Underground detention is detention storage located in underground tanks or vaults designed to provide water quantity control through temporary storage of stormwater runoff. In addition they can improve water quality by removing heavy amounts of sediment.

There are some common problems to be aware of when maintaining an underground detention area. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Requirement to have Occupational Safety and Health Administration (OSHA) confined space entry training

Routine maintenance should be performed on the underground detention areas to ensure that the structure is properly functioning. Routine maintenance includes the removal of debris from inlet and outlet structures and cleaning sediment built up inside the structure. Because this is an underground system, inspection and maintenance may be difficult to conduct. Generally these underground systems can be inspected by looking in an access opening. Sometimes, however, maintenance requires an individual who is certified in OSHA confined space entry. Should there be a situation where a safety concern arises, the inspection should stop and the safety concern addressed. Once the concern is addressed, the inspection can continue.

Inspect the underground detention area after a large rainstorm. If the underground detention area is not draining properly, check the inlet and outlet structures to make sure they are not clogged.

Sediment should be removed from the practice by either a vacuum or boom. If the system is accepting water that flowed from a hazardous facility, the sediment may need to be disposed of by other means. Check with the local government to identify any additional constraints on the disposal of sediments excavated from underground detention.

The table on the following page shows a schedule for when different maintenance activities should be performed on a submerged gravel wetland.

Underground Detention Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Remove any trash/debris and sediment buildup in the underground trash racks, vaults or tanks. • Check drainage areas for trash, erosion, and debris. • Clean underground detention if hazardous or foreign substances are spilled in the contributing drainage area. • Perform structural repairs to inlet and outlets.	As needed
• Follow manufacturer's guidelines and develop/adjust plan for the underground detention. • Clean out underground detentions with vacuum or boom trucks. • Clean sediment or oil chambers	Annually

Underground Detention

Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet Structure and Pretreatment					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Inlet structure is in good condition. No signs of cracks or leaks.					
Diversion structure (high flow bypass structure or other) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Inlet pipe fits tightly to the underground detention.					
Inlet has protection to prevent clogging with leaves or other debris and has fine mesh for mosquito control.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
Structure seems to be working properly. No signs of settling, leaking, or cracking. Comment on overall condition of structure.					
Emergency Overflow and Outlet Structure					
Area is free of trash, debris, and sediment.					
Overflow valve appears to be in good condition and show no signs of leaking.					
Results					
Overall condition of Underground Detention:					
Additional Comments					

Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.

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Vegetated Filter Strips

Vegetated filter strips are uniformly graded and densely vegetated sections of land, designed to treat runoff and remove pollutants through vegetative filtering and infiltration. Vegetated filter strips are best suited to treating runoff from roads and highways, roof downspouts, very small parking lots, and pervious surfaces. These filter strips may be constructed with turf, meadow grasses, or other dense vegetation. They are also ideal components of the "outer zone" of a stream buffer, or as pretreatment for another structural stormwater control. Filter strips can serve as a buffer between incompatible land uses, be landscaped to be aesthetically pleasing, and provide groundwater recharge in areas with pervious soils.

There are some common problems to be aware of when maintaining a vegetated filter strip. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the pea gravel diaphragm or other flow spreader
- Establishing vegetation within the vegetated filter strip
- Ant mounds
- Erosion
- Concentrated flow

Routine maintenance should be performed on the vegetated filter strips to ensure that the practice is functioning properly. Note that during the first year the vegetated filter strip is built, maintenance may be required at a higher frequency to ensure the proper establishment of grass and vegetation in the practice. Upon establishment, grass should be routinely cut and vegetation trimmed, as necessary, to maintain a grass height of 3-12 inches or 6-15 inches along a roadway. Other routine maintenance includes removing trash from the vegetated filter strip and ensuring that grass clippings and other debris are removed from the filter strip.

Vegetated filter strips should be inspected after a large rainstorm. Keep drainage paths, both to and from the BMP, clean to promote sheet flow so that the water can be filtered by the BMP.

If the vegetated filter strip is not draining properly, check for clogging in the inlet and outlet structures. Also, consider if the filter strip has a sufficient slope or if there are obstructions within the filter strip that may cause inhibit the flow of water. If the practice includes a permeable berm, a structural repair or cleanout to unclog the outlet pipe may be necessary.

In order to keep the water that exits the vegetated filter strip clean, fertilizers should be used sparingly during the establishment of the practice. Once the vegetation in the practice has been established, fertilizers should not be used. While vegetation in the vegetated filter strip is important, a primary purpose of a vegetated filter strip is to act as a water quality device and introducing fertilizers into the vegetated filter strip introduces nutrients such as phosphorus and nitrogen that can pollute downstream waters. To control animal nuisances and invasive species, pesticides (including herbicides, fungicides, insecticides, or nematode control agents) should be used sparingly and only if necessary.

The table below shows a schedule for when different maintenance activities should be performed on a vegetated filter strip.

Vegetated Filter Strips Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Mow grass to a height to maintain a dense vegetative cover. It is recommended that the height of grass is 3-12 inches and 6-15 inches along a roadway. Remove any grass clippings • Keep the practice clean and remove all trash, sediment, and debris. • Reseed any eroded or bare spots. • Water the practice during dry conditions of vegetation establishment.	As needed
• Inspect vegetated filter strip for signs of erosion, and repair the strip as needed. • Inspect for invasive species and remove as needed. • Inspect pea gravel diaphragm for clogging and remove built-up sediment. • Inspect vegetation for rills and gullies. Seed or sod bare areas. • Inspect to ensure that grass has established. If not, replace with an alternative species.	Annual Inspection

Vegetated Filter Strip					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. removed).					
Inlet					
Drainage ways (overland flow or pipes) to the practice are free of trash, debris, large branches, etc.					
Area around the inlet is mowed and grass clippings are removed.					
No evidence of gullies, rills, or excessive erosion around the inlet.					
Water is going through the filter (i.e. no evidence of water going around the filter).					
Diversion structure (high flow bypass channel or overflow spillway) is free of trash, debris, or sediment. Comment on overall condition of diversion structure and list type.					
Pretreatment (choose one)					
Area is free of trash, debris, and sediment.					
No signs of erosion, rills, or gullies.					
Pea gravel diaphragm or other level or flow spreader – No cracks or structural damage in concrete trough.					
Main Treatment					
Main treatment area is free of trash, debris, and sediment.					
No signs of erosion, rills, or gullies.					
No evidence of long-term ponding or standing water in the ponding area of the practice (examples include: stains, odors, mosquito larvae, etc).					
Practice seems to be working properly.					
No areas of unhealthy grass or bare areas.					
No unwanted or invasive vegetation.					
No evidence of use of fertilizer on plants (fertilizer crusting on the surface of the soil, tips of leaves turning brown or yellow, blackened roots, etc.).					

Vegetated Filter Strip					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
Grass is kept at the proper mowing height, 3-12 inches and 6-15 inches along the roadway. Grass clippings are removed.					
No signs of accumulated sediment.					
Outlet Structure					
Outlet is free of trash, debris, and sediment.					
No evidence of erosion, scour, or flooding.					
Results					
Overall condition of Vegetated Filter Strip:					
Additional Comments					
Notes: *If a specific maintenance item was not checked, please explain why in the appropriate comment box.					