Maintaining Your Stormwater Pond or BMP

A Practical Guide for Private Owners of Stormwater Facilities in the Town of Warrenton, Virginia

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Glossary

Aesthetics is a concern for the visual beauty of the object.

BMP or "Best Management Practice" is a method, or activity believed to be effective at controlling the negative impacts of excessive stormwater runoff.

Design capacity is the volume of water that the facility is designed to hold.

Disease vectors are disease carrying organisms that can transmit an infectious disease from one host to another such as mosquitoes, ticks, lice and fleas.

Embankment is an elongated ridge or wall of material that is used to hold back water inside the stormwater facility.

Emergency spillway is a structure or channel that safely conveys high flows out of the facility. This structure is intended for safe removal of flows that exceed the design capacity of the facility.

Energy dissipater is a structure designed to quickly slow the velocity and energy of rapidly flowing water.

Erosion is a natural process of water or wind moving soil and rock and depositing them elsewhere. This process can be dramatically increased by human land use and the removal of vegetation that can better hold the soil and rock in place.

Forebay is a settling basin typically constructed at the beginning of a stormwater facility so that sediment can settle and be isolated from the rest of the facility.

Flash flooding is a quick rise in streams and tributaries caused by intense rainfall. Flash flooding is sudden in nature and can occur within six hours of the beginning of the rainfall event.

Impervious surfaces are surfaces that do not allow water to be absorbed.

Infiltration capacity is the ability of a facility to absorb water.

Invasive plants are plants that are not native to the region and have the potential to adversely affect the ecology in the area.

Nutrient loading is the accumulation of nutrients such as nitrogen and phosphorus that can detrimentally affect the natural productivity of a water body. This can lead to a decreased amount of fish and other healthy organisms that are able to survive in the water body.

Outflow point is the point where water leaves the facility.

Orifice plate is a thin plate with a hole in the middle that is used to control the amount of water exiting through it.

Re-suspension of settled material is the mixing of settled dirt particles with water. This mixture of dirt and water allows the water to transport the dirt along with it.

Riser structure is a vertical pipe located in a stormwater facility that is used to control the rate of water leaving the facility.

Runoff is water from rainfall or snowmelt that does not absorb into the soil and will flow down-slope along the surface of the ground.

Sediment consists of fragments of rock and soil that are deposited by water.

Side slopes are the sloped areas on the perimeter of a facility that keep water inside the basin.

Stormwater is surface water that occurs due to a rainfall event.

Swale is a gentle ditch or channel that is created to convey rainfall runoff in a controlled manner.

Trash rack is a device placed in a stormwater facility to intercept and collect floating trash and debris that is typically transported downstream with rainfall runoff.

Tributary is a small stream that flows to a larger stream or water body.

Vector control is any action or method used to eliminate disease carrying organisms that can transmit an infectious disease from one host to another.

Stormwater Management BMP Maintenance Overview

Stormwater Management Best Management Practices (BMPs) are facilities designed and constructed to reduce the impacts of increased stormwater that occur due to development practices. These impacts include an increased amount of runoff from impervious surfaces and an increased amount of pollutants that are carried along with the water. These stormwater facilities are an essential part of the Town of Warrenton's efforts to restore and maintain the critical habitats of the rivers and tributaries.

Unfortunately, all BMPs require maintenance. These facilities must be regularly maintained to prevent failure. Once a BMP fails, it will no longer perform its intended function and may have a negative contribution to the local waterways. It also can be quite costly to repair a BMP once it has been severely neglected.
Whether you are an individual property owner, a homeowner's association representative, or a commercial property owner or manager, this guide is intended to provide some basic recommendations for the maintenance and planning needed to keep your BMP functioning properly.

Why do we need Stormwater Management?

As the landscape becomes more developed, forests and farmlands are being converted into shopping malls and housing developments. Impervious surfaces (parking lots, roads, or rooftops) cannot absorb water as the native soil and vegetation could. This causes significant increases in the volume and speed of stormwater runoff during rainstorms. Shown below is an example of the amounts of runoff that can be released by areas with different amounts of impervious surface.

LOTS OF RUNOFF **LITTLE RUNOFF**

When functioning properly, BMPs can help control flooding by temporarily storing stormwater. These ponds lessen flash flooding and improve water quality by holding storm water loads and allowing settlement of sediment and pollutants. Stormwater ponds allow areas with high amounts of impervious cover to release stormwater at the same rate the site would if it were to remain in a natural, more pervious state.

Who contributes to Stormwater Runoff?

Anyone who has impervious surfaces on their property contributes to the total amount of runoff going to the streams and tributaries. A rooftop, an asphalt driveway, or patio all can contribute to runoff. The steady growth in this region is slowly adding impervious surfaces to the land. Between the years of 1990 and 2000, Virginia has experienced a **45°/o increase** in impervious surfaces statewide.

Pipe Discharging into creek.

To counteract these impacts, The Town of Warrenton has adopted regulations that require management of stormwater for all new development and redevelopment.

Who benefits from Stormwater Management?

The entire Warrenton region can benefit from stormwater management. During rainfall events, water that falls on roads, driveways, parking lots, rooftops and other paved areas flows quickly off these surfaces and ends up in the rivers and tributaries. The water often picks up many different pollutants found on the paved surfaces such as: sediment, nitrogen, phosphorus, bacteria, oil, grease, trash, fertilizers and many other types of chemicals.

Proper stormwater management helps keep our region's streams and waters clean and healthy.

What is a Stormwater Management BMP?

A stormwater management BMP is a specific practice (constructed or natural) intended for the reduction, detainment or the slowing of quantity of stormwater runoff. These BMPs also may have additional features that detain pollutants incorporated into the

designs as well. Stormwater management BMPs are intended to mimic some of the natural processes that would have existed before the site was developed.

Some natural features provide stormwater management for the area and are therefore left in their natural states. Oftentimes it is more cost effective to preserve naturally vegetated areas than to try and mimic the processes after the site has been completed.

Simple depressions, ponds, or ditches that you may see on a regular basis may actually be stormwater BMPs designed to reduce flooding and improve water quality. Some BMPs are quite visible, while others may be located completely underground. The most common stormwater BMP in the Town of Warrenton is the dry detention pond as shown in the picture below.

There are many different types of stormwater BMPs and each has different maintenance needs. Take time to understand what type of BMP you have and that will help you plan better for its short and long-term maintenance needs. If you are unsure what type of BMP you have, check the construction plans on the Town or Fauquier County GIS website, or if you have additional questions please feel free to call Public Works Stormwater Management at (540) 347-1858.

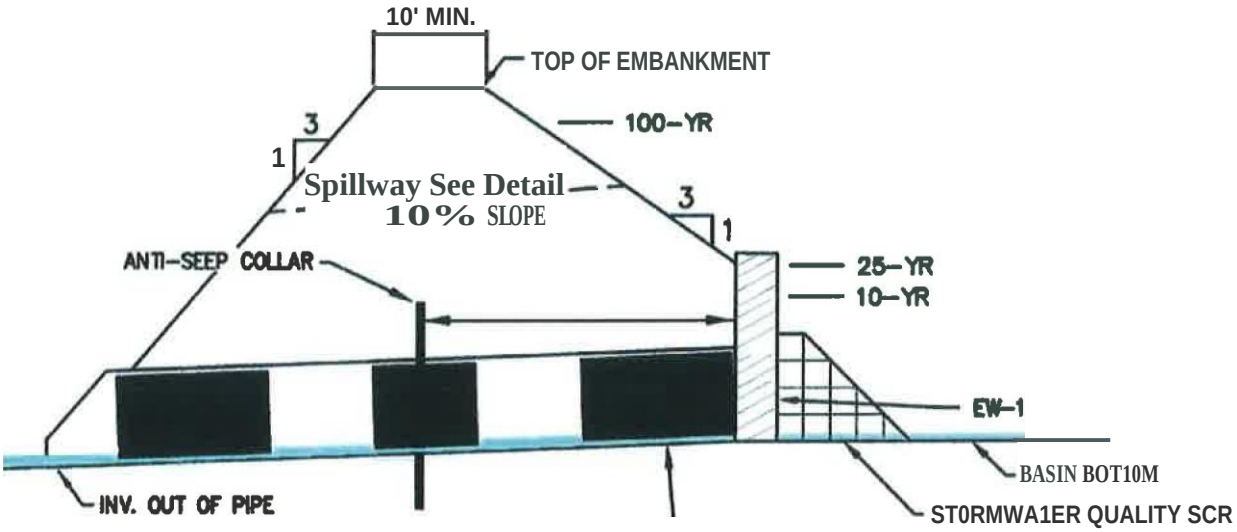
Types of Stormwater Management BMPs

Dry Detention Ponds

Dry detention ponds are designed to detain water for a specific period of time (usually 36-72 hours) after a storm. Water flows into the dry pond which holds the water back as it slowly drains out. The outlet of this structure is critical because the size controls the speed in which water is released.

Most dry detention ponds do not have a permanent pool of water. They are designed only to be wet for short periods after a storm. If water persists, then the pond is not functioning properly. Some dry detention ponds do contain a small permanent pool of water to incorporate a wetland marsh area. A wetland area can improve the removal of pollutants from the water before it exits the pond; this type of pond is called an **Enhanced-Extended Detention Basin.** It is important to determine whether standing water is by design or a sign that maintenance is required.

Shown below is a diagram of a dry detention pond embankment. Each pond may be different, but these elements are typical.



Maintenance Concerns, Goals, and Objectives

- Sediment and Trash Removal
- Vector (mosquito) Control
- Vegetation/ Landscape Maintenance
- Prevent Re-suspension of Settled Material
- Prevent Clogging of the Outlet

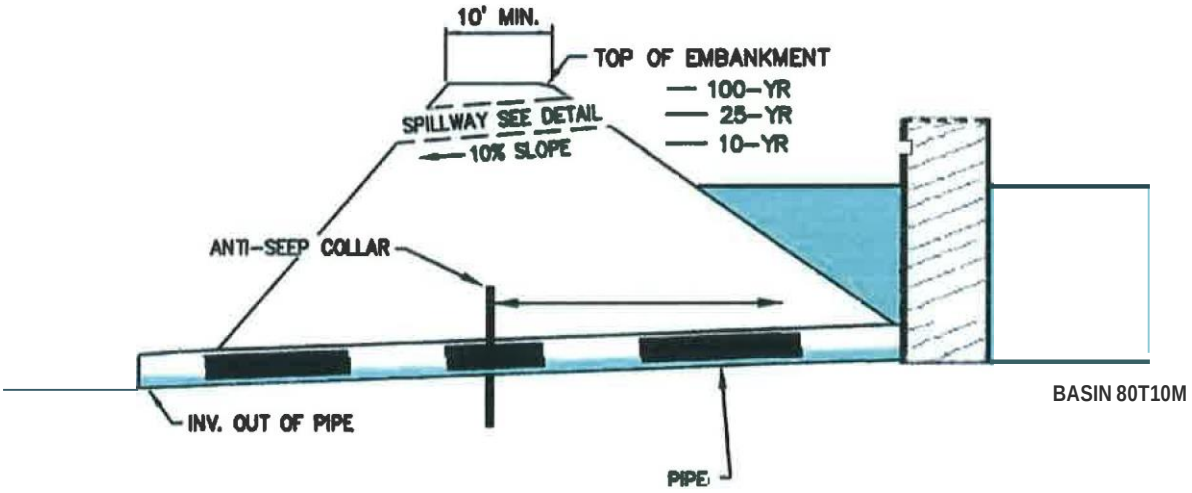
Detention Pond Maintenance Activities	Suggested Frequency
Mow side slopes.	Twice during growing season, as needed during off season
Remove accumulated trash and debris from the basin, around the riser pipe, side slopes, embankment, emergency spillway, and outflow trash racks. The frequency of this activity may be altered to meet specific site conditions.	Quarterly, or more frequently, as needed
Manage pesticides and nutrients.	Annually
Trim woody vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector control reasons.	Semi-annually, or more frequently, as needed
Repair undercut or eroded areas.	Annually
Control vectors by eliminating ponding areas.	Annually, as needed
Keep access road clear of obstructions and woody vegetation.	Annually
Seed or sod to restore dead or damaged ground cover.	Annually, as needed
Monitor structural components (pipes, riser structures, orifice plates or energy dissipaters) for signs of deterioration such as cracks, sink holes, and separation.	Annually, as needed
Repair erosion to banks and bottom as required.	Annually, as needed
Supplement wetland plants if a significant portion has not been established (at least 50% of the surface area).	Annually, as needed ***(Enhanced-Extended Detention Only)***
Remove nuisance or invasive plant species.	Annually, as needed
Remove sediment from forebay to reduce the frequency of main basin cleaning.	Annually, as needed, if applicable

Detention Pond Maintenance Activities	Suggested Frequency
Monitor sediment accumulation and remove accumulated sediment and re-grade about every 10 years or when the accumulated sediment volume exceeds 10-20% of the basin volume, or when accumulation reaches 6 inches or if re-suspension is observed. Clean in early spring so vegetation damaged during cleaning has time to re-establish.	Every 10-25 years, as needed

Wet Detention Ponds

Wet detention ponds contain a permanent pool of water throughout the year (or at least throughout the wet season) much like a natural pond. The wet pond is designed to hold a permanent level of water, above which stormwater runoff is temporarily stored and released at a controlled rate. The release is regulated by an outlet similar to one for a dry pond except the opening is higher off the ground. Wet ponds have the advantage of being utilized as an aesthetic feature as well as a stormwater management BMP.

Shown below is a diagram of a wet pond embankment. Each pond may be different, but these elements are typical.



In order to maintain the pool's design capacity, sediment must be removed occasionally and adequate resources must be committed to properly maintain peripheral aquatic vegetation, control vector production (mosquitoes and other disease conveying insects), and to maintain effective pool volume.
Wet ponds can become a serious nuisance due to mosquito and insect breeding unless carefully designed and maintained.

Nutrient loading is also a concern for wet ponds. If excessive amounts of nutrients from fertilizers or other sources collect in the pond, an algal bloom can kill the natural ecosystem of the pond. This can create an unpleasant aesthetic for your pond (shown on the right) and could potentially harvest toxic microscopic organisms. An algal bloom should be avoided if at all possible.

Maintenance Concerns, Goals and Objectives

- Sediment and Trash Removal
- Vector (mosquito) Control
- Prevent Nutrient Loading
- Prevent Clogging of the Outlet
- Landscape Maintenance
- Maintain Aesthetics

Wet Pond Maintenance Activities	Suggested Frequency
Mow side slopes.	Twice during growing season, as needed during off season
Remove accumulated trash and debris from the basin, around the riser pipe, side slopes, embankment, emergency spillway, and outflow trash racks. The frequency of this activity may be altered to meet specific site conditions.	Quarterly, or more frequently, as needed
Trim woody vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector control reasons.	Semi-annually, or more frequently, as needed
Manage pesticides and nutrients.	Annually
Repair undercut or eroded areas.	Annually
Control vectors by eliminating stagnant water.	Annually, as needed
Keep access road clear of obstructions and woody vegetation.	Annually
Seed or sod to restore dead or damaged ground cover.	Annually, as needed
Monitor structural components (pipes, riser structures, orifice plates or energy dissipaters) for signs of deterioration such as cracks, sink holes, and separation.	Annually, as needed
Repair erosion to banks as required.	Annually, as needed
Remove nuisance plant species.	Annually, as needed
Remove sediment from forebay to reduce the frequency of main basin cleaning.	Annually, as needed, if applicable

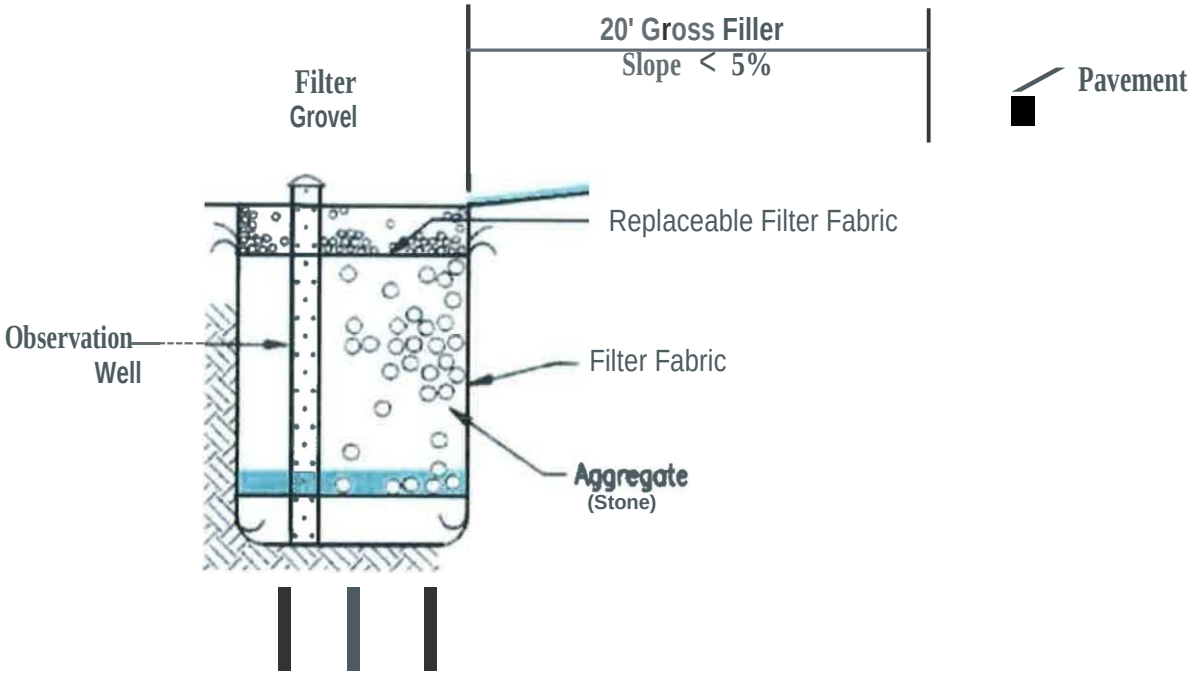
Monitor sediment accumulation and remove accumulated sediment and re-grade about every 10 years or when the accumulated sediment volume exceeds 10-20% of the basin volume, or when accumulation reaches 6 inches or if re-suspension is observed. Clean in early spring so vegetation damaged during cleaning has time to re-establish.	Every 10-25 years, if applicable

Infiltration Practices

Infiltration practices include many different types of BMPs, such as infiltration trenches, dry wells, or seepage areas. These stormwater management BMPs are typically trenches filled with gravel or other porous media that temporarily stores stormwater in the spaces between the rocks and then allow the stored water to slowly infiltrate naturally into the soil around the trench. In areas where soil infiltration is not feasible due to clay, waterlogged, or compacted soils, the infiltration trench may have drains installed at the bottom that will slowly collect water and direct it to the storm drain system.

Infiltration practices have a tendency to fail relatively quickly due to improper maintenance or improper use. Long periods of standing water outside of rainfall events are typically a sign of failure. Loose dirt and sediment that enters the infiltration device is a common cause of clogging and failure.

Shown below is a diagram of a typical infiltration practice.



Maintenance Concerns, Goals and Objectives

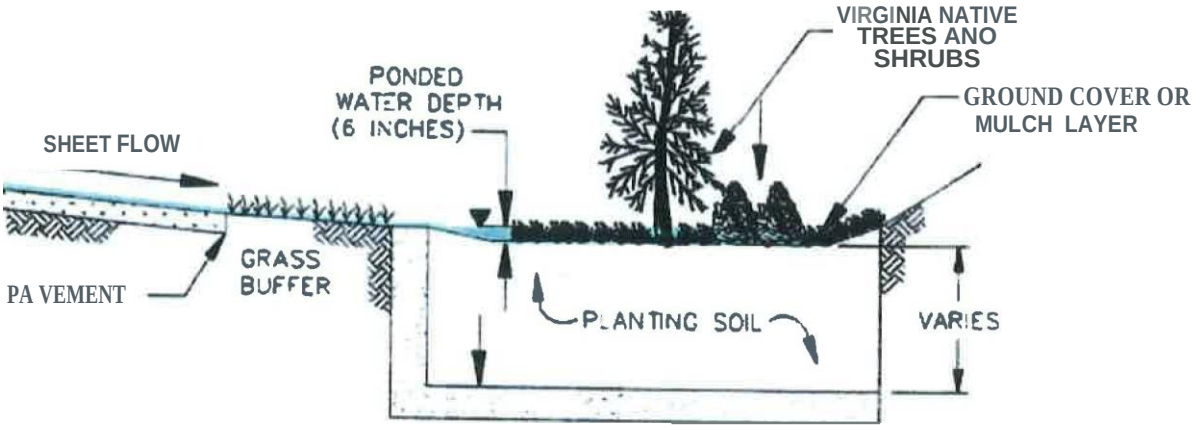
- Litter and Trash Removal
- Vector (mosquito) Control
- Maintain Infiltration Capacity
- Prevent Clogging of the Outlet
- Prevent Sedimentation
- Maintain Aesthetics

Infiltration Maintenance Activities	Suggested Frequency
Remove litter and debris.	Quarterly
Mow grassed side slopes.	Twice during growing season, as needed during off season
Examine infiltration areas and outlet for signs of clogging.	Semi-annually, or more frequently, as needed
Ensure no standing water remains in basin. Standing water indicates infiltration is clogged.	Semi-annually, or more frequently, as needed
Trim woody vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector control reasons.	Semi-annually, or more frequently, as needed
Repair undercut or eroded areas.	Annually
Monitor structural components (pipes, riser structures, or observation wells) for signs of deterioration such as cracks, sink holes, and separation.	Annually, as needed
Repair erosion to banks and adjacent grassed areas to prevent excess sediment from entering facility and clogging it.	Annually, as needed
Remove nuisance plant species.	Annually, as needed
Control vectors by eliminating ponding areas.	Annually, as needed
Trees shall be pruned such that the drip line does not extend over the surface of the infiltration area. All trees shall be removed within the infiltration area to prevent the puncture of the filter fabric.	If applicable, annually, as needed

If the basin loses infiltration capacity (i.e., standing water for more than 72 hours), rock fill should be removed and any sediment shall be disposed of in an upland area. The rock shall be replaced and the sediment should be stabilized with vegetation to prevent any re-entrance into the infiltration facility.	Every 10 years, or as needed, depending on the condition of upstream drainage areas

Bioretention Practices

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff is distributed evenly along the ponding area. Stored water slowly leaves the facility through soil absorption or through the soil media into perforated under-drains.



Shown above is a diagram of a typical bioretention practice.

Maintenance Concerns, Goals and Objectives

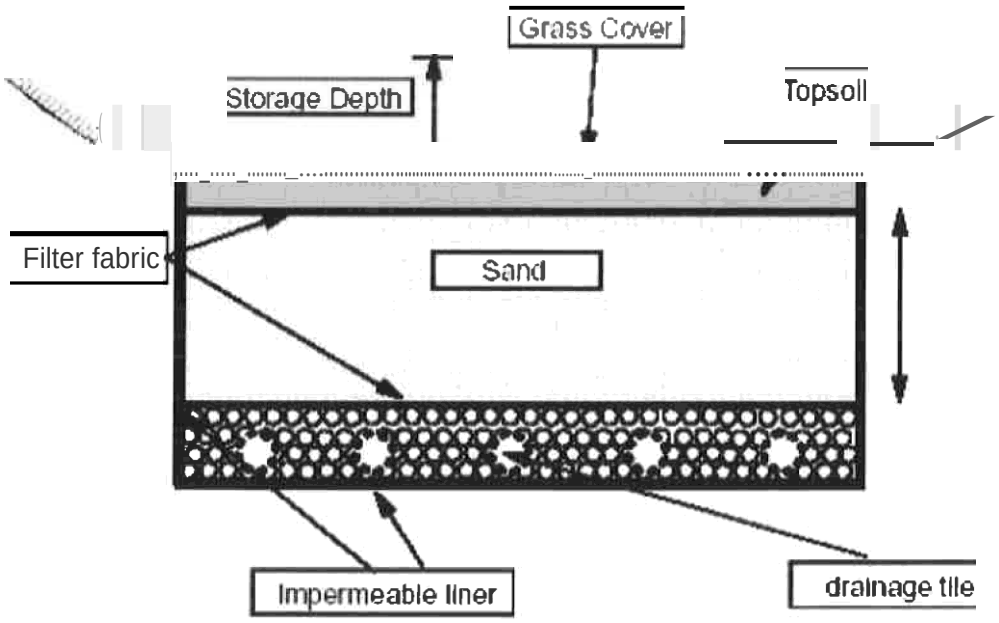
- Sediment and Trash Removal
- Vector (mosquito) Control
- Landscape Maintenance
- Prevent Clogging of the Outlet
- Prevent Channelization of Flow
- Maintain Aesthetics

Bioretention Maintenance Activities	Suggested Frequency
Remove litter and debris.	Quarterly
Mow side slopes (if applicable).	Twice during growing season, as needed during off season
Manage pesticides and nutrients.	Annually
Repair undercut or eroded areas.	Annually
Control vectors by eliminating ponding areas.	Annually, as needed
Keep access road clear of obstruction and woody vegetation (if applicable).	Annually
Replace mulch layer.	Annually
Seed or sod to restore dead or damaged ground cover (if applicable).	Annually, as needed
Monitor structural components (inflow pipes or riser structures) for signs of deterioration such as cracks, sink holes, and separation.	Annually, as needed
Repair erosion to banks and bottom as required.	Annually, as needed
Supplement plants when they fail to get established.	If applicable, as needed
Remove nuisance or invasive plant species.	Annually, as needed
Remove accumulated sediment to maintain the quality of the infiltration soil layer.	If applicable, 3 to 5 year maintenance

If the basin loses infiltration capacity (i.e., standing water for more than 72 hours), replace planting soil and vegetation to restore infiltration and biodiversity to the facility.	Every 5-10 years, as needed

Sand Filter Treatment

Sand filters are a stormwater management BMP that uses physical straining to remove the suspended solids and particulate nutrients. There are many types of sand filter systems including the Austin sand filter, DC sand filter, Delaware sand filter and Multi-Chambered sand filter.



Many of these filters are located below ground so knowledge of the facility and proper maintenance is critical for long-term function. Sand filters are one of the most expensive stormwater BMPs to repair when failing.

OCR, Virginia Stormwater Management Handbook, First Edition, 1999

Underground Sand Filter Treating Runoff from a GasStation

Maintenance Concerns, Goals and Objectives

- Sediment and Trash Removal
- Prevent Sedimentation
- Maintain Filtration Capacity
- Prevent Clogging of the Outlet
- Vector (mosquito) Control
- Maintain Aesthetics

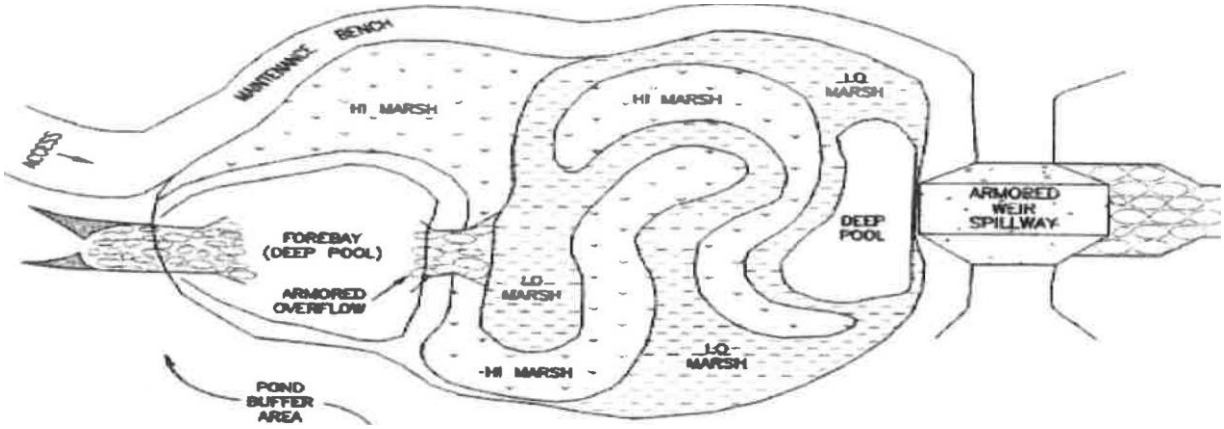
Sand Filter Maintenance Activities	Suggested Frequency
Remove litter and debris.	Quarterly
Examine filtration areas and outlet for signs of clogging.	Semi-annually, or more frequently, as needed
Ensure no unwanted standing water remains in basin. Standing water indicates filtration media is clogged.	Semi-annually, or more frequently, as needed

Clear woody vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector control reasons.	Semi-annually, or more frequently, as needed
Pump out sedimentation chamber. If water has an oil skim, it should be removed by a firm specializing in oil recovery and recycling. Refill the first chamber with water to restore the water seal.	Semi-annually, or more frequently, as needed, if applicable
Remove sediment and dispose of it properly in an appropriate landfill.	Semi-annually, or more frequently, as needed
Repair undercut or eroded areas adjacent to facility to prevent excess sediment from entering the facility.	Annually
Monitor structural components (pipes, riser structures, or concrete chambers) for signs of deterioration such as cracks, sink holes, and separation.	Annually, as needed
Remove nuisance plant species in facility and in adjacent areas.	Annually, as needed
Control vectors by eliminating unwanted ponding areas.	As needed
If the basin loses filtration capacity (i.e., standing water for more than 40 hours), replace filter cloth and top 2-inches of sand to restore filtering capacity. The sand should be taken to an appropriate landfill.	As needed depending on the condition of upstream drainage.

Constructed Wetlands

Constructed stormwater wetlands are man-made shallow pools that create growing conditions suitable for emergent and aquatic vegetation. These stormwater BMPs are installed on non-natural wetland sites to enhance the quality of stormwater runoff. These BMPs enhance stormwater by utilizing the natural pollution removal mechanisms in wetland plants. ***A distinction should be made between using a constructed wetland for storm water management and diverting storm water into a natural wetland. Natural wetlands should be protected from the adverse impacts of development, including the impact from increased stormwater runoff.***

Shown below is a diagram of a typical constructed stormwater wetland.



DCR, Virginia Stormwater Management Handbook, First Edition, 1999

The type of maintenance allowed in a constructed wetland is highly dependent on local and state regulatory agencies. These guidelines are subject to change as a result in any changes to regional environmental regulations.

Maintenance Concerns, Goals and Objectives

- Sediment and Trash Removal
- Vector (mosquito) Control
- Landscape Maintenance
- Prevent Sedimentation
- Maintain Aesthetics

.DCR, Virginia Stonnwnter Management Hnndbook, First Edition, 1999

Constructed Wetland Maintenance Activities	Suggested Frequency
Remove litter and debris.	Quarterly
Mow side slopes.	Twice during growing season, as needed during off season
Manage pesticides and nutrients.	Annually
Repair undercut or eroded areas.	Annually
Harvest vegetation to maintain nutrient removal and prevent the leaching of the nutrients from dead and dying plants falling into the water.	Annually, preferably in the summer
Keep access road clear of obstruction and woody vegetation to facilitate surveillance and control activities.	Annually
Remove accumulated trash and debris from the basin, around the riser pipe, side slopes, embankment, emergency spillway, and outflow trash racks. The frequency of this activity may be altered to meet specific site conditions.	Semi-annually, or more frequently, as needed
Trim woody vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.	Semi-annually, or more frequently, as needed

Seed or sod to restore dead or damaged ground cover.	Annually, as needed
Monitor structural components (pipes, riser structures, orifice plates or energy dissipaters) for signs of deterioration such as cracks, sink holes, and separation.	Annually, as needed
Supplement wetland plants if a significant needed portion has failed to establish.	If applicable, as
Remove nuisance or invasive plant species.	Annually, as needed
Remove sediment from forebay to reduce the maintenance frequency of main basin cleaning.	If applicable, 3- to 5- year
Monitor sediment accumulation and remove accumulated sediment and re-grade when the accumulated sediment volume exceeds 10-20% of the basin volume. Remove sediment in early spring so vegetation damaged during cleaning has time to re-establish.	Every 5 - 10 years, as needed

Vegetated Filter Strips, Grassed Swales and Water Quality Swales

Vegetated Filter Strips, also called vegetated buffer areas, are relatively flat vegetated areas in which overland runoff is routed to reduce velocities and filter pollutants. By reducing the velocity, suspended sediment is removed through filtering, absorption, and gravity sedimentation.

Grassed Swales are broad and shallow drainage channels with check-dams and may be utilized to control peak flows during storms. They filter pollutants and increase natural soil infiltration. These swales require check-dams to create small ponding areas to detain the initial runoff within the swales, while providing adequate drainage for larger design storms.

Water Quality Swales are broad and shallow drainage channels similar to Grassed Swales that are utilized to control peak flows during storms. They also filter pollutants and increase natural soil infiltration. These swales require check-dams to create small ponding areas to detain the initial runoff within the swales, while providing adequate drainage for larger design storms. The main difference between the grassed and the water quality swales is the water quality swales contain a bio-engineered soil bed mixture designed for sites that have greater pollutant removal needs.

Water Quality Swale **in** Construction

Grassed Swale, DCR Virginia Stormwater Handbook, First Edition 1999

Maintenance Concerns, Goals and Objectives

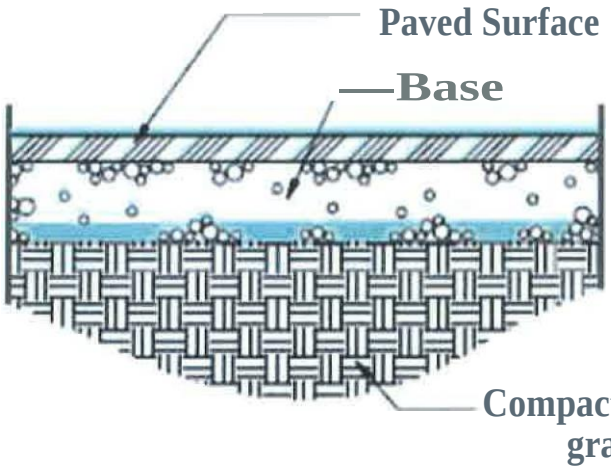
- Litter and Trash Removal
- Vector (mosquito) Control
- Ground Cover Maintenance
- Prevent Sedimentation and Erosion
- Maintain Aesthetics

Filter Strip and Swale Maintenance Activities	Suggested Frequency
Remove litter and debris. Keep the channel clean to reduce litter and floatables from being washed downstream.	Quarterly
Mow side slopes.	Twice during growing season, as needed during off season
Observe landscaping growing conditions. If landscaping is not thriving, correct conditions by applying fertilization, pesticide, herbicide, or soil amendment.	Quarterly
Check for uniformity of vegetative cover and for sediment and debris accumulation.	Quarterly
Seed or sod to restore dead or damaged ground cover.	Annually, as needed
Repair undercut or eroded areas.	Annually

Control vectors by eliminating unwanted ponding areas.	Annually, as needed
Check for structural repair to check dams (if applicable).	Annually
Trim woody vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.	Semi-annually, or more frequently, as needed
Remove accumulated sediment in channels, behind check dams, and at outfalls and culverts to maintain flow capacity and drainage. Repair any damage that occurs during sediment removal.	Annually, as needed
Provide reinforcement planting after the first growing season, if necessary. Thereafter, replace landscaping that dies or fails to thrive	Annually, as needed
Remove nuisance plant species.	Annually, as needed
If the swale loses infiltration capacity (i.e. standing water for more than 72 hours), replace bio-engineered planting soil and) vegetation to restore infiltration to the facility. ***(Water Quality Swales, only)***	Every 5-10 years, as needed

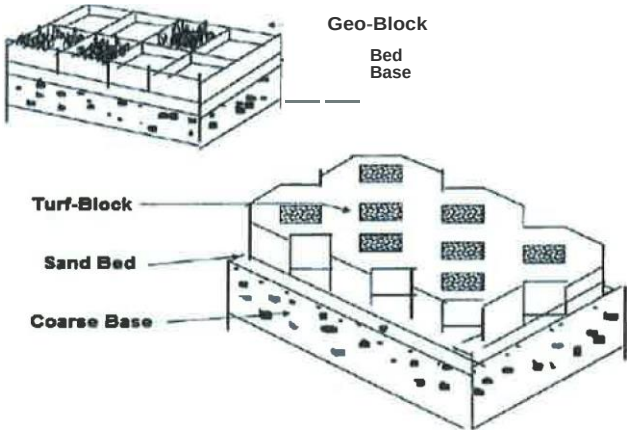
Pervious and Permeable Surfaces

Permeable pavement is an alternative to conventional concrete and asphalt paving materials because it allows for rapid infiltration of stormwater. Traditionally paved surfaces do not allow water to infiltrate into the soil; this process converts almost all rainfall into stormwater runoff. With a pervious or permeable surface, stormwater infiltrates into a porous paving material that provides temporary storage until the water infiltrates into underlying permeable soils or through an underground drain system.



Shown above is a diagram of a typical permeable surface.

If designed and implemented correctly, permeable pavement systems will reduce peak runoff volumes and flows. Permeable paving materials include, but are not necessarily limited to, porous concrete, permeable interlocking concrete pavers, concrete grid pavers, and porous asphalt.



Permeable Pavers

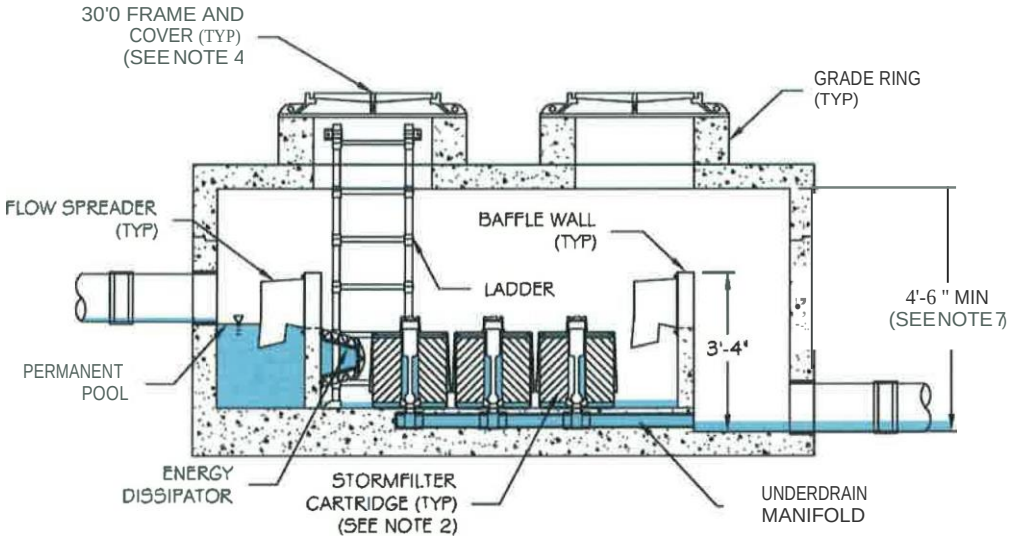
Maintenance Concerns, Goals and Objectives

- Litter and Trash Removal
- Vector (mosquito) Control
- Permeable Material Upkeep
- Prevent Sedimentation
- Maintain Aesthetics

Pervious Cover Maintenance Activities	Suggested Frequency
Remove litter and debris.	Quarterly
Vacuum or pressure wash pervious pavement surface to remove sediment and extend the life of the pervious media (depending on pervious cover type).	Quarterly
Mow upland areas and seed bare spots to prevent excess sediment from entering the pervious media.	Quarterly
Examine pervious media for signs of clogging.	Semi-annually, or more frequently, as needed
Ensure no standing water remains in facility. Standing water indicates pervious media is clogged.	Semi-annually, or more frequently, as needed
Control vectors by eliminating ponding areas.	As needed
If the pavement loses perviousness (i.e. standing water for more than 72 hours), a complete replacement of media is required. In some cases, the structural elements of the pervious cover can be re-used with a fresh layer of new pervious media between blocks.	Every 10 years, or as needed depending on the condition of upstream drainage areas

Manufactured BMP Systems

A manufactured BMP system is a structural measure which is specifically designed and sized by an engineer to intercept stormwater runoff and prevent the transfer of pollutants downstream.



Contech Stormwater Solutions

The Virginia Department of Conservation and Recreation (DCR) has in the past approved several manufactured BMP systems for use in meeting stormwater quality requirements. Information regarding OCR-approved manufactured BMP systems is included in the VA Stormwater Management Handbook. Additional manufactured systems may be found on DCRs website as new technologies are approved and added.

Manufactured BMP systems may be suitable for providing stormwater quality enhancement where other structural BMPs are not feasible due to limited land space and high flows or velocities. Applicability is likely to vary based on the manufactured BMP system.

The maintenance for these BMP systems varies widely. It **is critical to have detailed maintenance information provided by the manufacturer.** Many manufacturers include

a maintenance service with the unit for an additional price. It is important to understand what maintenance must be provided by the owner and what may already be provided by contract.

*The Town of Warrenton does not promote or approve any manufactured BMP system not already approved by the Virginia Department of Conservation and Recreation (DCR). Please see DCR's website for state approved BMPs for more information at www.dcr.virginia.gov .

Underground Detention Ponds

Underground detention ponds are similar to dry detention ponds except they are located underground. Similar to dry ponds, they are designed to detain water for a specific period of time (usually 36-72 hours) after a storm. Water flows into a chamber made of large pipes or a concrete box, which serves as an underground holding pond and it slowly drains out. The outlet of this structure is critical because its size controls the speed in which water is released.

Most underground detention ponds do not have a permanent pool of water. They are designed only to retain water for short periods after a storm. If water persists, then the pond is not functioning properly. Underground detention ponds are difficult to monitor due to their location underneath the ground. Due to many safety concerns that exist for underground ponds, **the maintenance for these structures should always be performed by a professional.**

Underground Stormwater Pond Under Construction

Who is Responsible for the Maintenance of the BMP?

In the Town of Warrenton Stormwater Ordinance Article 5 (Pursuant to code 61.1-44.15:27 of the Town Code), the maintenance of all stormwater management facilities (BMPs) remains with the property owner or responsible party and shall pass to any successor or owner.

According to these regulations, it is the property owner's responsibility to maintain the stormwater management facility onsite. The Town also requires that a Maintenance Agreement between the responsible party and Town of Warrenton be signed and recorded. If the stormwater facility is located in a housing development, the responsibility is typically shared by the homeowners association or a maintenance association. If that is the case, a recorded plat can be found showing the easement or lot surrounding the stormwater facility and citing the homeowners association as the responsible party. If there is no recorded easement for the stormwater management facility, it is the sole responsibility of the owner or owners of the parcel housing the facility. Often the development's homeowner's association covenants will describe cost sharing responsibilities and use of the BMP.

Similarly, if the stormwater management facility is located on a commercial site, the facility is the responsibility of the commercial business or businesses that maintains ownership of the parcel housing the facility.

Private agreements between commercial entities may provide more detail regarding cost sharing responsibilities and use of the stormwater management BMP.

Maintenance Work on a Stormwater Pond

Inspections

Owner Inspections

The property owner or responsible party is responsible for the proper operation, inspection, maintenance, and repair of stormwater management facilities, after the completion of construction, in accordance with the applicable maintenance agreement. All inspection, maintenance, and repair activities shall be documented. Establishing a record keeping procedure will aid in the long term health of your stormwater BMP. Not only will a procedure make it easier to manage your maintenance records, but reoccurring problems can be kept track of and monitored. This will aid the maintenance effort and can improve future cost estimates as well. The responsible party shall inspect and maintain stormwater management facilities at frequencies that are appropriate for the specific stormwater management BMP. Each year, before December 31st, the property owner or responsible party shall mail to the Town copies of the documentation for all inspection and maintenance activities that occurred during that year. This information shall be mailed to:

Dept. of Planning and Community Development
Town of Warrenton
P.O. Drawer 341
Warrenton, VA 20188

A property owner or responsible party that does not properly maintain a stormwater management facility in accordance with the maintenance agreement may be subject to the enforcement actions outlined in the Stormwater Management Ordinance and the Virginia Stormwater Management Law.

Inspections Performed by the Town of Warrenton

In addition to the inspections performed by the responsible party, each stormwater management facility will be inspected periodically by the Town of Warrenton. The Town performs routine inspections of storm water management facilities to ensure that all facilities are adequately maintained and functioning properly.

In the event that the Town finds the facility is in need of maintenance and/or becomes a danger to public safety, public health, or the environment, the Town of Warrenton shall notify the property owner, or responsible party, by registered or certified mail and issue a Notice of Violation. The Notice shall specify the measures needed to correct the situation and shall specify the time within which such measures must be completed.

If the responsible party fails or refuses to meet the requirements of the maintenance agreement, the Town of Warrenton, after reasonable notice, may apply a civil or criminal penalty and may correct a violation of the design standards or maintenance needs by performing all necessary work to place the facility in proper working condition, and recover the costs from the responsible party or property owner.

Planning for BMP Maintenance Costs

The maintenance needs for Stormwater BMPs can be difficult to assess, especially in situations where the responsible party has little previous experience with the maintenance of such facilities. The needs and costs vary widely and are typically site specific. However, the operation and maintenance can be estimated by utilizing some general parameters as guidance. In determining the costs for maintenance, it is important to understand that there are different types of maintenance for stormwater BMPs. Most of BMP maintenance can be separated into either routine or non-routine actions.

Routine Maintenance

Most routine actions involve inspections, debris and litter control, vegetation maintenance, and the monitoring of the mechanical components (if any). These duties often can be performed by a "non-expert" such as a neighborhood volunteer or lawn care company already on contract. Expert services may also be utilized by contracting a company that specializes in stormwater services to perform all needed maintenance and inspections.

In the cases where "non-expert" services are utilized, it is critical to communicate effectively with the person or persons performing the maintenance of the BMP. It is important that any novice involved in the maintenance of the BMP is made very aware of the components of the system, the needed frequency of maintenance, and the safety issues involved with the BMP.

Regular routine maintenance is one of the easiest ways to extend the life and minimize the overall expense of the stormwater facility.

Non-Routine Maintenance

The non-routine maintenance for stormwater BMPs can often be costly and always should be completed by a stormwater professional. Some or all of these items shown below (depending on the type of BMP) will eventually be necessary to have performed for your BMP. Creating a long-term fund for large maintenance items is highly recommended to offset costly improvements.

- Repair and/or Replacement of Mechanical Components
- Sediment Removal or Grading
- Repair of Structural Components

How can I Save Money on Maintenance Costs?

The easiest way to save money over the life of the stormwater BMP is to take good care of it. Any attempt to rehabilitate a pond left to neglect can cause enormous spikes to property owner's costs and massive un-budgeted expenses. The following is a list of Dos and Don'ts regarding the care for your stormwater BMP.

DOs!

• Educate residents on the role of the stormwater facility. Many people do not know the water quality benefits provided by the facilities and do not treat them accordingly.

• Plan neighborhood lawn care to prevent the over-use of fertilizers. This can waste money and have a negative effect on water quality.

• Discourage others from dumping lawn-clippings, leaves, or other yard waste into the storm drain or stormwater facility.

• If you notice an oil leak under your vehicle, place a pan filled with kitty-litter under it until the leak gets repaired. This is an absorbent material and will soak up the oil making it easy to dispose of properly.

• Dispose of your pet waste in the trash can. Animal wastes that enter the storm drain or the stream network may contain disease causing bacteria.

DONTs!

• Do not dump used motor oil, antifreeze or other automotive by-products into storm drain inlets. **This is a criminal offense.**

• Do not dump grass clippings, leaves, loose soil or trash into a storm drain or into a stormwater facility. All of these materials will cause the stormwater facility to clog. The grass and leave do not go away. They end up in the creek where they will break down and release bad odors, cause an excessive amount of algae growth, and ultimately deplete the oxygen in the stream, which can lead to the death of fish in the stream.

• Do not wash dirty vehicles on the street or driveways. The detergent will only end up in the storm drain. If you wash your car at a self-serve car washing station, the runoff is collected and treated before it enters our streams and rivers.

• Do not over-fertilize your lawn. More fertilizer does not always produce greener grass. Once the soil and grass has absorbed what it needs, all the extra fertilizer will just wash away unused, resulting in polluted streams and wasted money.

• Do not dispose of paint, household chemicals, petroleum products or soaps in the storm drain. These materials can kill grass, plants and any living creature in the stream that it will eventually reach. **This is also a criminal offense.**

Questions or Concerns?

Town of Warrenton Contact Information

If you have questions about anything in this guide, or have concerns that you would like to express, please contact the Town of Warrenton Stormwater Management / Public Works Department at (540) 347-1858.

Our contact information is:
Department of Planning and Community Development
Town of Warrenton
P.O. Drawer 341
Warrenton, VA 20188
Or email us at: rbattaglia@warrentonva.gov

Other Agencies Contact Information	*Phone Number*
Department of Public Works	(540) 347-1858
MS4 Stormwater Program	(540) 347-6574
Department of Parks and Recreation	(540) 349-2520
Virginia Department of Transportation (VDOT), Warrenton District Office	(540) 347-6441
Department of Environmental Quality, Water Quality Division	(703) 583-3800
Environmental Protection Agency, Region 3 Office	(540) 347-8970
Virginia Department of Health	(804) 864-7000