Johns Creek
GEORGIA
be the exception

Stormwater Management Program

A Guidebook for Property Owners and Homeowner Associations

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Additional Resources

- Annual Inspection Report (available on the City's Website: www.JohnsCreekGA.gov)
- Sample Maintenance Agreement (available on the City's Website: www.JohnsCreekGA.gov)

1.0 Introduction

Expanding urban and residential developments in watersheds have resulted in increased stormwater runoff (flow of rain across the ground surface) which directly affects the quality of our streams and rivers.

Stormwater management facilities or structures are designed to reduce the impacts of pollutants and increased stormwater runoff on local streams. Facilities such as detention ponds can fail before their anticipated design life if not properly maintained. Once a facility fails, it will no longer perform its intended functions and it is often very expensive to replace.

Stormwater management facility maintenance programs save money in the long run and improve the water quality of local streams and rivers.

KEY POINTS TO REMEMBER AS YOU DEVELOP YOUR MAINTENANCE PROGRAM:

- Identify your type of facility and understand its unique maintenance needs.
- Understand your responsibility for maintenance and inspection.
- Define the tasks required for maintenance.
- Identify costs and allocate your resources.
- Involve your local community.
- Maintain records of your activities.

2.0 What is A Stormwater Management Facility?

Stormwater management facilities (sometimes referred to as Best Management Practices) are structures and facilities that are designed to reduce the impacts of development on the quality of the water in streams, rivers, and aquatic habitats. These facilities include stormwater ponds, swales, open ditches, and other facilities.

Common pollutants from urban and residential areas include sediment, heavy metals and nutrients, motor oil, lawn care, or anything else that can wash off of driveways, parking lots, lawns, roofs, and streets during a storm event.

Stormwater management facilities are also designed to reduce flooding from the increased runoff due to an increase in paved or compacted (impervious) areas. Impervious areas such as parking lots, driveways, sidewalks, and roofs do not allow stormwater to infiltrate into the soil. Impervious areas forces the stormwater to run off, increasing the quantity (amount) of stormwater. The relatively smoother surfaces of the impervious areas also decrease the amount of time it takes for the stormwater to run off, which allows it to reach streams and rivers faster. The effects of which causes peak water levels to occur much sooner. Both the increased flow and the decreased travel time increases the possibility of flooding and erosion.

Stormwater management facilities slow the velocity and/or temporarily holds stormwater runoff, and releases it slowly over time to reduce the flow rate while providing treatment of pollutants to improve the quality of the runoff. Treatment of pollutants by slowing or detaining the stormwater runoff occurs by settling, filtering, infiltration, or reaction with vegetative cover.

GOALS OF AN EFFECTIVE STORMWATER MAINTENANCE PROGRAM:

- Prolong the life of the stormwater practices.
- Avoid the expense of costly repairs.
- Protect the water quality of downstream streams and rivers.

3.0 What type of Stormwater Management Facility do you have?

There are several basic types of stormwater management facilities commonly used in developed areas. Facilities are designed specifically to meet the needs of the area where they are located and that the maintenance needs of each facility may differ.

However, generalities for each of the major types of facilities can be made and suggested maintenance for each can provided. It is also common for multiple types of facilities to be used in the same area.

Therefore, it is necessary to look at the system as a whole to design and implement a maintenance program that will protect the integrity of each component.

Different Types of Stormwater Facilities

A grassy swale: ripcap has been added to reduce the velocity of the runoff, allowing sediment to settle.

A concrete lined swale: Riprap has been added near the outlet structure to reduce velocity, allowing sediment to settle while providing erosion protection.

A wet detention pond provides stormwater control and an appealing amenity for residences.

A dry detention pond: Embankments and bottom are grassed to provide erosion protection and stormwater.

3.1 Swale

Swales are long, shallow depressions that are usually grassed. They are commonly used along roadways to slow and channel stormwater runoff. Grassed swales allow runoff to infiltrate into the ground and trap particles. Often swales have small berms or check dams to slow the velocity of the water, prevent erosion, and promote infiltration.

Concrete swales are common in urban areas. Many include riprap or other velocity dissipating devices near the downstream ends. Concrete swales do not allow infiltration and are used to channel stormwater runoff. Concrete swales are not designed to remove sediment and other pollutants.

3.2 Wet Detention Pond

Wet detention ponds contain a permanent pool of water like a lake. The design of a wet pond includes storage above the permanent pools to handle stormwater. The release of the stored stormwater is regulated by an outlet structure that provides prolonged release.

Wet ponds have the advantage of providing increased levels of pollutant removal and decreasing the likelihood of resuspension of sediments during a storm. Wet ponds are usually more aesthetically pleasing than other stormwater management facilities and can serve as a recreational amenity as well as provide habitat for some wildlife.

However, wet ponds do pose a higher safety liability than other types of facilities.

An aesthetically pleasing wet detention pond provides stormwater runoff storage, while also offering a recreational amenity.

3.3 Dry Retention Pond

Dry ponds are designed to impound or store water for a short duration and are relatively common. Dry ponds that are designed and operating properly do not contain standing water during dry periods.

The temporary impoundment of water allows many pollutants to settle to the bottom. Release from a dry pond is controlled much the same way as with a wet pond.

Dry ponds are usually grassed and some may contain wetland vegetation near the bottom to provide additional pollution control. Dry ponds that contain a wetland area are referred to as extended detention wetland basins.

It is important to determine if a dry pond that has a marshy area is designed as an extended detention wetland basin or is in need of maintenance. Some dry ponds will have a concrete flume in the bottom to provide drainage during low flows.

This dry detention pond contains wetland vegetation to provide additional pollution control.

3.4 Concrete Walled Pond

Concrete ponds are usually dry ponds that have concrete walls and usually have grassed bottoms. These are common in urbanized areas. Concrete ponds can handle high velocity stormwater runoff. Pollutant removal is not as high in this type of facility as in others. Ponding of water during dry events or the establishment of wetland plants is a sign that maintenance is needed.

Concrete-walled dry detention pond with earthen bottom: Concrete sides provide erosion protection. The grass is well maintained with no unwanted plants. The bottom of this pond dries between storm events and indicates a well-designed and maintained detention facility.

3.5 Infiltration Trench

Infiltration trenches are designed to temporarily store stormwater and allow it to infiltrate into the soil. Pollutants are carried into the soil during infiltration and transported though the soil environment where they react with the soil particles or are trapped in the soil. Infiltration trenches are gravel filled excavations.

There are two ways for stormwater to enter the infiltration trench: dispersed input and concentrated input. Dispersed input allows stormwater to flow across a large grassy area removing trash, sediment, leaves, or other wastes that might clog the infiltration trench. Concentrated input receives runoff directly from curb inlets, gutters, and pipes.

This bioretention area has an infiltration trench. The infiltration trench allows storm-water to seep into the ground during low flow conditions.

3.6 Green Infrastructure

Green Infrastructure is a stormwater management approach, which mimics the natural water cycle to minimize the negative environmental impacts of development.

Development introduces impervious areas where stormwater is unable to seep into the ground. Therefore, the pollutants in the stormwater runoff are not filtered by the natural landscape and continues into downstream bodies of water. Green Infrastructure remedies some of these negative impacts by implementing vegetation, soils, and other elements to restore some of the natural processes that are required to manage water in urban environments.

The following are **techniques towards reducing stormwater runoff for single-family residences** through Green Infrastructure (GI) practices:

- Directing the flow of water (runoff) to vegetated filter strips, or any appropriate combination of techniques.
- Routing downspouts to modified french drains or
- Replacing traditionally impervious surfaces (driveways, patios, etc.) with pavers or a pervious surface.
- Installing a rain garden or bioretention area.
- Routing downspouts to underground dry wells.
- Using cisterns for reuse or irrigation.

3.6.1 Vegetated Filter Strips

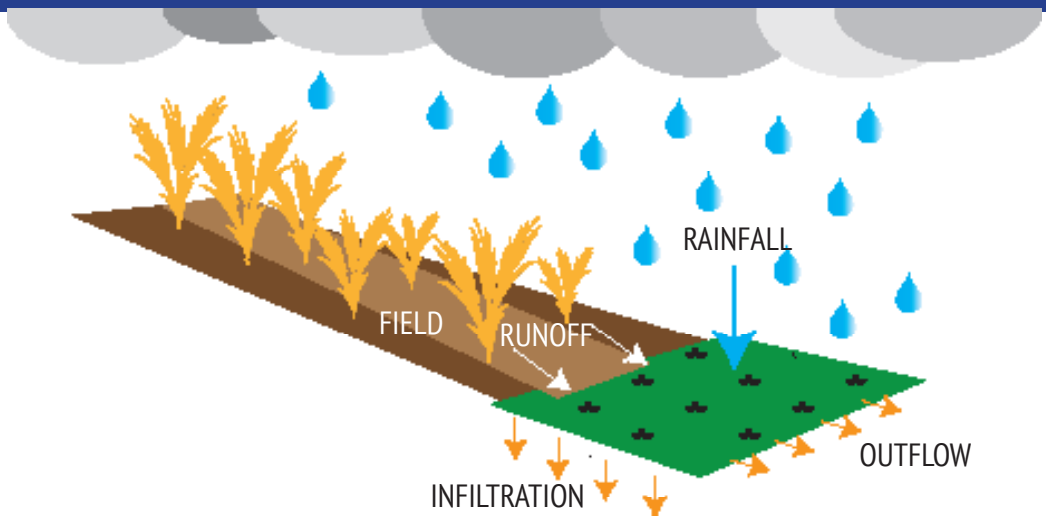
Vegetated filter strips are vegetated areas of land designed to receive rainwater while slowing and filtering the runoff from roof downspouts and parking areas. These can provide significant reductions in stormwater runoff and pollutant loads in the local watersheds. They are an attractive and functional addition to home landscapes.

IMPORTANT NOTES WHEN INSTALLING A VEGETATED FILTER STRIP:

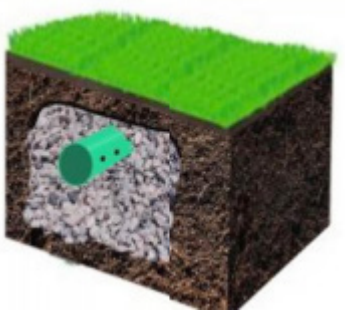
- Determine the best location by assessing the drainage area flow paths on your property. Look for a gentle slope away from the structure or pavement, a relatively flat area, and where the flow can be evenly dispersed.
- The ideal slope for the vegetated filter strip is 1 to 5 percent.
- The length of the vegetated filter strip should be no less than 25 feet, unless there is a permeable berm at the lower end – in which case, the vegetated filter strip should be no less than 15 feet.
- The impervious area (rooftops, driveways, sidewalks, etc.) draining to any one vegetated filter strip cannot exceed 5,000 square feet.
- Choose proper vegetation that can tolerate the stormwater runoff rates, while also tolerating both wet and dry conditions.

Proper maintenance of the vegetated filter strip is also important to ensure proper stormwater management capability over time.

- Water as needed to promote plant growth and survival, especially in the first two seasons.
- Provide normal turf or garden maintenance (mow, prune, trim, etc.).
- Inspect after rainfall events. Fix erosion issues immediately.
- Remove any accumulated trash, sediment, debris.



3.6.2 Modified French Drain



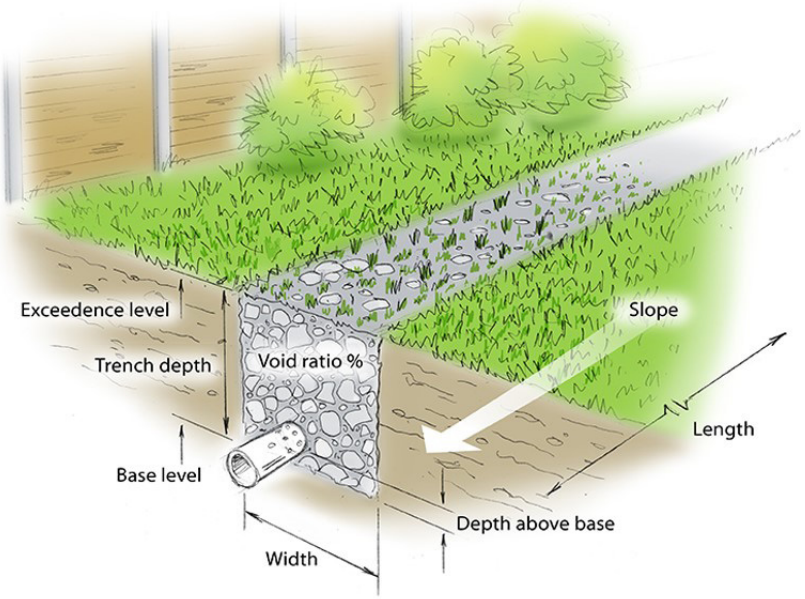
Modified French Drains (MFDs) are shallow trench excavations filled with stone and a perforated pipe, which intercepts and temporarily stores stormwater runoff until it infiltrates into the soil. They are well suited to receive rooftop runoff, but can also be used to receive runoff from other small impervious areas. It is recommended that only the daylighted French Drain version is used, due to poor draining soils in the area. This allows for the stormwater to overflow at the end, in the event that infiltration cannot keep up with larger storms.

When installing a Modified French Drain, ensure that proper **location, installation, and vegetation is implemented:**

- MFD trenches should be located at least 5 feet from the building foundations and 10 feet from building with basements. They should also be located at least 10 feet from property lines.
- The MFD should slope away from the structure, with a 0.5 to 6 percent grade.
- To reduce the chances of clogging, MFDs should only be used to drain impervious areas which have been pretreated with at least one of the leaf removal methods to remove debris and larger particles.
- The MFD gravel depths should be at least 18 inches and no more than 36 inches.
- The MFD should be located in a lawn or pervious (unpaved) area.
- The MFD should NOT be located:
    - o Beneath an impervious (paved) surface
    - o Above an area with a water table or bedrock less than two feet below the trench bottom
    - o Over utility lines
    - o Above a septic field
- MFDs are normally covered with topsoil, managed turf, or other herbaceous vegetation.
- As an alternative, the area above the surface of the MFD may be covered with pea gravel.
- The downstream end of the pipe must be stabilized and can be landscaped for aesthetics.

To ensure proper functionality of MFDs, the following **maintenance tasks should be performed annually:**

- Inspect gutters/downspouts and remove accumulated leaves and debris.
- Clean leaf removal system(s).
- Inspect any pretreatment devices for sediment accumulation.
- Inspect MFD after a large rainfall event.



3.6.3 Permeable Pavers

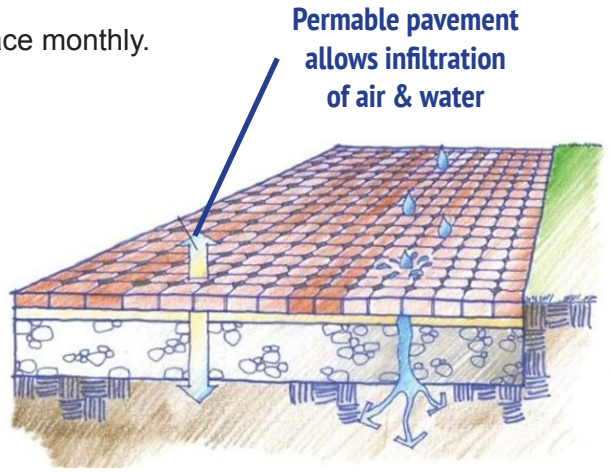
Permeable pavers are an alternative to traditional impervious paving surfaces and allows stormwater runoff to pass in between the paver surface and into underlying soils. They are well suited for sidewalks, parking areas, patios, and driveways. They consist of permeable interlocking or grid concrete pavers with an underlying drainage layer. Permeable pavers can provide significant reductions in stormwater runoff and pollutants in your local watershed.

Ensure that the permeable paver is **installed at a proper location** using the following guidelines:

- The maximum contributing drainage area to the permeable paver surface area is 4:1.
- Permeable paver systems should be located at least 5 feet from the building foundations and 10 feet from buildings with basements.
- Permeable pavers should only drain impervious areas to avoid clogging.
- Installation must be on slopes less than 6 percent away from structures to allow even distribution of runoff.
- Permeable pavers should NOT be located:
    - Above an area with a water table or bedrock less than 2 feet from the gravel bottom
    - Over other utility lines
    - Above a septic field

Proper Maintenance of permeable paver systems must be employed to provide measurable stormwater management benefits over time:

- Remove accumulated sediment and debris from joint space monthly.
- Observe the system for excessive ponding during storm events and repair as needed.
- Vacuum, sweep, or blow permeable paver surface quarterly to keep the surface free of sediment.
- Annually inspect the permeable paver surface for deterioration and repair/replace any damaged areas as needed.



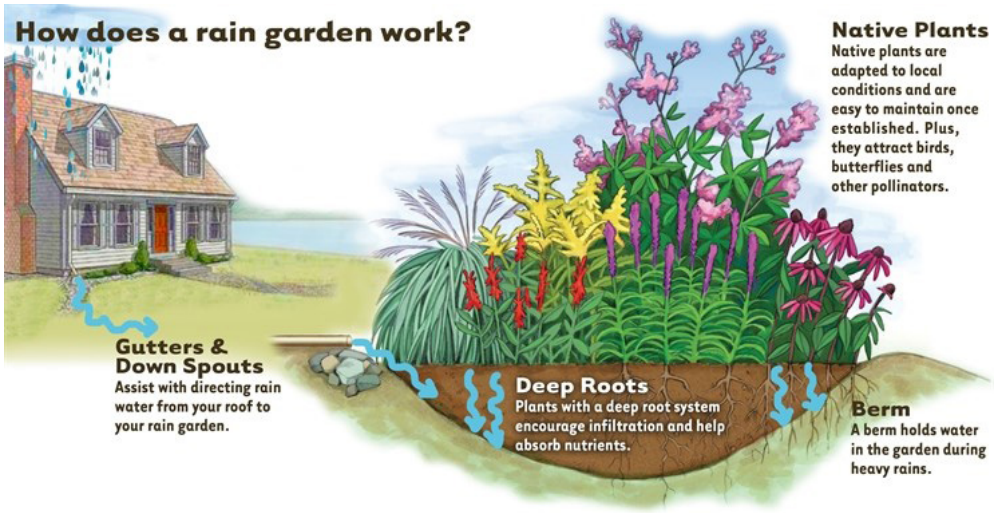
3.6.4 Rain Gardens

Rain gardens are designed to temporarily store stormwater runoff around your home, while reducing the runoff rates and pollutant loads. They are small, landscaped depressions that are planted with trees, shrubs, and other garden-like vegetation. A rain garden can be a beautiful and functional landscape addition.

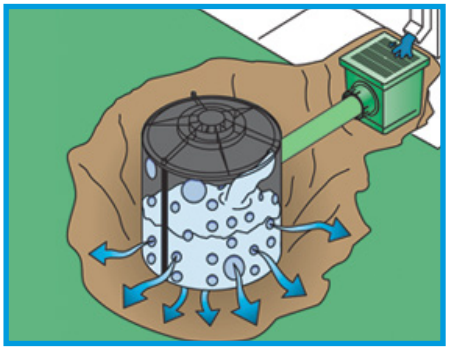
When adding a rain garden, ensure that proper l**ocation, design, and vegetation** is implemented using the following guidelines:

- Rain gardens should be located to receive the maximum amount of stormwater runoff from impervious surfaces. Ensure that downspouts or driveway runoff can enter the garden away from your home.
- Swales, berms, or downspout extensions may be used to route the runoff to the garden.
- Locate at least 10 feet from foundations.
- Rain gardens on slopes greater than 10 percent may require alternative design with terracing
- A maximum ponding depth of 6 inches of water is allowed in order to avoid creating a mosquito problem
- The rain garden entrance must be designed to immediately intercept the flow and reduce the runoff speed by using stones, dense hardy vegetation, or other means
- If sides are to be mowed, the designed side slopes should be 3:1 or flatter.
- Vegetation at the outflow of the rain garden should be able to stabilize the soils and tolerate the stormwater runoff rates to avoid erosion
- Vegetation in the rain gardens should be able to tolerate both wet and dry conditions.
- Do NOT place rain gardens:
  - Within the public right of way
  - Near utility lines
  - Over septic fields
  - Near steep bluff edges

Routine maintenance of the rain garden includes weeding, deadheading, replacing dead plants, and replenishing mulch. It is also important to catch areas of erosion and correct standing water issues.



3.6.5 Dry Well



Dry wells are comprised of seepage tanks in the ground and surrounded with stone, which intercepts and temporarily stores stormwater runoff until it can infiltrate into the soil. Dry wells are well suited to receive rooftop runoff through either an inlet grate or direct downspout connection.

Determine the appropriate **location and vegetation** for installing a dry well using the following guidelines:

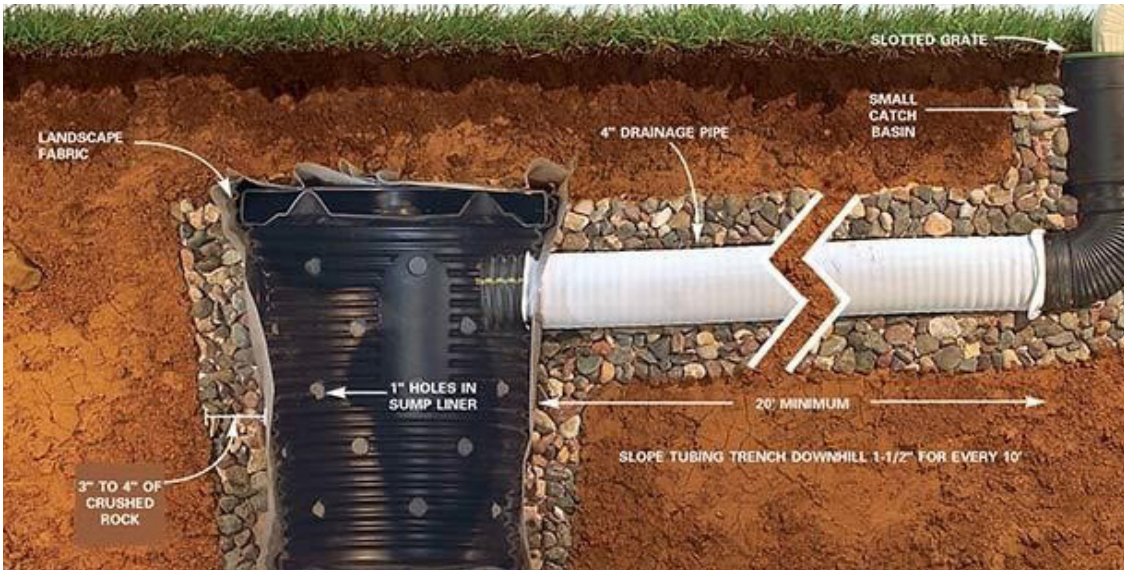
- Dry wells must be located at least 10 feet from the building foundations and 10 feet from the property lines.
- To avoid clogging, dry wells should only drain impervious areas, with pretreated runoff to remove debris and larger particles.
- The height of the tank should not exceed 45 inches.
- Dry wells should be located in a lawn or other pervious area, with the top of the well as close to the surface as possible.
- The area above a dry well should be covered with pea gravel (for inlet grate dry wells) to provide additional sediment removal.
- A dry well may be covered with an engineered soil mix and planted with managed turf or other herbaceous vegetation.

Dry wells should NOT be located:

- Beneath an impervious (paved) surface
- Above an area with a water table or bedrock less than two feet below the trench bottom
- Over utility lines
- Above a septic field

To ensure dry wells provide adequate benefits over time, annual maintenance is required:

- Inspect gutter and downspouts.
- Inspect dry well after heavy rainfall events
- Inspect pretreatment devices for sediment accumulation.
- Inspect top layer of filter fabric for sediment accumulation.



3.6.6 Cistern

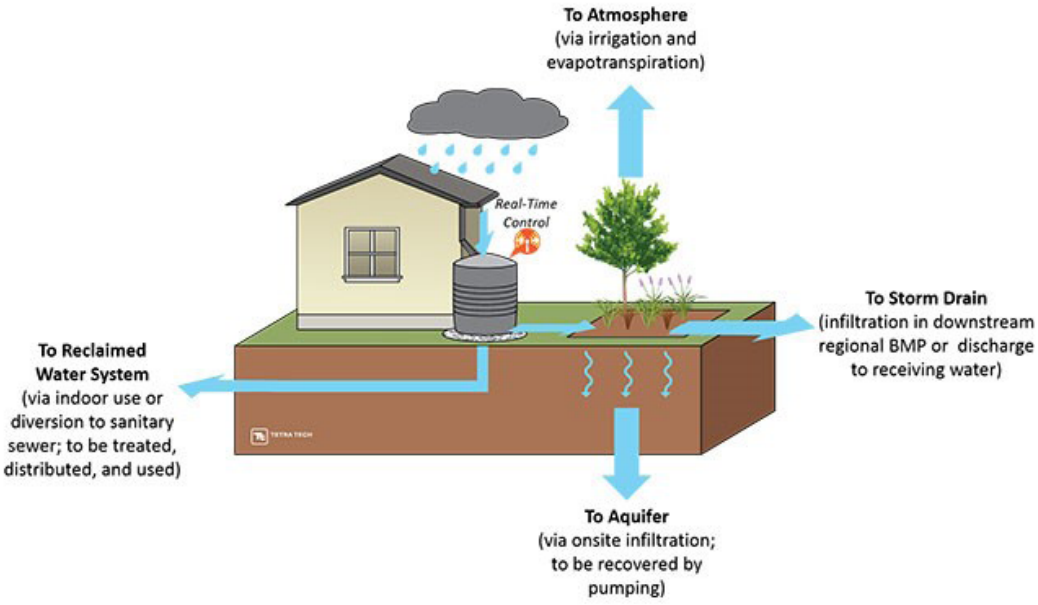
Cisterns collect rain from a downspout system, where it is screened to remove trash and leaves and stored for subsequent use. Water from cisterns are for non-potable water use only, unless advanced filtration systems are used.

Suggestions to determine the appropriate **location, design, and maintenance** measures for installing a cistern:

- Determine the size of the storage tank required by considering the contributing draining areas.
- Cisterns should only drain impervious areas.
- Cistern capacity must be designed for a 1 inch storm. A 100 square foot roof surface will fill a 55 gallon barrel.
- Drainage system components leading to the cistern should have a minimum slope of 2 percent.
- Rainwater from the cistern should be used regularly to maintain the storage capacity.
- Routine checks of the intake and leaf screening components should be done once in the spring and periodically in the fall.
- Ensure mosquito screen is tight.
- Inspect and (if necessary) clean out tank annually.
- Check connections for leaks.
- Inspect overflow for erosion.

Keep the following in mind when choosing a location for the cistern:

- Ease of connection for roof drains
- Overflow to downslope areas
- Level area
- Location relative to intended water uses
- Utility conflicts
- Electrical connections (if applicable)
- Residential emergency ingress/egress
- Leaf screen option
- Location of hoses or water distribution components
- Aesthetic considerations



4.0 Who is responsible for maintenance of Stormwater facilities?

Each person is responsible for protecting the environment and the quality of our water. While the City of Johns Creek is responsible for the maintenance of a small number of city-owned facilities, the responsibility for maintenance of the majority of stormwater management facilities within the city is vested with the private property owners and the homeowners associations for a subdivision.

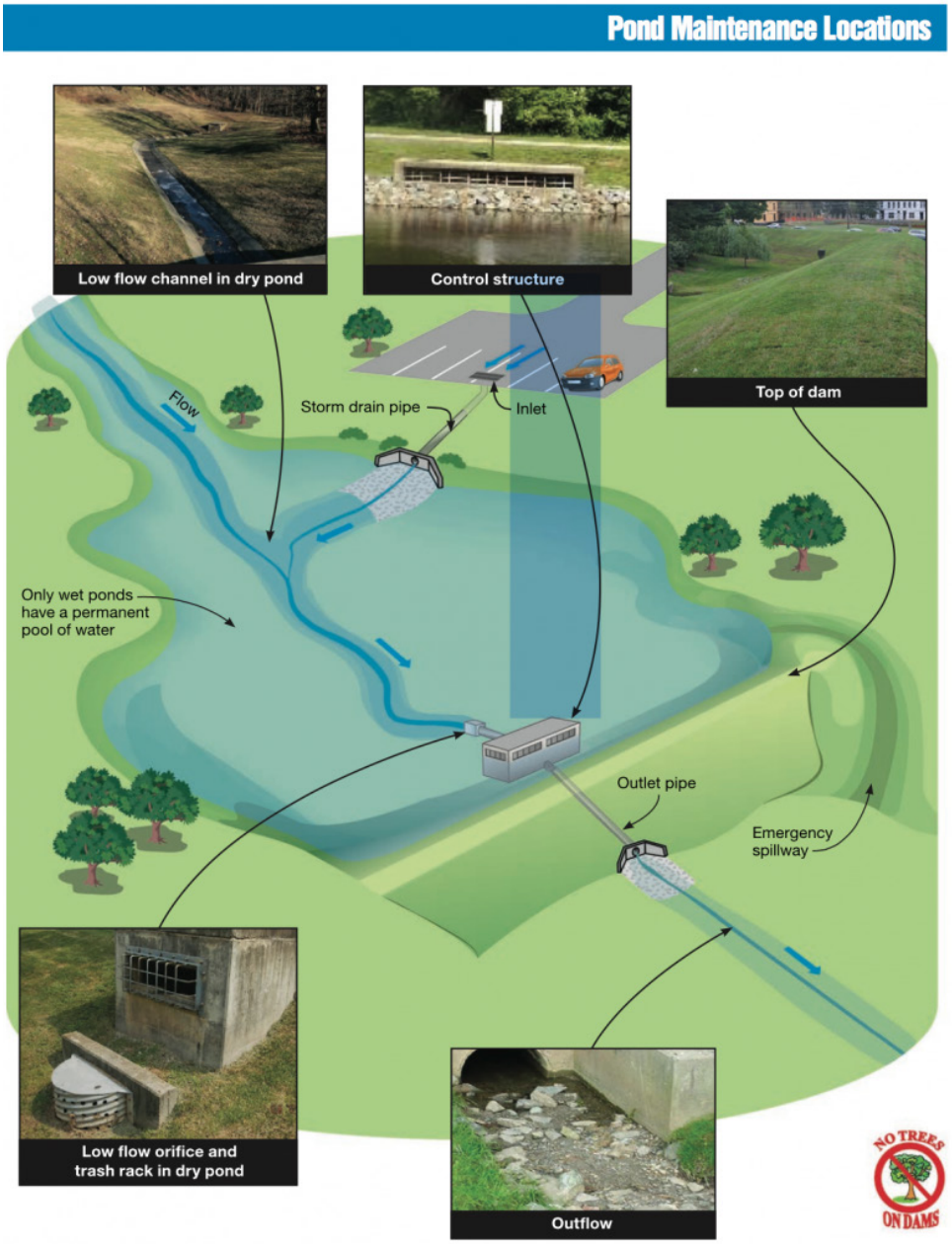
It is important for you as a private property owner or as part of a homeowner's association to understand your maintenance obligations and identify your legal obligations with respect to stormwater management facilities maintenance. This responsibility is outlined in a Maintenance Agreement that was executed as part of the original development plans. See appendix for a sample Maintenance Agreement.

5.0 What maintenance is required?

Each stormwater management facility or system may have unique maintenance requirements. A well-designed maintenance program will have routine and non-routine maintenance requirements.

SOME KEY ELEMENTS TO SHOULD BE CONSIDERED WHEN DEVELOPING OR CONTRACTING A MAINTENANCE PROGRAM:

- Regular inspections
- Vegetation management, embankment and outlet stabiliation
- Removal of accumulated trash, branches, leaves, and/or yard clippings
- Insect control
- Ensure proper drainage (no standing water)
- Access maintenance
- Overall pond maintenance
- Sediment/Pollution Control
- Component repair and replacement



5.1 Routine Maintenance

Routine maintenance will keep your facility functioning properly and will reduce costs needed for repair and replacement. Common routine maintenance requirements are discussed below:

5.1.1 Regular Inspections

To maintain facility performance, routine inspections should occur. Inspections should occur monthly and after major storm events. Monthly inspections are easily done during monthly mowing for vegetation management. These routine inspections look for accumulations of trash or other wastes that may potentially block the inlet or outlet structures.

Inspections also cover vegetation condition, integrity of access control, and signs that the facility's design conditions are being exceeded. A checklist for use during the monthly inspections is included in the appendix. A photograph guide depicting optimal and poor examples of several items contained within the checklist which is provided on the City's website (www.JohnsCreekGA.gov).

Annual inspections by a registered professional engineer are required by the City of Johns Creek. These inspections look at the sediment build-up, erosion, structural stability, and the conditions of the inlet/outlet structures. Many inlet/outlet structures are in confined spaces and should only be entered by an individual certified and qualified to enter such areas. A checklist for use during the annual inspections is included in the appendix.

NEVER ENTER A CONFINED SPACE!
CONFINED SPACE ENTRY SHOULD ONLY BE PERFORMED BY QUALIFIED AND TRAINED INDIVIDUALS.

5.1.2 Vegetative Management

Most stormwater management facilities use vegetation to slow the velocity of the water, prevent erosion, and provide a filter to remove pollutants and uptake nutrients. Turf grass is the most common vegetation used, but other types of vegetation such as woody plants and wetland plants are used in some types of facilities.

It is important to keep the vegetation healthy and under control to optimize performance. Screening vegetation is a useful part of a facility because it provides visual screening of the facility for homeowners and commercial patrons. Trees, shrubs, climbing vegetation for chain link fences, or different types of ground cover can be used singularly or in combination to provide screening vegetation.

To decide on the best type of vegetation in your area contact a landscaping service, home and garden center, or the Fulton County Extension Service.

5.1.3 Mowing

Generally, grassy areas associated with a facility should be cut no shorter than 6 inches. Likewise, grassy vegetation should be maintained below 12 inches to avoid attracting unwanted small animals. The health of the grass is an important consideration for the performance of a facility. If a manicured look is desired because of the location of the facility, special attention to the health of the grass is important.

LAWN-CARE TIPS TO CONSIDER:

- Bald areas should be replanted regularly.
- Periodic fertilization and lime addition may be needed to maintain closely cut grass.
- Grass should be cut at least once a month during the growing season.
- Buildup of grass clippings or sediment in the grassed areas should be avoided.
- Mowers with grass bags attached can be used to reduce grass clippings.
- Raking the area to remove accumulated trash, grass clippings, sediments, and other wastes should be per formed when buildup is noted.
- Dumping of clippings and yard waste should be avoided.

Grass clippings should be removed to prevent build-up in storm drains and protect our water quality.

5.1.4 Unwanted Vegetation

Unwanted vegetation is any vegetation that is not included in the design of the facility. Unwanted vegetation is destructive to a facility. The deep roots can weaken the structure. Trees and brush can reduce the capacity and cause failure of dams, embankments, sidewalls, trenches, inlets/outlets and other structures.

Routine inspections and regular maintenance will control unwanted vegetation. Remove any dead trees or other large vegetation, and periodically remove young trees and brush before the trunks get larger than 1 inch in diameter.

A dry pond overgrown with vegetation reduces its effectiveness and its life span.

5.1.5 Weed / Pest Control

Weed and pest control are necessary to maintain turf grass and to reduce the number of unwanted insects. Precaution should be used when applying herbicides or pesticides. Excess application of herbicides or pesticides results in runoff to downstream rivers and streams, damaging the downstream ecosystem. An excessive application of herbicides and pesticides may cause damage to the ground cover, resulting in erosion and additional lawn care maintenance. If you must use chemicals, use the manufacturer's recommended application rates or contact the Fulton County Extension Office.

5.1.6 No Mow Zones

Except for a dam structure, a 10-foot unmaintained vegetative/planted strip may be established around the perimeter of wet ponds. This buffer zone provides some filtration of pollutants from adjacent properties and helps prevent erosion of the embankments. Contact the City for a list of recommended vegetation.

5.1.7 Preventing Vegetation Damage

Many activities that seem harmless may result in damage to vegetation and reduce the overall effectiveness of a facility. Sports activities or inappropriate landscaping may result in compacting of the soil or other soil disturbances that could take years off the life of your stormwater management facility. When soil becomes compacted, rainfall is unable to infiltrate into the soil and the amount of runoff increases. Access control and maintaining the stormwater management facility within the original design guidelines helps ensure that your facility operates properly, while reducing the potential impacts of pollution to the downstream environment.

5.1.8 Trash Control

The build-up of trash, yard clippings, branches, and other material in your facility can cause damage to the facility and reduce its effectiveness. Routine removal of this material will prolong the life of your facility and help ensure that it is operating effectively. A removal program may be contracted to a landscaping service and performed during regular monthly mowing of grassy areas.

After a major storm event it is advisable to check the inlet and outlet structures for blockage. Trash or other materials that may have washed in, preventing proper operation.

Benefits of removing unwanted materials:

- Reduces the chance of clogging the outlet structure.
- Prevents damage to areas with planted grass, trees, or other vegetation.
- Reduces mosquito breeding habitats.
- Maintains the appearance of the facility.

Removal of trash, accumulated leaves and other yard waste protects the downstream water quality and habitat for wild animals.

5.2 Non-routine Maintenance

Non-routine maintenance of a facility can be a major undertaking and should be performed by a professional. While tasks may vary by facility, they generally include sediment and pollutant removal and maintenance, repair, or replacement of structural components.

5.2.1 Sediment Removal

The primary purpose of a stormwater management facility is to remove sediment and other pollutants that may be attached to the sediment from stormwater. Sediment naturally accumulates within the facility and must be removed at periodic intervals.

Sediment removal requirements vary dramatically from facility to facility. Dry ponds should be cleared when approximately 33 percent of the facility volume has been filled. Wet ponds should be dredged when the sediment blanket is approximately 3 feet from the normal water surface or when sediment islands begin to form. Sediments and associated pollutants removed from a facility will need to be discarded. The most cost effective solution is to have an onsite area that can be stabilized against erosion and used for sediment disposal. Otherwise, sediments may have to be transported to a landfill for disposal.

If possible, wet sediments should be dried onsite to reduce the cost of sediment disposal. Dry ponds need occasional removal of accumulated sediment. Bottom slopes are constructed with a minimum slope of about 1 percent. Stormwater management facilities should be designed so that they are accessible to needed machinery to remove sediment.

A wet pond with embankment protection and a concrete swale channels stormwater. A silt fence reduces the stormwater velocity and sediment load entering the facility.

5.2.2 Bank Stabilization

Sedimentation & erosion have degraded the quality of this stream. Properly designed and maintained stormwater management facilities reduce this type of impact to downstream enviornments.

Pond banks, side slopes, and bottoms (of dry ponds) should be inspected periodically for erosion or other damage. Early corrective measures can save considerable costs for repair. A healthy ground cover must be routinely maintained to prevent erosion and clogging of the facility. Bare patches should be reseeded or sodded and stabilized as quickly as possible to avoid erosion. The roots of woody trees and bushes tend to destabilize the embankments. Routine mowing will prevent growth of woody plants on banks, slopes, and bottoms.

Trees and shrubs planted outside of a stormwater management facility can play an important role in maintaining a healthy pond ecosystem. Woody growth away from an embankment does not generally pose a threat to its stability. Trees and shrubs should be planted outside the maintenance and access areas.

Animal burrows and animal impoundments such as beaver dams can damage the integrity of the facility and increase the amount of water ponding. Removal of these animals is advised to protect the operation of the facility. Contact the Fulton County Animal Control Office or Health Department for advice and help for animal removal activities.

Damages from sediment buildup

A wet pond with buildup of branches and sediment, as well as considerable shoreline erosion. This pond should be considered for shoreline restoration and dredging.

A wet pond with sediment buildup in the center is forming an island. Sediment buildup reduces the detention time and decreases the effectiveness of the stormwater management facility.

Sediment has filled this drainage swale and blocket the inlet structure. The capacity is reduced by more than 50 percent. Periodic removal of sediment is required to maintain the capacity of the structure.

5.2.3 Maintenance / Repair / Replacement

While most stormwater management facilities (if properly maintained) will last a long time, communities should plan for the costs associated with repair or replacement. Eventually, components will break down and will require repair or replacement.

These components may include:

- Fences and gates.
- Planted tree or vegetative screens.
- Inflow/outflow devices/structures.
- Trash racks and anti-vortex devices.
- Valves, orifices, and aerators.
- Concrete structures.
- Pumps and switches for mechanic devices.
- Earthworks such as embankments, dams, and side slopes, and vegetation.

Access control is provided using an attractive, well-maintained fence.

6.0 What are the costs for maintenance?

Costs associated with stormwater management facility maintenance can be divided into routine and non-routine. Routine costs can be planned and budgeted and may include mowing, vegetation management, trash and other unwanted material removal, weed/pest control, and fertilization. Costs can range from $100 to $500 per acre depending on the maintenance plan.

Non-routine costs can be considerable, especially considering eventual facility replacement. To lessen the financial impact of non-routine costs, the establishment of a stormwater management facility maintenance fund with annual contributions is advised. The primary non-routine costs are sediment/pollutant removal and facility renovation/replacement.

Repairing broken gates and fences results in a more secure area.

7.0 What can I do to involve the community?

Community involvement will prolong the life of the stormwater management facility and reduce maintenance costs. Also, discuss the facility with local lawn-care professionals that work in the area. Explaining the purpose of the facility and the maintenance needs through community outreach and education will go a long way in reducing the pollutant load during and after storm events.

Some homeowner associations organize sponsored stormwater management facility cleanup days, which is a great way to circulate information to residents and involve the local community. These types of activities can raise the awareness of the need to protect water quality and the environment.

KEY POINTS:

- The facility is designed to reduce flooding, streambank erosion and to protect the water quality of the receiving stream.
- Grass clippings and yard waste should be bagged and disposed of elsewhere not in a storm water facility.
- Applications of fertilizers and pesticides should be kept to a minimum to protect water quality and should never be applied prior to a heavy rain. Contact the Fulton County Extension Office for additional information.

8.0 When to call a professional

Annually the City of Johns Creek will require a performance assessment of your facility by a licensed professional. More frequent self-inspections help with understanding the ongoing condition of your stormwater management facility. Major changes in performance or noticeable deterioration of structures and embankments or other parts of your facility may indicate a more serious problem. It is difficult to predict when additional professional help (such as a professional engineer or other professional) is needed.

CONDITIONS WARRENTING ATTENTION FROM PROFESSIONALS:

- Unexpected ponding or water remaining in the system longer than the design detention times.
- Obstructions of the inlet or outlet structures.
- Excessive erosion or sedimentation.
- Cracking or settling of facility components.
- Wetness on the downstream side of the dam indicating seepage.
- Low spots or sinkholes.
- Deterioration of pipes.
- Erosion or damage to the emergency spillway or shoreline.
- Sediment buildup downstream of the facility.
- Signs of serious damage from vandalism or other sources.

9.0 Stormwater Management facility safety

Since stormwater management facilities are designed to hold water for a specific period of time, the safety of residents should be considered on a case-by-case basis. Some maintenance tasks can be performed by non-professional personnel quite effectively; however, safety programs should be established for any facility maintenance program.

Cleaning of trash and other types of waste material from confined spaces should never be performed by a non-professional.

Entering confined spaces should only be performed by a certified, properly trained individual and NEVER by a private commercial property owner or homeowner. Confined space entry can be hazardous and result in INJURY OR DEATH.

The side slopes of embankments of wet ponds are often steep and can be slippery, especially when wet. Therefore, care is required when inspecting facilities to avoid accidents and potential injuries.

10.0 Where can I find more information?

Each stormwater management facility has unique maintenance needs and a facility specific maintenance program should be developed. Contact a stormwater professional for more information on the maintenance needs of your particular facility or if you would like help in establishing a successful facility maintenance program.

CITY OF JOHNS CREEK CITY WEBSITE
https://www.johnscreekga.gov/Residents/Community-Development/Stormwater-Management

KEEP NORTH FULTON BEAUTIFUL, INC.
http://www.keepnorthfultonbeautiful.org/

CLEAN WATER CAMPAIGN
http://cleanwatercampaign.org/educational-resources/

DEPARTMENT OF COMMUNITY AFFAIRS
http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/downloads/DCABackyardBuffers.pdf

GEORGIA ENVIRONMENTAL PROTECTION DIVISION
https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/Streambank_and_Shoreline_Stabilization_Guidance.pdf

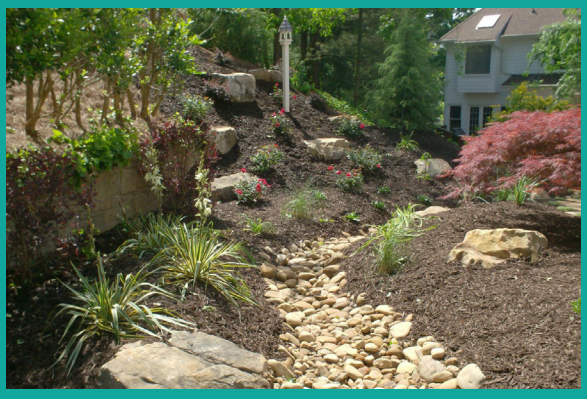
10.0 Photograph Guide

The Photograph Guide presents examples of well-maintained stormwater management facilities and poorly maintained facilities. These are included to provide examples and are not intended to cover each type of facility or recommend one type of facility.

WELL-MAINTAINED

POORLY MAINTAINED

The outlet structure on the left shows a functioning outlet structure. The outlet structure on the right shows structural damage and will need to be monitored for performance impact.



Backyard drainage can be an issue if not properly taken care of, all too many times homeowners fill in low areas creating flooding problems for others. The photo on the left shows how to manage the runoff while creating a beautiful backyard. The right photo shows runoff during a heavy rain event.

Access control to most facilities should be controlled as pictured on the left. The gate on the right is not locked and does not provide access control.

WELL-MAINTAINED

POORLY MAINTAINED

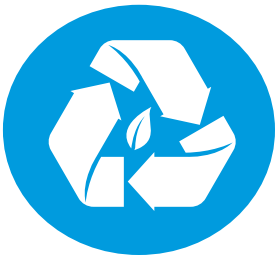
Inlet structures channel stormwater into the stormwater management facility. The left photograph's inlet structure is maintained with no apparent erosion or other structural problems. The right photograph shows the headwall for the inlet structure is being washed out and will be in danger of collapsing if corrective measures are not taken.

Based on the design of the pond, plants growing in the pond should be controlled. Pictured on the left is a properly maintained pond, which includes plants in its design. The pond on the right is filled with cattails reducing the capacity of the facility.

Control of unwanted vegetation will increase the life of your facility. The wet pond on the left has been maintained free of trees, brush, and other unwanted plants. The dry pond on the right is overgrown with saplings.

Safety is an important consideration. The inlet shown above on the right is missing a grate and poses a considerable liability.

Do!



- Provide information to those who maintain their own vehicles where to recycle or dispose of used oil and antifreeze (such as a local auto parts store).
- Keep properties, streets, and gutters free of trash, branches, sediment, and lawn clippings.
- Report any erosion or sediment runoff from new construction activities or land clearing activities to the City of Johns Creek **678-512-3200** or file a request online at www.johnscreekga.gov/online/forms/service-request.
- Educate residents on where they can properly dispose of hazardous wastes like paints, solvents, and oil and grease.
- Encourage residents to use commercial car washes or to select a location (such as your lawn) where wash water will not enter the storm inlet (know the drought status before washing).

- Plan lawn care to minimize the use of fertilizers, pesticides, and herbicides. Sweep excess chemicals off paved areas and put them back on lawn.
- Encourage residents with leaking vehicle fluids to put a pan underneath to catch fluids or to spread an absorbent
  like cat litter to soak up fluids that can be disposed of properly until the vehicle can be repaired.
- Limit the amount of impervious surfaces. Encourage the use of porous materials for patios and walkways such as bricks or gravel.
- Incorporate native trees, shrubs, and ground covers to help water soak into the ground. Select species that require little chemical additions and are adapted to local conditions.
- A properly cared for stormwater management facility can work effectively for years without major maintenance costs. If maintenance is reglected or abused, a stormwater management facility can potentially be a financial drain.

Do NOT!

- Do not dump used motor oil, antifreeze, or other oil and grease products into storm inlets.

- Do not dump or allow lawn service crews to blow grass clippings, leaves, soil, or trash of any kind into a stormwater management facility or storm inlet. Decomposing leaves and grass encourage the growth of oxygen-demanding bacteria; release nutrients that degrade the water quality of the receiving waters; and can potentially kill aquatic organisms.

- Do not dispose of paints, solvents, or other hazardous substances into the storm inlet. These materials can kill stormwater management facility vegetation and aquatic life.

- Do not wash your vehicle on the street or in your driveway. Oils and grease that come off your vehicle end up in the stormwater management facility and can degrade the water quality of the receiving water.

- Do not over-fertilize your lawn. Excess fertilizers wash off lawns, end up in the stormwater management facility, and are ultimately discharged to receiving waters, causing overgrowth of unwanted weeds and bushy plants in the bottom of the facility and downstream of the outfall. Nutrients associated with the fertilizers also encourage the growth of oxygen demanding organisms and can potentially cause the destruction of an aquatic ecosystem.

- Do not leave bare areas. Bare areas add sediment to runoff that is transported to the stormwater management facility and will eventually clog the facility.

- Do not dispose of animal wastes in the storm inlet or on the buffer zones of a stormwater management facility. Animal wastes contain pathogenic bacteria, produce oxygen-demanding bacteria, and release nutrients that degrade the water quality of the receiving stream or river.

Large bare patches of ground should be reseeded or sodded to protect against erosion and provide some treatment of stormwater.