

**BEST MANAGEMENT PRACTICES FOR
MAINTENANCE OF
PRIVATE STORMWATER FACILITIES**

CITY OF CEDAR RAPIDS, IOWA PUBLIC WORKS DEPARTMENT
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PREFACE

This document has been developed to comply with the requirements of the City of Cedar Rapids' National Pollution Discharge and Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit issued by the Iowa Department of Natural Resources (Permit No. 57-15-0-05). Section II.E. Post-construction Storm Water Management requires that the City enforce ordinance that controls the runoff from building activities after construction has been completed and also requires inspection of private and public runoff control devices. Educational materials are to be developed and made available to landowners that outline proper control devices maintenance procedures.

The Public Works Department's preparation of this document is intended to meet the provisions of the NPDES MS4 permit and is not an attempt to assume maintenance responsibilities of privately owned stormwater management structures. This is to be used as a resource in efforts of reducing the impacts of post-construction stormwater runoff through proper operation and maintenance of stormwater control structures.

The Public Works Department will provide technical and educational resources to the public for improving water quality upon request. Any questions or comments regarding this document or water quality programs should be referred to the City of Cedar Rapids Stormwater Engineer at (319) 286-5604.

BACKGROUND

Detention Basins

Your detention basin is a critical part of the City's stormwater system, helping protect public and private property, public health and safety, and water quality. Detention basins are designed to protect property by holding stormwater during storms and slowly releasing the water into the storm sewer system. This reduces the chance of local flooding by regulating the flow of water into the stormwater system, and improves water quality by allowing sediment and pollutants to settle out of the water before entering our streams and rivers. Routine maintenance will help prolong the life of your detention basin, prevent flooding and property damage, protect water quality, improve your basin's appearance, and help you avoid costly repairs to the basin.



When land is altered to build homes and other developments, the natural system of trees and plants over relatively spongy soil is replaced with hard surfaces like sidewalks, streets, decks, roofs, driveways, and lawns over compacted soils. As a result, less rainwater is soaked up and more rain runoff flows off the land at a faster rate. This can lead to streambank erosion within the local streams and possible downstream flooding.

In addition, pollutants in stormwater include sediment, phosphorus and nitrogen from fertilizers, salts, and oil/ grease from roads and parking surfaces, and bacteria from pet waste. These pollutants, which result from a variety of common outdoor activities, degrade water quality and limit the habitat for wildlife in the stream. Every stormwater detention basin located in Cedar Rapids plays an important role in improving and protecting water quality.

Whether you are an individual property owner, homeowners' association member, or a residential/commercial property manager, this best management practice manual will provide you with instructions for stormwater management facility maintenance. Routine maintenance will prolong the life of your detention basin, improve its appearance, reduce the potential of flooding and property damage, enhance local streams, and help you avoid costly repairs to the basin.

Retention Basins

Like detention basins, retention basins help protect public and private property, public health and safety, and water quality by holding stormwater. However, retention basins are designed to

hold a permanent pool of water.



MAINTENANCE RESPONSIBILITIES

Do you have a detention basin near your property?

If your development was built after the mid- 1990's, it may have a detention basin that manages stormwater runoff. If you live in a residential community, your association bylaws or abstract may indicate the location and maintenance responsibilities for any detention basins. If you are unsure, contact the Cedar Rapids Public Works Department.

Are you responsible for detention basin maintenance?

Responsibility for maintenance varies by development. If your homeowners' association or business has a recorded maintenance agreement, you may be the responsible party. It is important to check your maintenance agreement to identify your specific legal obligations. If you are not sure who is responsible for maintenance, contact the City of Cedar Rapids at (319) 286-5604.



DETENTION BASINS

Detention Basin Components

Inlet pipes direct stormwater from neighborhoods, parking lots, streets, and other surfaces into detention basins.



Outlet pipes direct stormwater out of a basin to a receiving drainage way, creek, or stream. Outlet types may include a riser pipe connected to an outlet pipe, orifices, pipes/culverts, and weirs.



Trash racks and grates prevent debris and garbage from getting into the outlet structure, which if occurs, can clog the pipe and prevent the proper discharge of water from the basin.

Detention Basin Maintenance

Periodic inspections, as well as inspections after major rain events, should be done to ensure proper functioning of your detention basin. It is important to regularly inspect the structural elements (inlets, outlets, and grates) of your detention basin to ensure that stormwater is flowing in and out of the basin as originally designed. It is also important to inspect for and remove accumulated debris and sediment. Debris and sediment can clog inlet and outlet structures as well as accumulate in the basin bottom, obstructing flow and reducing the basins design capacity and overall effectiveness. Common routine maintenance needs include:

1. Inspection of Inlet and Outlet Structures

- Inspect the inlet and outlet pipes for structural integrity and ensure they aren't crumbling or damaged.
- Inspect for trash or other debris that may be blocking the inlet or outlet structures or emergency spillway. Remove all trash and debris from the inlet and outlet structures and the basin on a regular basis and especially after rain events. Trash and debris accumulation can harbor breeding area for mosquitoes and reduce the storage capacity of the pond.
- Inspect riprap at the inlet and outlet structures. Replace when the riprap is clogged with sediment and debris.
- Inspect for sediment accumulation at the inlet and outlet structures. Clean out sediment that might be restricting water flow. Remove accumulated sediment with a shovel and wheelbarrow. Small amounts of removed sediment can be spread evenly on upland areas and seeded with permanent vegetation.
- Inspect the stone around the riser/standpipe (outlet pipe). If the stone has accumulated sediment, vegetation, and/or debris to an extent that water is not flowing through the stone and out of the basin as originally designed, then the stone should be replaced with clean 3" diameter stone choked with Class A road stone.

2. Embankment & Outlet Stabilization

- Inspect for erosion, including gullies and sloughing, on the basin banks and bottom. Repair and permanently stabilize undercut and eroded areas. Eroded areas can be repaired and stabilized by filling with topsoil and seeding with permanent vegetation. Seeding should be adequately covered with mulch or straw to prevent it from being washed into the basin.
- Inspect for animal burrows that can deteriorate the structural integrity of the embankment.
- Inspect the outlet structure for undercutting and erosion, and consult a professional engineer if you observe sink holes or cracking around the outlet pipe.

3. Vegetation Management

Many detention basins rely on vegetation to filter sediment from stormwater before it reaches the outlet of the basin and to prevent erosion of the banks and the bottom of the basin. Turf grass is the most common ground cover - although BMPs that utilize natural vegetation like rain gardens and wetland plants (wet ponds) are also used as BMPs that increase pollutant removal efficiencies. Maintenance actions will vary depending on the type of vegetation you have selected for your basin.

Turf

- Inspect the vegetation along the side slopes/banks and in the basin. Remove dead cattails and other decomposing vegetation in the spring and fall.
- Re-establish permanent vegetation on eroded slopes. (Annually in the spring and after rain events)
- Restore dead or damaged vegetation by seeding or sodding.
- Mow the side slopes and bottom to prevent erosion and aesthetic problems, typically two to three times per year. Height should be kept at 4-6" to maintain healthy grass.
- Keep the basin free of trees, including around the inlet and outlet structures, and remove saplings on an annual basis. Trees reduce the storage capacity of a basin and roots can damage the banks and piping.

Native Vegetation

Native vegetation that may be found (or planted) in your basin includes Big Bluestem, New England Aster, Ironweed, Blue Flag Iris, Black-eyed Susan, Silkweed and Joe-Pye weed. The following maintenance and inspection tasks should be included for proper native vegetation management:

- Re-establish permanent native vegetation on eroded slopes. (Annually in the spring and after rain events)
- Maintain 15-25 foot "no-mow and chemical free" zone around the basin edge. (Annually)
- Mow the "no-mow" buffer zone once a year to a minimum height of 6". (Annually in late April/ early May) Rake mown material off and compost, burn or discard.
- Inspect basin and "no-mow" zone for invasive species such as purple loosestrife, phragmites, buckthorn (common & glossy), honeysuckle and autumn olive that out- compete native vegetation. (Annually - July)
- Have a professional selectively remove invasive species with applications of appropriate herbicides. (Annually - July/August) If woody debris is cut, cut 4" above the ground surface and treat the stumps with herbicide immediately after cutting. Monitor for sucker growth.
- Purple loosestrife flower heads can be clipped off to reduce seed production until plant removal may be achieved. Pulling purple loosestrife is not an effective removal method. Pulling purple loosestrife may actually encourage plants to multiply. Herbicide application of plants is the most efficient method. If stands of loosestrife

are dense, it may take several years of maintenance to eliminate the plants from the site. Apply one round of herbicide in mid-July. Reassess the site three weeks after application to ensure all plants have been treated successfully. Apply additional herbicide treatment as necessary.

- Increase plant diversity. (Annually - fall or early spring) Purchase native seed mix and wetland vegetation from a native plant nursery and install plantings in the early spring or fall. Increasing plant diversity in your basin will enhance water quality, minimize algae blooms and encourage habitat for birds, frogs & toads and other wildlife. Native vegetation and seed mixes may be purchased through a number of local plant nurseries.

4. Sediment Removal

- Inspect for excess sediment accumulation in the basin. Remove every 5-10 years or when the sediment accumulation is more than 6-12”.

5. Property Management

Property management refers to specific activities that you as a property owner can do to enhance the detention basin and minimize long-term maintenance. A number of these activities are described as follows:

- Limit the use of pesticides, herbicides, or fertilizers in your pond. These products will leach from the pond and pollute our streams and rivers. In addition, these chemicals are harmful to wildlife, including frogs, toads, fish, dragonflies, etc. in the pond. If you must use fertilizers, only use low-phosphorus, slow-release varieties. Keep fertilizers on the lawn and not on paved areas.
- Do not place yard waste such as leaves, grass clippings or brush in the detention basin or in the storm drains located in the streets. These materials release excess nutrients as they decompose and will lead to more algae growth in the pond.
- Do not dump any materials in the basin or inlet and outlet structures. Improperly disposed of materials will pollute the basin.
- Consider contracting with a street sweeping company to minimize excess sediment from entering your storm sewer system and detention basin. This can reduce the need for future pond maintenance. Pick up and dispose of pet waste with your weekly garbage.
- Provide educational updates to the property owners. Discuss your maintenance plan at regular meetings, provide information in newsletters, and host annual clean-up days.

6. Other

- Inspect and clean the storm sewer system and catch basins upstream from the detention basin.

RETENTION BASINS

Maintenance

In general, detention basin maintenance measures apply to retention basins as well. Floating litter, scum, algal blooms, and shoreline erosion are additional maintenance considerations for retention basins.

The establishment of wetland vegetation within your basin as well as the creation of vegetation buffers or no-mow zones around the basin will help to improve water quality by filtering pollutants in stormwater. This, in turn, helps to reduce algae growth within the basin and in downstream rivers, lakes, and streams.

Excess nutrients, including nitrogen and phosphorus, encourage algae growth. If fertilization of your property is necessary, use low-phosphorus, slow-release varieties. Laws including the Federal Clean Water Act encourage or require the control of urban pollutants. As such, maintaining your BMP is an important part of Cedar Rapids' environmental protection efforts.

DETENTION BASIN INSPECTION AND MAINTENANCE SCHEDULE

Inlet & Outlet Structures, Sediment & Debris	
Task	Inspection Frequency
Inspect the riser/standpipe cover for trash and debris	Monthly and after rain events
Conduct routine inspections for trash or other debris that may be blocking the inlet or outlet pipes or emergency spillway	Monthly and after rain events
Inspect for sediment & trash accumulation at the inlet pipes	Semiannually and after rain events
Inspect the stone around the riser/standpipe (outlet pipe)	Semiannually and after rain events
Remove accumulated sediment at basin inlets or in basin forebay	Semiannually and after rain events
Inspect the inlet and outlet pipes for structural integrity	Annually
Inspect riprap at inlet pipes	Annually
Inspect for excess sediment accumulation in the basin	Annually
Inspect and clean the storm sewer system and catch basins upstream from the detention basin	Every 5 years or as needed
Have a Professional Civil Engineer inspect the pond to ensure it is functioning properly	As Needed
Have a Professional Civil Engineer inspect all outlet control structures to ensure they are functioning properly	As Needed

Detention Basin Vegetation - Turf	
Task	Inspection Frequency
Re-establish permanent vegetation on eroded slopes	Annually and after rain events
Mow the side slopes and bottom to prevent erosion and aesthetic problems	Regularly, maintain height of 4-6"
Inspect for and remove trees, including around the inlet and outlet structures	Annually
Detention Basin Vegetation – Native Vegetation	
Task	Inspection Frequency
Mow (or burn) the “no- mow” buffer zone once a year	Annually, late April / early May
Inspect basin and “no- mow” zone for invasive species such as purple loosestrife, phragmites, buckthorn (common & glossy), honeysuckle and autumn olive that out-compete native vegetation.	Annually, July
Have a qualified professional selectively herbicide invasive species	Annually, July / August
Increase plant diversity by planting additional vegetation in around the pond	Annually, fall or early spring
Property Management	
Task	Inspection Frequency
Inspect basin for signs of chemicals (solvents, gas, diesel, paint, natural gas) - Identify and remove / dispose of properly	Monthly and after rain events
Review maintenance plan	Annually

Other Practices

Bio-retention “Rain Garden” Maintenance

Bio-retention, or “rain gardens” are vegetated basins designed to mimic the conditions found in a mature forest floor. Acting as a sink and underlain with engineered layers of soil, sand, and organic mulch, runoff is trapped and treated by vegetation and microbes. A native rain garden is not maintenance free and will regularly need some maintenance garden decreases over time. Native rain garden plants do not need fertilizers, winter protection or irrigation. Native plants are adapted to the climate and soils and can tolerate excessive heat, bitter cold, drought, and flooding. The first two years require the most care while the plants are establishing themselves in the garden. As they are maturing during the first year, they need regular watering to encourage good root development. Irrigate the plants so the water soaks deeply into the ground. Short sprinkles of water encourage the roots to grow along the surface. When roots grow along the surface plants are less hardy during droughts and freezing temperatures.



Pull weeds to reduce competition for space, light, and water. Most weeds are pioneer species, which means they can grow very quickly. They fill in the open spaces and often can crowd out new rain garden plants. Additionally, they give the garden a messy, unkempt appearance. Spreading a three inch layer of wood chip or leaf mulch around the new planting helps control some of these uninvited species.

Much of the maintenance during the establishment years occurs during the summer months. Therefore, before summer vacation, enlist volunteers to monitor, water, and weed the garden during summer vacation. Local garden clubs, summer school students, scout troops, and families may be willing to volunteer during the summer.

Year 1

Watering

- For the first three weeks after planting, water the rain garden once per week. It is not necessary to water during a given week if one–inch of rain accumulates.
- Water the garden during droughty periods in mid-summer, if needed.

Weeding

- First identify what is a weed and what is a rain garden plant. Rain garden plants may be marked with planting stakes.
- Remove plants carefully so not to disrupt the rain garden species. Pull from the base of the plant. It is easier to pull weeds when the weeds are young and small.
- Dispose weeds in your yard waste container or place in a compost pile.
- Check status of weeds and pull them, if necessary, once every three weeks during the

summer. A layer of mulch helps to reduce weed growth and weeding time.

Year 2

Watering

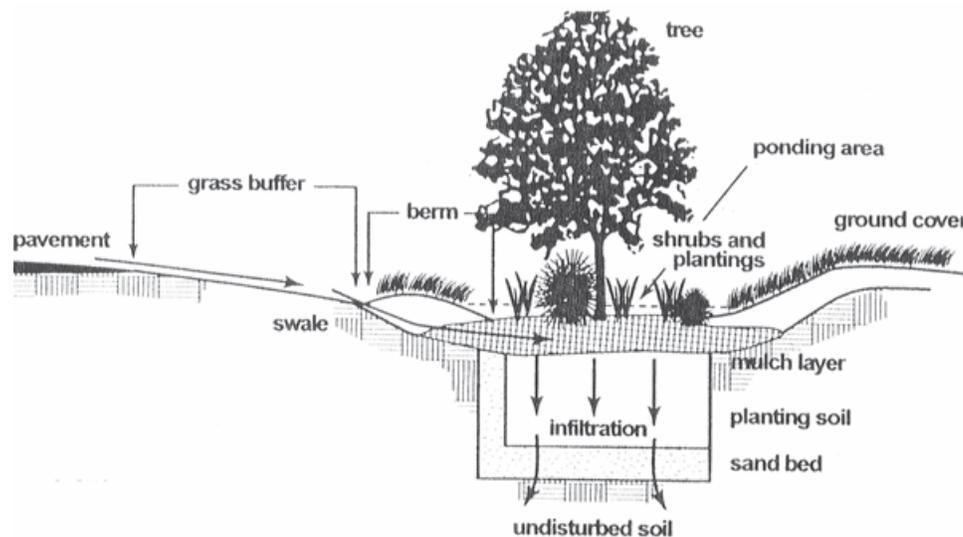
- Water only if in a drought.

Weeding

- Continue weeding as needed. Rain garden plants will fill in the spaces and form a dense root mass, which will significantly reduce weeding over time. It is still worthwhile to monitor the garden for weeds once every three to four weeks during the summer.

Maintenance is required when:

- Litter accumulates in the rain garden.
- Standing water is visible in the basin 72 hours after a rain event.
- Insects and/or odor become problems.
- Vegetation is wilting, discolored, or dying.
- Erosion is visible within the basin, on the berm, or on the slopes.
- Settling has occurred along the berm, if present.
- The overflow riser or grate is covered by debris.
- In spring when new growth begins, cut off dead plant material. (Keep stems and seed heads on during winter for visual interest, wildlife cover, and food for birds.)



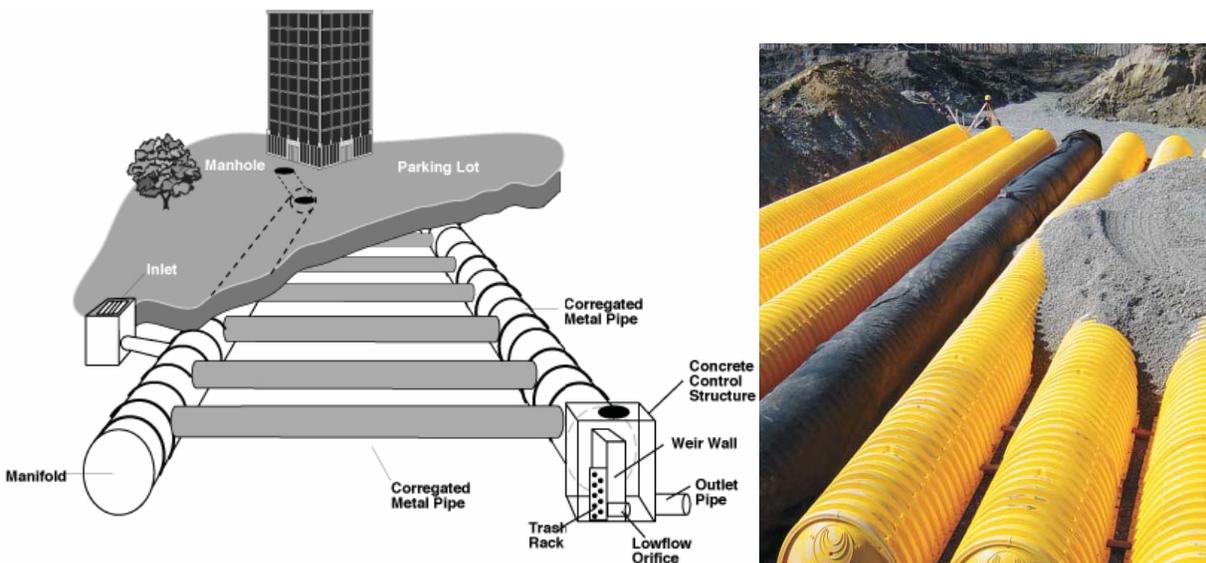
Underground Detention Maintenance

Underground detention consists of large underground pipes that provide storage and water quality treatment. Underground detention is often used in space limited areas, such as parking lots in commercial and industrial developments, where adequate land for a surface BMP facility is not available. Subsurface detention facilities are commonly associated with other manufactured pretreatment facilities to improve water quality before the stormwater is released.

Establish a routine inspection schedule. This will be determined by the land use, anticipated pollutant load, imperviousness of the site, and climate. In the first year of operation, inspect the facility every six months. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

Maintenance is required when

- Significant amounts of trash and/or sediment has accumulated in the vaults or tanks. Clean when the depth of sediment exceeds three inches.
- There is visible damage to the inlets or outlets.



NOTE: If entry into a manhole is required, please follow OSHA rules for confined space entry.