



Maintenance Procedures

For

Stormwater Management Facilities

Prepared By:

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INFILTRATION/EXTENDED DETENTION BASINS

Before the development site is graded, the area for the infiltration basin should be roped off to prevent heavy equipment from compacting the underlying soils.

Light earth-moving equipment should be used to excavate the infiltration basin. Use of heavy equipment causes compaction of the soils beneath the basin floor and side slopes, resulting in reduced infiltration capacity. Since some compaction of soils will occur during construction, the basin floor should be tilled with a rotary tiller to restore infiltration rates after final grading.

Infiltration basins perform better in well-drained permeable soils. Infiltration basins in areas of low permeability can clog within a couple of years, and require more frequent inspection and maintenance. The use and regular maintenance or pretreatment BMP's will significantly minimize maintenance requirements for the basin. Spill response procedures and controls should be implemented to prevent spills from reaching the infiltration system. Scarification or other disturbance should only be performed when there are actual signs of clogging or significant loss of infiltrative capacity, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand guided rotary tiller, if possible, or a disc harrow pulled by a light tractor. Clogged infiltration basins with surface standing water can become a breeding area for mosquitoes and midges. Maintenance efforts associated with infiltration basins should include frequent inspections to ensure that water infiltrates in the subsurface completely by the end of the state required 72 hour period and that vegetation is carefully managed to prevent creating mosquito and other vector habits. Below is a list of inspection and maintenance activities that should be followed to ensure a proper functioning stormwater management facility.

Inspection activities	Suggested frequency
Observe drain time for a storm after completion or modification of the facility to confirm that the desired drain time has been obtained	Post construction
Newly established vegetation should be inspected several times to determine if any landscape maintenance (re-seeding, irrigation, etc.)	Post Construction

is necessary	
Inspect for the following issues: differential accumulation of sediment, signs of wetness or damage to structures, erosion of the basin floor, dead or dying grass on the bottom, condition of rip-rap, drain time, signs of contamination, standing water, trash and debris, sediment accumulation, slope stability, pretreatment device condition	Semi-annual and after storms exceeding 1” rainfall
Maintenance Activities	Suggested frequency
Factors responsible for clogging should be repaired immediately	Post construction
Weed once monthly during the first two growing seasons	Post construction
Stabilize eroded banks	Standard maintenance (as needed)
Repair undercut and eroded areas at inflow and outflow structures	Standard maintenance (as needed)
Maintain access to the basin for regular maintenance activities	Standard maintenance (as needed)
Mow as appropriate for vegetative cover species	Standard maintenance (as needed)
Monitor health of vegetation and replace as necessary	Standard maintenance (as needed)
Control mosquitoes as necessary	Standard maintenance (as needed)
Remove litter and debris from infiltration basin area as required	Standard maintenance (as needed)
Mow and remove grass clippings, litter and debris.	Semi-annual
Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons	Semi-annual
Replant eroded or barren spots to prevent erosion and accumulation of sediment	Semi-annual
Scrape bottom and remove sediment when accumulated sediment reduces original infiltration rate by 25-50%. Restore original cross-section and infiltration rate. Properly dispose of sediment	3-5 year maintenance
Seed or sod to restore ground cover	3-5 year maintenance
Disc or otherwise aerate bottom	3-5 year maintenance
De-thatch Basin Bottom	3-5 year maintenance

Additional Information

Light equipment which will not compact the underlying soils and sands should be used to remove the top layer of sediment. The remaining soils or sands should be tilled and re-vegetated as soon as possible where applicable.

Sediment removal within the basin should be performed when the sediment is dry enough so that it is cracked and readily separates from the basin floor. This also prevents smearing of the basin floor.

Once the basin has gone on-line, inspections should occur after every major storm for the first few months to ensure proper stabilization and function. Attention should be paid to how long water remains standing in the basin after a storm; standing water within the basin should infiltrate within 72 hours after a storm.

Additional Maintenance Requirements:

To ensure the proper function of storm water infiltration basin, the following list of maintenance activities are recommended:

- For the first year, cut to a 6” height three times – once each in June, July and early August. To prevent damage to the native grasses, do not mowed below a 6” height. Remove excessive accumulation of clippings to avoid smothering next year’s seedlings.
- After the first year, mowing may only be needed in early June each year to help control the spread of cool season plants. The mowing should also be raised to 10-12” to avoid damage to the warm season plants.
- Burning may also be used to manage weeds in 2-5 years intervals. Late spring burns (mid-late May) provide maximum stimulus to warm season grasses and work well to control cool season grasses. Burn when the cool season grasses are growing and the warm season plants are just barely starting to grow to get maximum control of cool season species.
- Any major bare areas or areas taken over by nonnative species must be reseeded. To clear area of weeds and cool season grasses, treat with an herbicide that contains glysophosphate in accordance with manufacture’s instructions. Ensure a firm seedbed is prepared to a depth of 3 inches (a roller is recommended). Seeding should occur late March thru late

October. Seed with Tall Fescue(50 lb/acre), Perennial Rye-Grass(5 lb/acre), Redtop (5 lb/acre), & White Clover (5 lb/acre), (preferably an equal mix of all four types). A companion crop of oats is recommended. Seed must be placed at a depth of 1/4 – 1/2” into the soil. If broadcast seeding by hand, drag leaf rake over soil surface after seeding. Then roll it again and cover with a light layer of mulch and staked erosion control netting to hold it in place until germination. For other planting details, see NRCS standard 342 (Critical Area Planting).

The basin and all components (grass swales, forebay, inlets, outlets, etc.) should be inspected after each heavy rain, but at a minimum of once per year. If the basin is not draining properly (within 72 hours), further inspection may be required by persons with expertise in storm water management and/or soils.

- If soil testing shows that the soil surface has become crusted, sealed or compacted, some deep tillage should be performed. Deep tillage will cut through the underlying soils at a 2-3 foot depth, loosening the soil and improving infiltration rates, with minimal disturbance of the surface vegetation. Types of tillage equipment that can be used include a subsoiler or straight, narrow-shanked chisel plow.
- If sedimentation is determined to be causing the failure, the accumulated sediment must be removed and the area reseeded in accordance with the notes above.
- If inspection of the monitoring well shows that groundwater is regularly near the surface, additional design features may need to be considered, such as subsurface drainage or conversion to a wetland treatment system.
- If the washed stone trench has become clogged, the stone – and possibly the soil immediately around the stone – must be replaced.

All outlet pipes, stone trenches and other flow control devices must be kept free of debris. Any blockage must be removed immediately.

Any eroding areas must be repaired immediately to prevent premature sediment build-up in the system. Erosion matting is recommended for repairing grassed areas.

Heavy equipment and vehicles must be kept off of the bottom and side slopes of infiltration basins to prevent soil compaction. Soil compaction will reduce infiltration rates and may cause failure of the basin, resulting in ponding and possible growth of wetland plants.

No trees are to be planted or allowed to grow on the earthen berms of the bottom of the basin. On the berms, tree root systems can reduce soil compaction and cause berm failure. On the basin bottom, trees may shade out the native grasses. The basin must be inspected annually and any woody vegetation removed.

Grass swales leading to the basin shall be preserved to allow free flowing of surface runoff in accordance with approved grading plans. No buildings or other structures are allowed in these areas. No grading or filling is allowed that may interrupt flows in any way.

If floating algae or weed growth becomes a nuisance in the forebay (decay odors, etc.), it must be removed and deposited where it cannot drain back into the basin or forebay. Removal of the vegetation from the water reduces regrowth the following season (by harvesting the nutrients). Wetland vegetation must be maintained along the waters edge for safety and pollutant removal purposes.

When sediment in the forebay has accumulated to an elevation of three feet below the outlet elevation, it must be removed (refer to figure). All removed sediment must be placed in an appropriate upland disposal site and stabilized (grass cover) to prevent sediment from washing back into the basin. Failure to remove sediment from the forebays will cause re-suspension of previously trapped sediments and increase deposition in the infiltration basin.

Periodic mowing of the grass swales will encourage rigorous grass cover and allow better inspections for erosion. Waiting until after August 1 will avoid disturbing nesting wildlife. Mowing around forebay may attract nuisance populations of geese to the property and is not necessary or recommended.

Basin Outlet Control Structures

Outlet structures should be inspected periodically to ensure no parts of the structure are malfunctioning. Below is a list of inspection and maintenance activities that should be followed to ensure a proper functioning outlet control structure.

Maintenance Activities	Suggested frequency
Remove debris from orifice outlet(if necessary)	Standard maintenance (as needed)
Remove litter and debris from Trash Racks	Standard maintenance (as needed)
Inspect the inside of control structure for any litter and debris and remove if causing blockage**	Standard maintenance (as needed)**
Structural components must be inspected for cracking, subsidence, spalling, erosion and deterioration**	At least annually**

may require outside contractor or township to clean

Sample Maintenance
and
Inspection Checklist

Inspection Checklist / Maintenance Actions

Surface Infiltration Basin

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ **Inspection Date:** _____

Date of most recent rain event: _____

Rain Condition (circle one):

Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):

Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

Infiltration Bed	1	<p>Standing water is present after the design drain time</p> <p>The observed drain time is approximately _____ hours.</p>	<p>Y__</p> <p>N__</p>	<p>Recheck to determine if there is standing water after 72 hours</p> <p>If standing water is present longer than 5 days, report to mosquito commission.</p> <p>Remove any sediment buildup</p> <p>Replace the sand layer (6" K4 SAND)</p> <p>Work Order # _____</p>
	2	<p>Excessive sediment, silt, or trash accumulation on basin bed</p>	<p>Y__</p> <p>N__</p>	<p>Clean pretreatment system</p> <p>Remove silt, sediment, and trash</p> <p>Work Order # _____</p>

Note:

Infiltration Bed	3	Erosion or channelization is present	Y__ N__	Check whether the flow bypass or diversion device is clogged Re-grade the infiltration bed Work Order # _____
	4	Animal burrows/rodents are present	Y__ N__	Pest control Work Order # _____
	5	Uneven bed	Y__ N__	Use light equipment to resurface the bed Work Order # _____
	6	Evidence of sinkholes or subsidence	Y__ N__	Monitor for sinkhole development

Note:

Vegetation	1	Large spot(s) showing bare soil	Y__ N__	<p>Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost.</p> <p>Check Landscaping plan for guidance (if available)</p> <p>Work Order # _____</p>
	2	Overgrown vegetation	Y__ N__	<p>Mow/trim the vegetation</p> <p>Work Order # _____</p>
	3	Tree growth in the basin	Y__ N__	<p>Clear, trim, or prune the trees according to the original Landscaping Plan</p> <p>Inspect to determine if the tree roots caused any structural damage</p> <p>Work Order # _____</p>
Note:				

<p>Basin Embankment and Side Slopes</p>	<p>1</p>	<p>Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope</p>	<p>Y__ N__</p>	<p>Check for excessive overland runoff flow through the embankment.</p> <p>Check for any sink hole development</p> <p>Direct the overland runoff to the forebay or pretreatment area</p> <p>Restabilize the bank</p> <p>Work Order # _____</p>
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Note:

Emergency Spillway	1	Trees or excessive vegetation present	Y__ N__	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y__ N__	Repair Work Order #_____
Miscellaneous	1	Excessive or overgrown vegetation blocking access to the basin	Y__ N__	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____

Note:

Follow Up Items (Component):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

Inspector Name Signature Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities, if standing water is present longer than 5 days.

File this checklist in the Maintenance Log after performing maintenance.

Preventative Maintenance Record

Corresponding Checklist No. _____

Component No. _____, Inspection Item No. _____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal Sediment removal should take place when the basin is thoroughly dry		
	Infiltration Bed	
	Basin Embankment and Side Slopes	
Vegetation removal		
	Infiltration Bed	
	Basin Embankment and Side Slopes	
	Emergency Spillway	

Vegetation is removed by _____ (type of equipment) with minimum disruption to the remaining vegetation.

All use of fertilizers, pesticides, mechanical treatments, and other means to ensure optimum vegetation health must not compromise the intended purpose of the stormwater management measure

Debris, sediment, and trash are handled [by the maintenance contractor](#).

Crew member: _____ / _____ Date: _____

(name/ signature)

Supervisor: _____ / _____ Date: _____

(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.