



**MINNEHAHA CREEK
WATERSHED DISTRICT**

Inspection Guide

Filtration Practices, Infiltration Basins and Trenches, Bioretention (Raingardens), and Swales.



Photo Credit: Blue Thumb™

Maintenance of stormwater management structures is essential for keeping nearby lakes, wetlands, and streams within the Minnehaha Creek Watershed District (MCWD) clean. A poorly maintained and failing best management practice (BMP) provides little to no water quality benefit. BMPs are used to mitigate the negative effects of development by storage, infiltration, and/or filtration of stormwater runoff before it reaches valuable waterbodies.

1.

Where does the water that flows into your BMP come from?

In a natural environment, most rainwater soaks into the ground or is captured by trees and other plants. As land is developed, it is covered by hard surfaces - roads, parking lots and rooftops – that prevent natural infiltration, and allow water to quickly run downstream. This runoff, known as stormwater, carries dirt, fertilizer, pet waste, pesticides and debris into lakes, streams and wetlands. In many urban environments, stormwater is managed with storm sewer systems that quickly move stormwater away to prevent localized flooding. However, storm sewers often drain directly into lakes, streams and wetlands, rapidly carrying pollution into our valuable surface waters.

This guide covers several different types of BMPs, but this guide has provided information that can be helpful in maintenance of all of them.

Filtration practices and Infiltration basins come in many different shapes and sizes. Sometimes much of the work is done underground. The most well known practice is the raingarden. A raingarden is a shallow depression that captures stormwater and allows it to soak into the ground. It is also known as bioretention. Raingardens capitalize on the use of perennial shrubs, grasses, and wildflowers, which have deep roots that break up compacted soil and promote infiltration. By catching stormwater where it falls, raingardens slow runoff, prevent erosion and decrease the amount of pollution flowing downstream to lakes, streams and wetlands. Raingardens also provide beautiful landscaping – which increases property values – and much needed habitat for birds, butterflies, and other wildlife in an urban environment. Swales and infiltration basins come in many different forms. They can be planted with perennial plants or turf. They are primarily for conveying water, but do provide infiltration and retention of water. They allow for water to slow, reduce in temperature, and remove many pollutants before it reaches a downstream waterbody. Filtration practices use porous materials for water to filter through, removing pollutants and sediments.

Do you notice standing water in your BMP beyond 48 hours after it rains?

Most BMPs are designed to drain water within 48 hours after a storm event. A BMP that is holding water for more than 48 hours after a rain event needs maintenance. Some BMPs, like swales, are not built to hold water at all. If there is standing water in your swale, it is not working.



Failing BMP

These BMPs are holding large volumes of water which is an indicator the BMP is failing.



The image below is a functioning and healthy raingarden.



Functioning BMP

What can you do? Check on your BMP after a rain event to make sure the water is infiltrating. A BMP holding water 48 hours after a rain event is a good indication it needs additional maintenance.

3.a.

Sediment Accumulation



Sediment accumulation is problematic in a BMP.

Sediment is silt, sand, and gravel, which is carried downstream by water and wind along impervious surfaces like streets, driveways, or sidewalks. It is problematic because it reduces the surface area available for infiltration, and reduces the amount of stormwater being treated. Accumulation of sediment is going to occur in all BMPs, so regular maintenance to remove it is necessary. Most commonly, sediment will accumulate around inlets, outlets, or a pre-treatment device. Excessive accumulation in the BMP is an indicator that a pre-treatment device is not doing its job. It can also be caused by a new or significant source upstream (such as a construction site).



Sediment Accumulation

The pictures to the left demonstrate what sediment accumulation may look like around your BMP.



Is the accumulation due to a nearby construction project?

What can you do? Remove visible sediment accumulation around you BMP and put it in a garden area or in the garbage. If this is more than routine maintenance, discover where and why the sediment is accumulating. This may be because of a construction site up stream or a pre-treatment device may need maintenance.

Erosion and Gullies



Erosion or gullies are when the soil is exposed and channels are created by flowing water. This exposed soil is now easily washed away and creates a dysfunctional BMP. This happens because water is flowing into the BMP faster than the design predicted, and is not holding up to large amounts of fast moving water. It can also indicate that water is entering the BMP in ways that were unintended by the design. This is a very significant indicator that your BMP needs maintenance.

Before



At this site, the erosion became very serious and needed extensive restructuring.

After



What can you do? The best option is to contact someone at your city or watershed. Your BMP may be in need of some structural repairs to fix the problem.

3.c.

Litter or debris?

Litter, all large debris, and solid waste need to be removed from inlets and pre-treatment devices to ensure they are not blocking or stopping the entry of water into the BMP. If there is litter or debris in the BMP it is important to remove it.



What you can do? Check on your BMP regularly to make sure there is not a garbage pile collecting in it. Take extra care in the fall and spring to remove large amounts of organic debris (leaves, grass, and decaying material).

Compaction

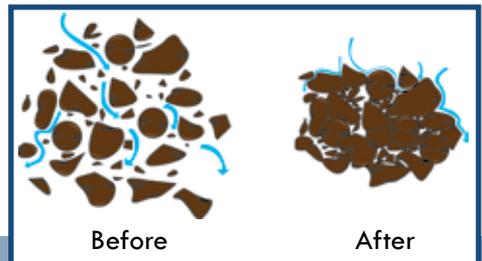


Compaction can be a headache for BMPs. It slows plant root growth and limits the amount of water that can enter the ground. Compaction can become apparent when bare soil becomes visible and looks smooth and hard.



To the left is a picture of a raingarden project that will break up clay soils that have been compacted via the use of deep rooted prairie grasses. The large light colored chunks in the picture is clay that was mixed with compost (the dark brown soil) to allow for infiltration.

To the right is a diagram that shows water flowing easily through loose soils and how difficult it is for water to flow through compacted soil.



What can you do? You may need to consult a professional to test the infiltration rate of your BMP or to measure the “soil bulk density” to see if a soil amendment should be installed. In some cases the BMP can simply be taken off line for a time to give the plants a better opportunity to establish themselves.

5.a.

Turf Evaluation

Dead spots on your turf indicate that there is too much or too little water getting to it. If water is not infiltrating or being conveyed fast enough downstream it may drown the grass. This can be a sign of compacted soils that are not allowing for infiltration or it could just be a small glitch in the function of the BMP. Dead grass can expose the soil to erosion, and some sort of remedy should be found.



The pictures below are both of turf that is filled in with sediment or being overly saturated.



What can you do? The best option is to contact someone at your city or watershed. Your BMP may be in need of some structural repairs to fix the problem.

Perennial plants provide several benefits to your BMP. The first benefit is from the roots of the plants. The roots break up the soil creating spaces for water to infiltrate down into the ground. They also glue the soil in place, protecting it from large amounts of fast water. The second benefit is the creation of habitat for birds, butterflies, and other wildlife. They use excess nutrients and can break down some pollutants. The overall health of the plants in your BMP is important. If the plants in the base of the BMP are dying it is an indicator for maintenance.

- If it is a lack of water that is causing the death of plants you may need to clean out the inlet or pretreatment devices.
- If it is too much water that is damaging your plants it is probably a sign that the wrong plants were planted at the base. Plants at the base should be tolerant to occasional periods of high water.
- It could also be because the water is not draining properly through the BMP.

To the right is a picture of a BMP with bare soil visible at the low spot in the BMP. This BMP has large healthy plants, but may need additional plantings.



What can you do? Keep an eye on your BMP to find the cause of the lack of growth at the base of the BMP. Is it too much water, too little? Would planting a different plant help? Go to BlueThumb's website (<http://www.bluethumb.org>) to learn more about options for helping your BMP work properly.

6.a.

Bare Soil

Bare soil or dying plants are problematic in a BMP for two reasons. First, dying plants and bare soil are a gateway for erosion, they are indicators that plants are not taking root and holding the soil in place. Second, it indicates a failure in water flow; wet spots that don't dry out or compaction can lead to this. If it seems only one specific plant is failing there is a good chance that plant is just not suited for the site, and the BMP is functioning.



Photo Credit: Murphy

Not all BMPs are designed to have plantings. The dry swale to the left is an example of a functioning BMP with out exposed bare soil.



The picture above is of a full and healthy rain garden.

What can you do? Get involved in your BMP, try to identify plants or find an original plant guide that was created in the design of your BMP. Find a nursery near you who knows about native and perennial plants or visit BlubThumb's website. Here you can find a wealth of information on what sort of plants you can try in your garden to find some that thrive and improve the effectiveness of your BMP.



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Plants under stress will demonstrate all or some of the following warning signs:

- wilting,
- discoloration of the leaves,
- few or no flowering buds,
- stunted growth,
- plants dying off completely

This can be from a variety of things; too much water or too little, a shady plant receiving too much light or vice versa, a lack of nutrients to support growth, compacted soil, or even toxic pollutants.

What can you do? Get more involved in your BMP. BlueThumb™ has great resources on native plants and you can get a better idea of what's in your BMP, and some of the reasons it may not be doing well.

6.c.

Aquatic vegetation in your BMP

Cattails are a common type of aquatic vegetation that can grow in a failing BMP. Cattail and other aquatic plant growth indicate that the water is not draining properly from your BMP. A large amount of terrestrial vegetation is a good indicator that the BMP is draining well and functioning properly.



What can you do? The best option is to contact someone at your city or watershed. Your BMP may be in need of some structural repairs to fix the problem.

You want your BMP to have 75-100% coverage to ensure that it is both working and attracting wildlife. A serious indicator that water is not flowing through the BMP well is dying plants. Dying plants will result in exposed soil, a loss of capacity for stormwater, and eventual maintenance.

The picture to the right is of a new raingarden with minimal growth. To ensure erosion doesn't occur there is a 3 inch layer of mulch to protect the soil. Below is a picture of a mature and healthy raingarden.



What can you do? Get involved in your BMP, try to identify plants or find an original plant guide that was created in the design of your BMP. Find a nursery near you who knows about native and perennial plants or visit BlueThumb™ website (<http://www.bluthumb.org>). Here you can find a plethora of information on what sort of plants you can try in your garden to find some that thrive and improve the effectiveness of your BMP.

Routine Maintenance

Regular raingarden maintenance is similar to any landscaped area. Routine inspections after rain events will help you become familiar with your raingarden so you can identify small or potential problems when they are still easy to fix.

- Replace mulch or add rock to bare areas
- Replace dead or diseased plants
- Remove litter
- Stabilize eroded areas using small stones
- Remove accumulated sediment in inlets, outlets, bottom of basin, and pretreatment areas
- Replace weeds/invasive vegetation with raingarden plants
- Re-vegetate stormwater inlets to reduce incoming sediments
- During droughts, water raingarden plants that show signs of stress
- Follow MCWD Inspection Report to check for problems

Signs additional maintenance is needed:

- Standing water is noticeable after 48 hours
- Odor becomes a problem
- Runoff flows across, rather than into the raingarden
- There is visible damage to any structures associated with the raingarden

Note: If non-routine maintenance is needed, you should consult a professional or contact MCWD for more information.

Key Terms



BMPs (Best Management Practices) are structures or techniques used to reduce the impacts of stormwater runoff. This runoff often contains pollutants or flows at rates that negatively affect water bodies downstream.



Compaction is the process by which the porosity of a given form of sediment is decreased as a result of its mineral grains being squeezed together by the weight of overlying sediment or by mechanical means.



Erosion is the process by which rocks, sediments, and soils are worn away by water and wind. Erosion also results in the displacement of this material to a new location.



Gullies or channelization is the formation of a ditch or channel from running water.



Impervious Surfaces are hard surfaces through which water cannot pass. Instead, the water simply runs off these surfaces. Examples include: most streets, driveways, sidewalks, and highly compacted soils.



Sediment is the weathered fragments of rock deposited by wind, water, or ice. Most commonly referred to as sand, silt, and clay.

Learn More:



Blue Thumb: Planting for Clean Water

www.bluethumb.org

Blue Thumb is a collaborate program that is a one-stop resources for finding government agencies and non profits, landscape designers and contractors, and nursery and garden centers that specailize in native plants, shoreline stabilization, and raingardens.



U of M Stormwater Assessment and Maintenance

stormwater.safl.umn.edu

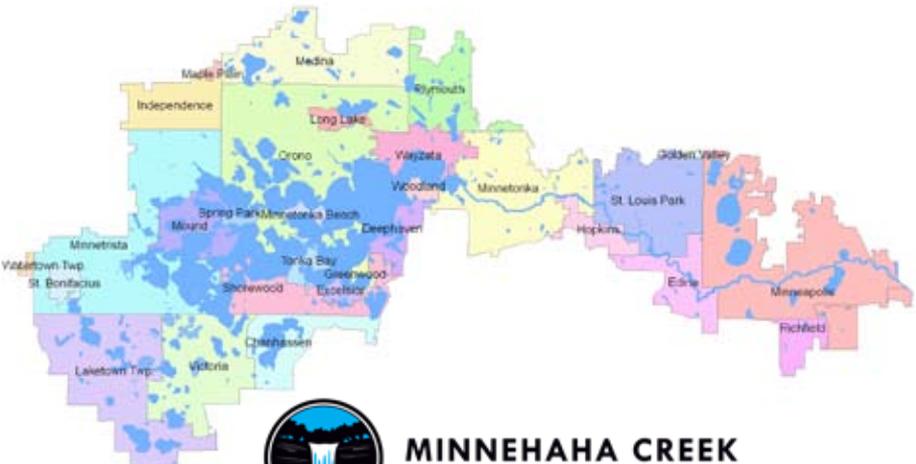
The University of Minnesota Stormwater Assessment and Maintenance site is a great resource for technical information on all stormwater best mangment practices.



Metro Blooms

www.metroblooms.org

Metro Blooms specializes in landscaping for clean water, such as raingardens and installing rain barrels. They hold many raingarden workshops throughout the spring, summer and fall.



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