BIORETENTION BASINS

STORMWATER MANAGEMENT PRACTICES GUIDANCE FOR PRIVATE OWNERS

[Delete this image in Adobe and insert logo here]

BASIN BASICS

Bioretention basins are shallow, landscaped depressions that are used to treat on-site stormwater runoff. Stormwater is directed to the basin and then infiltrates through several layers that help remove pollutants, reduce runoff volume, and lower temperature. The slowed, cleaned water then infiltrates into native soils or is directed to nearby stormwater drains or receiving waterbodies. Bioretention basins can be used as a standalone method or in conjunction with other stormwater management practices.

Maintaining healthy vegetation in a bioretention basin is vital for proper function. Basins are required to be planted with native plants that are adapted to growing in periodically wet conditions. Many native plants have extensive, deep root systems. Plants can lose 30% of their root structures annually, which produces macropores in the soil. Macropores increase the infiltration rate of the soil so that more runoff soaks into the ground. Additionally, dense vegetation slows overland flow, reducing erosion and resuspension of captured pollutants. Vegetation also aids in the breakdown of pollutants and uptake of nutrients in stormwater runoff. Plants native to an area are also more likely to establish quickly, and will be naturally hardy and healthy, making long term maintenance easier and cheaper for landowners.

Native plants are planted into an engineered soil consisting of a mixture of 70-85% sand and 15-30% compost which facilitates plant growth while acting as a natural filter, removing pollutants from runoff before it infiltrates into the ground beneath or is filtered to the underdrain system and then discharged.

COMPONENTS OF BIORETENTION BASINS

Ponding Zone: receives and holds runoff until it has an opportunity to infiltrate through the basin.

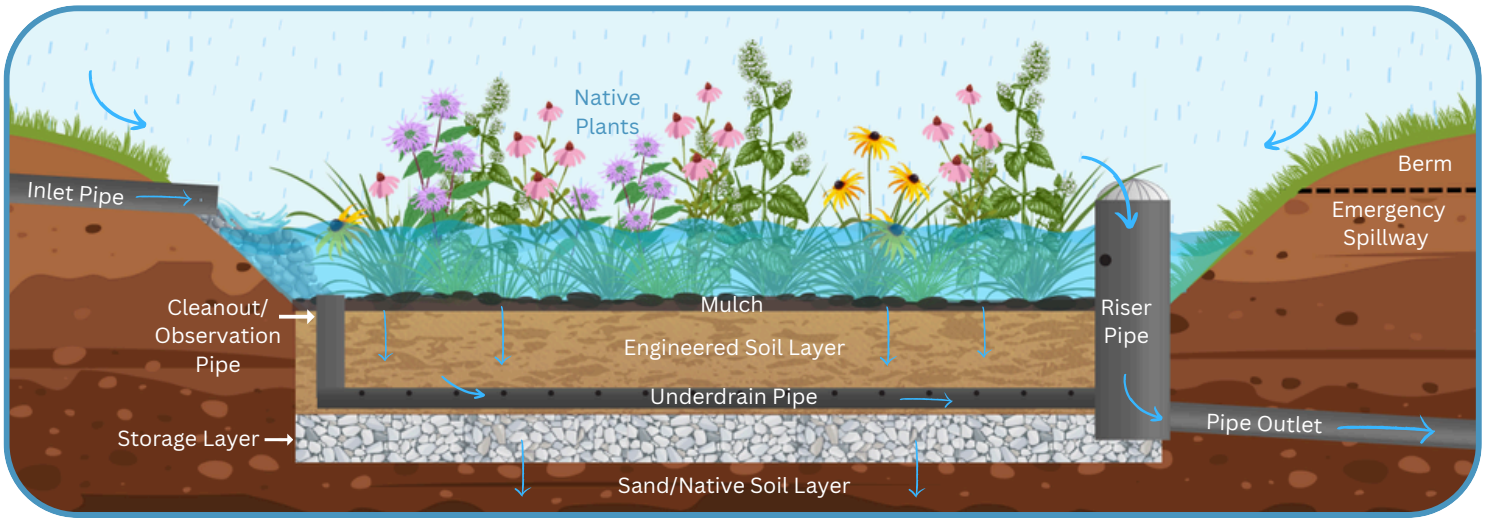
Vegetation and Mulch Layer: the first layer to be infiltrated by the runoff. Contains native plants and 2-3" of hardwood mulch or coconut mat to help suppress weed growth.

Engineered Soil Layer: composed of sand and compost, it facilitates plant growth and filters out pollutants.

Storage Layer: promotes infiltration. Since infiltration is the only way water is able to exit the storage layer, it is an important component of the bioretention facility.

Underdrain Pipe: a perforated pipe that is placed at the top of the storage layer as an outlet for runoff that cannot be infiltrated as quickly as needed. The underdrain must have a clean-out port that can be accessed for maintenance.

Sand/Native Soil Layer: an interface below the storage layer which is necessary when the native soil is not suitable for infiltration, such as clay soils.



BASIN MAINTENANCE

Upon the construction of stormwater facilities, landowners sign a maintenance agreement where they commit to carrying out necessary maintenance on the facility to keep it functioning as designed. While some maintenance tasks can be performed by the landowner, others may require a professional, such as a pond management technician. Below are several common maintenance tasks to perform on your stormwater basin.

Activity	Frequency	Maintenance Notes
Routine Inspection	Twice per year	Perform a routine visual inspection twice a year to ensure the bioretention basin is operating properly and there are no problems such as erosion, unwanted vegetation, outlet obstructions, or structural damage. For assistance on inspections, follow the Dane County Inspection Guide.
Vegetation Management	As needed	Maintain vegetation type specified in approved plan. Remove all other vegetation from device as needed. Vegetation plays a crucial role in the efficiency of a bioretention device. Routine vegetation management includes removing weeds, pruning shrubs, replanting in bare spots, removal and replacement of dead vegetation, and cutting back perennial plants each year in late winter/early spring. Watering may be necessary during extreme drought.
Trash & Debris Removal	Every 1-3 months	Basin inlet and outlet structures should be kept clear of debris to allow stormwater to flow as intended. A blocked outlet pipe can reduce drainage capacity, resulting in overflow and erosion. This not only jeopardizes the basin's functionality but also poses a risk of potential structural damage. Basins near high traffic areas may collect more trash & debris.
Mulch Maintenance	As needed	If used, replace hardwood mulch when bare spots are present. Mulch, which acts as a natural weed barrier, should be maintained at 2-3 inches of cover. Once a dense vegetation layer is established, additional mulch does not need to be added.
Observation Well Inspection	Annually	Check the observation well/cleanout pipe for standing water by removing the cap and looking inside. If the underdrain does not appear to be functioning, contact a civil engineer or Dane County Water Resources Engineering, as further investigation may be needed.

WHY MAINTENANCE MATTERS

In the first few years after bioretention basin construction, establishing at least 90% native plant cover and continuing maintenance is critical to ensuring long-term functionality of your basin.

Keeping up with general maintenance requirements also helps reduce future costs for fixing problems which may arise from failing to establish vegetation or from letting other problems go unchecked. Poorly maintained facilities also do not remove pollutants as intended, sending polluted water downstream to your local lakes, rivers, and streams.

In addition to the above maintenance requirements, keep the following in mind to help prolong your bioretention basin's lifespan:

- Native plants do not require the use of fertilizers or pesticides, which can not be applied in an infiltration facility.
- Bioretention basins should not be used for snow storage. Salt and sand can clog the engineered soil layer and kill native vegetation.

FREQUENT ISSUES AND TROUBLESHOOTING

Problem	Possible Cause	Possible Solutions
Standing water within the infiltration area for more than 72 hours	The surface of the ponding area may become clogged with fine sediment over time. This might be because the pretreatment is no longer working, or there are excessive sediment loads due to erosion or high sediment loads from the contributing area.	• Clean the pretreatment area more frequently • Scrape, clean or vacuum the infiltration area. A vacuum truck may be needed for sediment removal in the pretreatment area or BMP bottom • Core aeration or cultivating of non-vegetated areas may be required to ensure adequate infiltration • Ensure upland areas are well vegetated
Rainwater does not appear to flow to the infiltration area	Leaves, sediment, trash, or plant debris may be blocking the flow path into the basin.	• Remove these materials on a regular basis
Vegetation is not able to establish	Plant selection is inappropriate for the site or basin is overrun with weeds.	• Consult with a landscaper or native plant nursery to ensure that plants are suited to the local conditions • Make sure BMP is protected from snow storage or salt application • Remove common weeds • Watering may be necessary during establishment or extreme drought
Erosion or scouring around the inlet	Flow is obstructed by debris or improper grading.	• Correct for drainage and flow path issues to make sure flows are evenly distributed. Make sure the flow paths are unobstructed, and any riprap on the plan is in place

A bioretention basin that has remained wet due to clogging and overwatering, preventing proper vegetation growth.

A bioretention basin that has not been properly maintained. Weeds have taken over and covered the outlet structure.

Before photo: vegetation management at a a poorly maintained bioretention basin.

After photo: once woody vegetation and invasives were identified and removed, the basin needed to be replanted with native plant plugs to fill in bare areas.

The information in this fact sheet provides general maintenance recommendations. Refer to your maintenance agreement for specific requirements.

[Delete this image and add your municipal stormwater contact info here]

For more information regarding Stormwater Management in Dane County, scan the QR code or visit us at danecountystormwatermanual.com