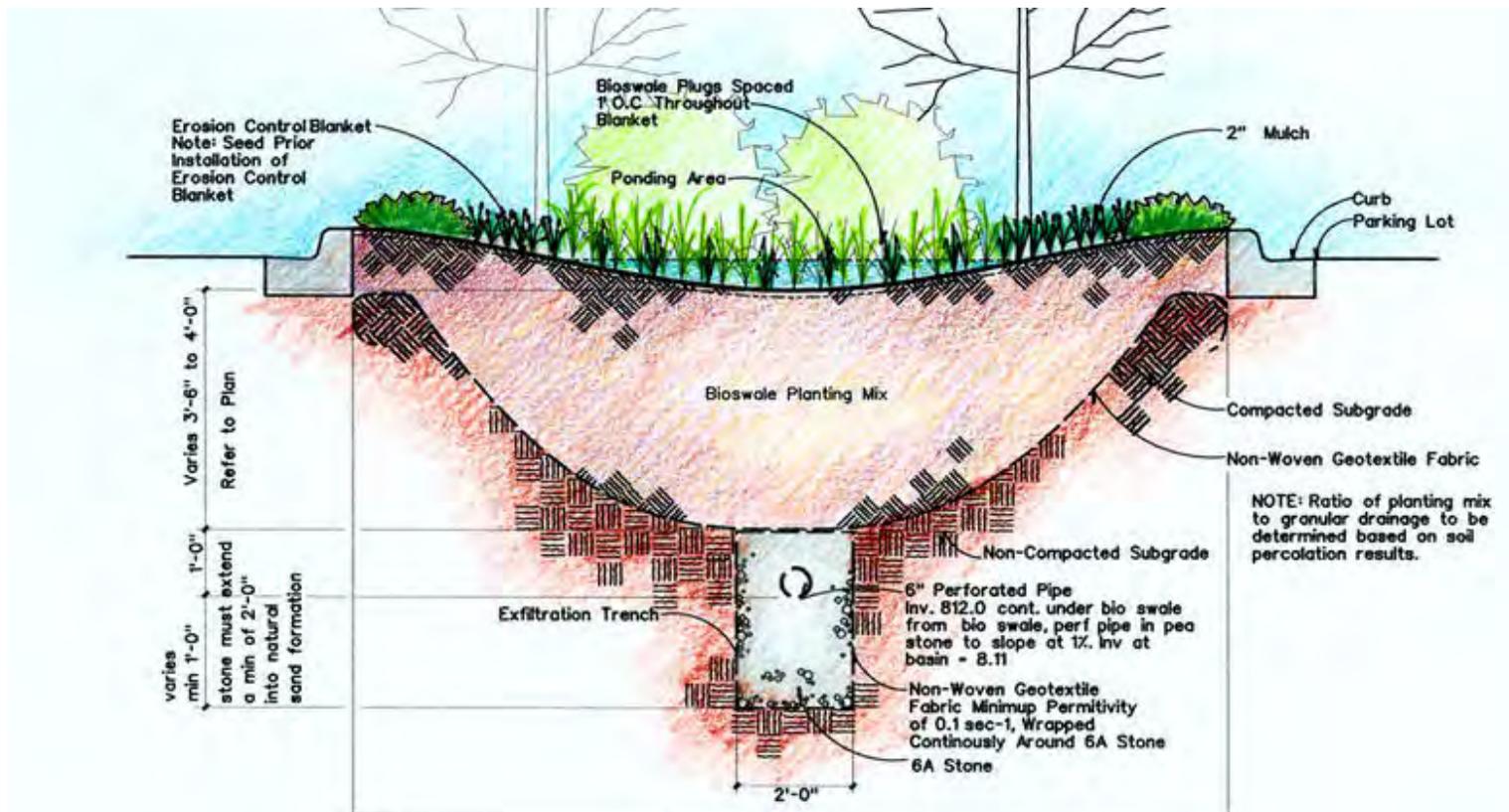


Bioswale

A bioswale is a stormwater conveyance channel that is designed to infiltrate stormwater. Bioswales are planted with vegetation designed to absorb the stormwater, filter out pollutants, and slow stormwater flow during flooding events. Underneath the vegetation, bioswales often have some form of secondary filtration (i.e. gravel or rock). Bioswales are designed to treat large impervious areas, such as parking lots or roadways.

Bioswales contain inflow and outflow structures and some variation of infiltration media. Examples of different types of bioswales are shown in the photos on this page.



Bioswale Maintenance

Typical Maintenance Indicators	Typical Maintenance Actions
Excessive Mowing	Depending on the bioswale design, taller native grasses and vegetation might be installed for filtration purposes and to slow flow in the conveyance channel; however, some landowners prefer to have shorter “lawn” vegetation. Proper mowing in accordance with the individual bioswale O&M plan should be implemented. Excessive mowing can reduce the efficacy of this stormwater BMP.
Poor vegetation establishment and bare spots	Re-seed, re-establish vegetation.
Overgrown vegetation and invasive weeds/plants	Strategically mow or trim as appropriate and remove invasive plants. Selective herbicides can be used if in accordance with local, state, and federal laws. Refer to invasive weeds/plants section of the guide for pictures.
Signs of dumping (grease, piles of grass clippings, discolored grass, etc.)	Contact your local municipality to report a potential illicit discharge/illegal dumping.
Erosion (gullies formed on berms, basin bottom, and/or around inlet/outlet structures)	Repair/re-seed eroded areas (may need added measures such as erosion control blankets or stone at flow entry points), may include re-grading areas.
Signs of rodents/animals (gopher holes)	Fill/repair/re-seed holes and make appropriate corrective measures to prevent rodent activity. May need to contact a professional pest control management company to assist.
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials such as trash and landscape debris. Dredge accumulated sediment. This may be required every 5 to 15 years and more frequently if there are excess sources of sediment. Dredging is usually a major project requiring mechanized equipment. The work will include an initial survey of depths and elevations; sediment sampling and testing; removal, transport, and disposal of accumulated sediment; and reestablishment of original design grades and sections. Permits may be required.
Standing water (BMP not draining) <i>If mosquito larvae are present and persistent, contact the PADEP. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.</i>	Abate by filling holes in the ground in and around the basin and by insuring that there are no areas where water stands longer than 96 hours following a storm (or shorter timeframe). Filling and re-grading will most likely require re-seeding or re-establishing vegetation as well.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet, or outlet structures; disconnected or failed pipes at structures	Remove any debris or sediment that could plug the outlets. A professional contractor or consultant may be required to assist with re-establishing/re-building a structural component.
General obstructions (trampolines, sporting equipment, stored boats, sheds, picnic tables, etc.)	Bioswales should be free of any general obstructions. This is critical for large and/or long rain events. Take the time to inspect and remove any general obstructions that may be present prior to forecasted rain.

What to Look For

Accumulation of Sediment, Litter, Debris

Standing Water

Erosion

**Rodents/Animal Burrows
(gopher holes)**

Overgrown Vegetation/Invasive Weeds

Poor Vegetation Establishment/Bare Spots

Obstructed Inlet/Outlet

Structural Damage

Signs of Dumping

**General Obstructions
(lawn furniture etc.)**

Bioswales are essentially a hybrid of an infiltration basin and a vegetate/grassed swale. Please refer to the guide sheets for infiltration basin and grass/vegetated swale for more information and tips for common issues and maintenance considerations.

Common Bioswale Issues

Blocked Inlet/Outlet Structures

- Refer to the invasive weed section of this guide for pictures of common weeds. If these weeds are encountered, they should be removed.
- Sediment, trash, etc. can build up at inlet and outlet structures. These obstructions can restrict the flow of stormwater.
- Vegetation can grow in built-up sediment and take over the structure. Excessive vegetation can inhibit the flow of stormwater and reduce the intended function of the overall facility.
- It is important to monitor for obstructions and overgrown vegetation at inlet and outlet structures. Obstructions, accumulated sediment, and any other debris blocking an inlet or outlet structure should be removed.



Lack of Appropriate Vegetation

- From time to time, bare spots in bioswale may generate. This could have been caused by a number of different factors including invasive vegetation and/or weeds that have squeezed out the original vegetation.
- Lack of (or dead) vegetation can create exposed soils or conditions that restrict the ability for the bioswale to infiltrate stormwater and result in other problems that can become more costly to deal with.
- It is important to check for bare spots and re-plant the vegetation (which are generally native plants with deep root systems) originally called out in the design for the bioswale.



Bioswale Considerations

Inlet/Outlet Structures

Stormwater can enter and exit bioswales through structural features referred to as inlet and outlet structures. At times, the stormwater entry or exit points may be a grassed swale. It is important to keep the entry and exit points free and clear of trash, debris, and accumulated sediment.



Trees

Unlike a majority of other stormwater BMPs, bioswales may have trees as part of the overall vegetation. Trees are exceptional performers when considering water uptake and play an important role in the overall infiltration processes that take place in a bioswale. Refer to the pictures of trees in the Native Plants section of this guide.

Spillway

Bioswales may share features similar to a dry detention basin or infiltration basin. One such feature is a spillway that is generally a depressed area along a berm. Spillways should always remain clear of overgrown vegetation, debris, and other obstacles that could inhibit overflows.



Wetland Forebay

Some bioswales may have a wetland forebay to collect sediment, trash, debris, etc. carried by stormwater run-off. A healthy wetland forebay is one of the most important features when considering the forebay's ability to retain runoff and improve the quality of stormwater entering the BMP.