

**BRIARCLIFF MANOR  
UNION FREE SCHOOL DISTRICT  
45 INGHAM ROAD  
BRIARCLIFF MANOR, NY 10510**

**MS4PY5 STORMWATER PROGRAM**

**FACT SHEET # 5  
MARCH, 2015**

**VEGETATED BIOSWALES  
FOR STORMWATER VOLUME  
REDUCTION AND WATER QUALITY  
IMPROVEMENTS**

**FOR MORE INFORMATION CONTACT  
YOUR STORMWATER COORDINATOR:**

**ANTHONY BAUSO AT:  
914-432-8134 OR AT:  
abauso@briarcliffschools.org**

**1. A VEGETATED BIOSWALE**

A bioswale accepts sheet flow from adjacent surfaces including parking lots. Swales have gently sloping sides and are used to convey overland flow of stormwater down a gentle sloping gradient to a stormwater destination such as a wetland or some other stormwater discharge destination. The stormwater functions of a vegetated swale are as follows:

- ❖ **Providing Directed Conveyance:** vegetated bioswales are well suited to areas adjacent to parking lots and impervious surfaces, where runoff can be conveyed and filtered, before it is discharged into a stormwater system or surface water body
- ❖ **Flood Control:** vegetated swales provide effective stormwater flood control by slowing down runoff and discharging the collected runoff to its final stormwater destination
- ❖ **Water Quality Improvements:** vegetated bioswales improve water quality by filtering pollutants from the stormwater (oils and greases, metals and sediments that can be picked up from paved surfaces)
- ❖ **Volume Reduction:** through plant adsorption and evapo-transpiration, bioretention systems reduce offsite stormwater runoff

## 2. EFFECTIVENESS

According to USEPA 1999 studies, vegetated bioswales can potentially remove from 20% to 40% of sediments and pollutants and sometimes as high as 80% of suspended solids.

## 3. DESIGN CONSIDERATIONS

A bioretention system should incorporate the following design implementation considerations:

- ❖ **Drainage Area Design and Swale Slope:** The bioswales should be used to treat relatively small, flat, drainage areas of less than 5 acres. If the swale is larger than 5 acres, with a channel slope of greater than 4%, the flow velocity in the swale may be too great for effective treatment, and channel erosion may occur
- ❖ **Inlet Slotted-Curbed Entrance:** the entrance to the swale should be designed with evenly spaced concrete curbs blocks to uniformly distribute stormwater into the channel from the collection area
- ❖ **Trapezoidal Cross Section:** The bioswale channel should have a trapezoidal cross section with relatively flat sides slopes of 2:1 or less, to allow stormwater to enter the swale without eroding the swale shoulder
- ❖ **Rip-Rap Swale Banks:** the channel banks should be lined with rip-rap rock, to protect the channel banks from erosion

- ❖ **Flat Channel bottom:** the channel bottom should be 4 feet to 6 feet wide, above the soil and gravel bed, to ensure sufficient filtering surface for water quality treatment
- ❖ **Soil and Gravel Bed:** the planting bed should be constructed with 24 inches of a permeable sandy soil, (70% sand and 30 % organic composted material). The gravel bed (below the planting bed and separated by a liner) should be designed with 12 inches of  $\frac{3}{4}$  inch stone, containing a 12 inch PVC perforated underdrain pipe, to direct the runoff flow in the channel to its stormwater destination
- ❖ **Groundwater Table Depth:** the bottom of the swale should be at least 1 feet above the groundwater table to prevent the swale bottom from being too wet

## 4. LIMITATIONS

Vegetated bioswales have a few limitations:

- ❖ **Vegetative Cover:** The vegetative cover in the channel has to be maintained to control erosion
- ❖ **Channel Maintenance:** requires maintenance to remove trash and sediment in the channel, to permit infiltration into the soil and gravel bed beneath the channel