ASSESSING FOREBAYS & OTHER BMP PRETREATMENT MEASURES

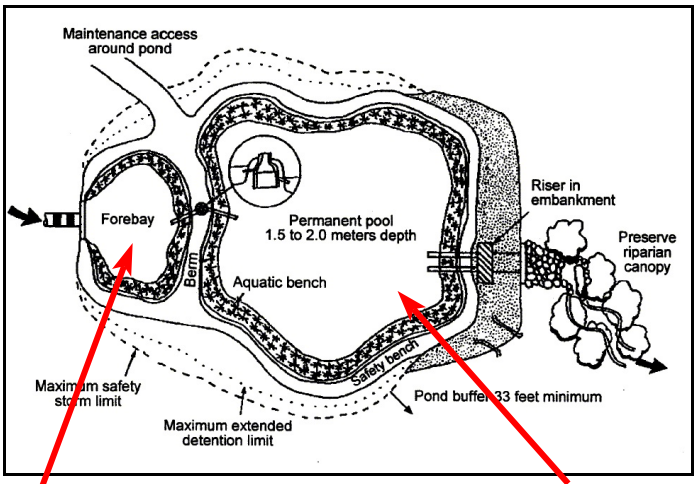
Keeping sediment and other debris out of ponds, filters and other stormwater Best Management Practices (BMPs); that's the purpose of forebays, filter strips, diaphragms, etc. These measures are usually located upslope of the BMPs so runoff first enters the pretreatment measure where sediment is trapped.

Pretreatment Measure Assessment, In General

If you see that a pretreatment measure is allowing sediment to reach the main part of a BMP then it must be cleaned and restored to its original condition. Usually you can guesstimate the original surface area. If you have difficulty then try looking at old aerial photos of the facility, like those on Google Earth, Terraserver, the Maryland MERLIN site, etc.

Forebay

Think of these measures as a little pond at the head of a big pond. The forebay provides a location where sediment can settle from suspension before entering the main BMP. The forebay must be cleaned when it has lost 50% of the original storage volume.



Forebay on left receiving runoff before it enters permanent pool
from Maryland Stormwater Design Manual

Filter Strip

The design for infiltration trenches, bioretention facilities and other smaller BMPs will frequently call for a minimum 20-foot long grass filter strip immediately upslope. The strip must be wide enough to contain all incoming runoff. Sediment trapping in a filter strip is maximized when the strip is flat which forces runoff to flow through the strip in a shallow sheet between grass blades. Occasionally, a device known as a Level Spreader will be placed at the head of the strip to increase the likelihood of sheet flow. Filter strips must be cleaned when sediment accumulation has reduced the storage volume by 25% of more. If other pretreatment measures are present then the grass strip can be shortened.

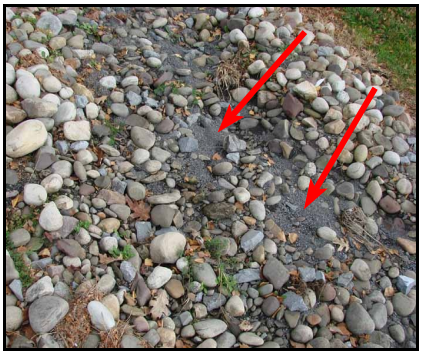
Filter strip between building on right and bioretention center

Gravel Diaphragm

This pretreatment measure consists of a trench which usually surrounds a BMP but may only be present where runoff from an impervious surface enters the facility. The trench is typically at least six inches wide and twelve inches deep. The trench is filled with gravel the size of peas then ranging up to two-inches in diameter. The Gravel Diaphragm usually encircles the BMP though it may only be present between the impervious surface the BMP it serves. Some Gravel Diaphragms extend across the entire side slope of a BMP. The idea is that sediment suspended in runoff

White stone gravel diaphragms along both sides of bioretention

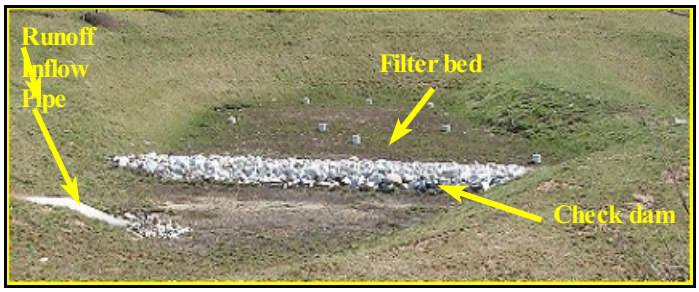
will be trapped between the gravel as it flows over and into the diaphragm. All too frequently runoff will cross the diaphragm at a small percentage of its length. The gravel quickly fills with sediment at this point of concentrated flow which then eliminates protective benefits. If you find that the spaces between gravel is filled with sediment then the diaphragm likely requires cleaning. If there's vegetation growing from the gravel in the middle of the diaphragm then this may mean enough sediment has accumulated within the gravel to support vegetation. Again, cleaning is likely required.



Spaces between gravel clogged with sediment

Check Dam

Occasionally a row of earth, stone or rock will be found across sand filters and other BMPs. This check dam will be located between the point where runoff enters and the overflow (outfall) point. The check dam may serve two purposes: 1) to ensure runoff enters the sand filter in a shallow, sheet flow and/or 2) to prevent sediment from reaching the filter surface. If sediment is reaching the filter surface or substantial sediment accumulation has occurred upslope of the check dam, then cleaning is required.



Check dam separating runoff inflow (lower left) from sand filter

Sand Layer

Occasionally you will find a layer of sand over the bottom of an Infiltration Basin. The sand layer is intended to prevent sediment and other particles from reaching, then clogging the soil surface of the Basin floor. When a significant amount of sediment accumulates on the sand then it is removed and replaced with clean sand.

Assessing Pretreatment Measures

1. If a pretreatment measure is present and sediment has entered the BMP it serves, then the measure requires maintenance regardless whether the following criteria are met.

Sediment discharged into bioretention facility from Stormwater Maintenance LLC

2. If a forebay has lost 50% or more of the original surface area then it must be restored.

3. If sediment occupies more than 25% of a grass filter strip then maintenance is required.

4. If the spaces between the gravel in a diaphragm are filled with sediment or vegetation grows from the middle, then the diaphragm likely requires maintenance.

5. If a sand layer is present on the floor of an Infiltration Basin, then has sediment or other particles accumulated on the surface? If yes, then cleaning may be required.