

## Stormwater Treatment

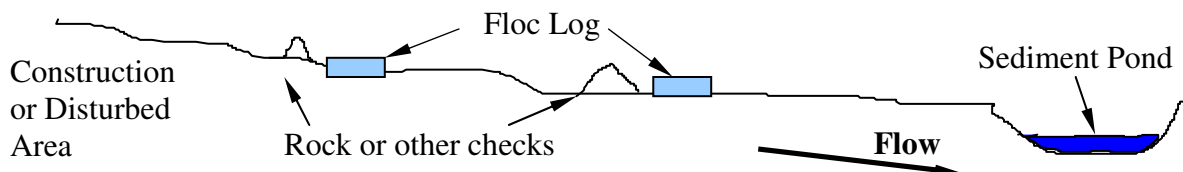
### Dewatering / Treatment Ditches

The Floc Logs are designed for use in flowing conditions for treating turbid water to remove suspended sediment. Stormwater Treatment Ditches are used to introduce site-specific polymers to turbid waters in such a manner to facilitate mixing and reaction between the polymer and the suspended particles. Collection of the flocculated particulate that forms will greatly reduce turbidity in stormwater.

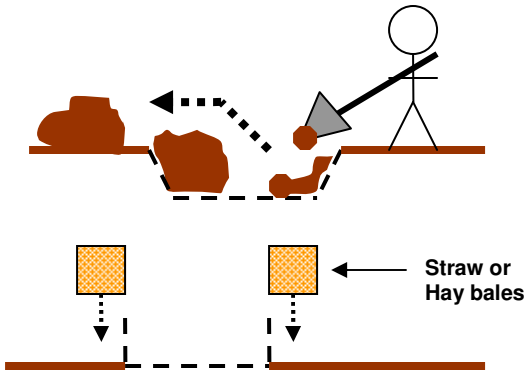
A ditch is created, either by digging out the bed or building up the walls, and lined with plastic or geosynthetic fabric to prevent erosion. Floc Logs are secured along the ditch, allowing the water to mix with the site-specific polymer blend and begin reacting with the suspended sediment. Checks can be placed along the ditch, forcing the water to flow over and around them, to increase turbulence and mixing with the Floc Logs. The ditch is lined with jute or similar matting to provide surface area for the flocculated sediment to adhere to and help remove fine particulate from the water.

- i. This application can be used for dewatering applications, recirculation treatment, or continuous flow treatment systems.
- ii. Cover the exposed soil with jute matting and apply Silt Stop powder to prevent erosion. With highly erosive soils protection with geotextile or plastic sheeting may be necessary.
- iii. Ensure only turbid water is entering the ditch. The turbidity of the water flowing through the system should not exceed 4% solids. If the sediment load of the water is above this limit, a grit pit or settling tank may need to be installed to encourage primary settling before treatment.
- iv. Make sure that the logs are not resting in mud or buried by sediment; drive rebar or wooden “feet” into the logs to raise them slightly if needed.
- v. Logs should be placed in a series, one after another. The number of logs is determined by the flow rate of the water and the length of the mixing ditch is determined by the reaction time required for the polymer.
- vi. Particle collection can be accomplished using jute matting in the ditch, as outlined here, or by using another method of particle collection as outlined in the next section.

#### Open Ditch Placement

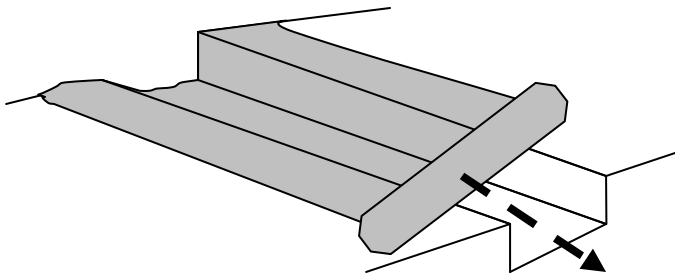


## Step-by-Step Dewatering / Treatment Ditch



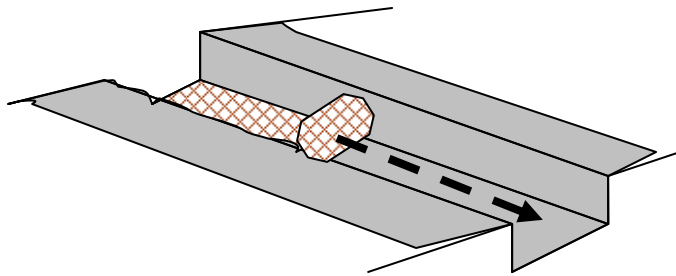
### Step 1: Create ditch.

The ditch can be dug into the ground, or created by building up the walls.



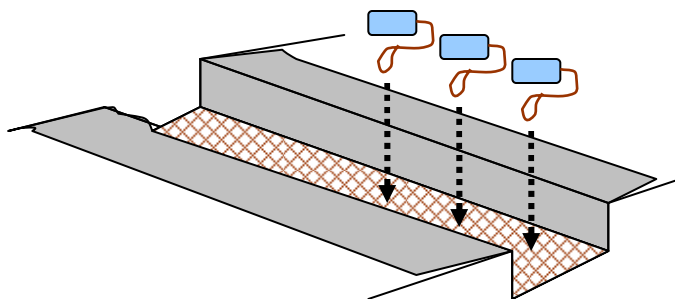
### Step 2: Line with Plastic.

The plastic sheeting is used to prevent the water being treated from picking up sediment and causing erosion.



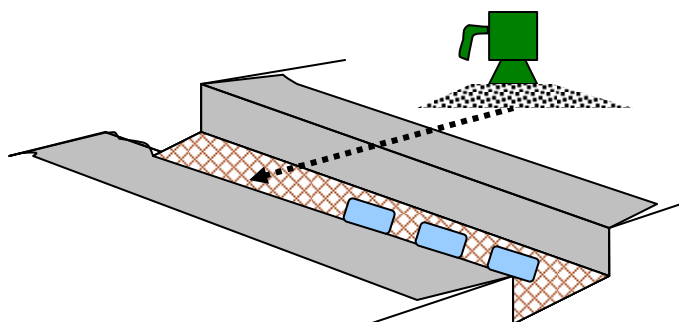
### Step 3: Lay Jute Matting.

The jute matting provides a surface for the particulate formed during treatment to adhere onto.



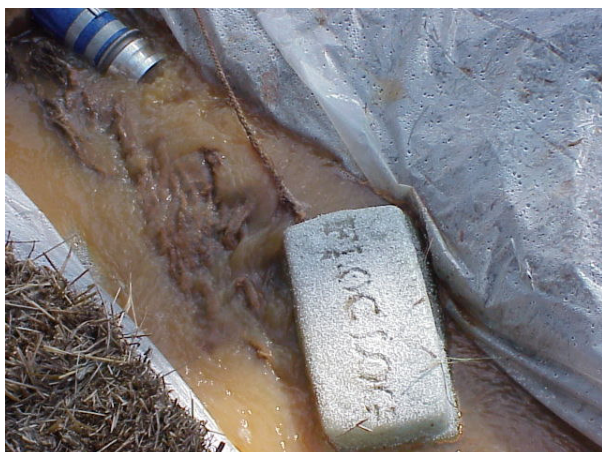
### Step 4: Place Floc Logs.

The Floc Logs are positioned in a line at the top of the ditch, allowing the water to flow over and around them.



Step 5: Apply Silt Stop powder.

Sprinkling the correct site-specific Silt Stop powder over the jute matting in the bottom portion of the ditch will assist in final water clarification.



Here is the water being pumped into the treatment ditch. Note the light brown color and turbidity.



The clarified water as it is leaving the site can be discharged directly to riparian waters.



## Application Example: Stormwater Treatment Ditch

### Dewatering Operation

**1) Dig ditch**



**2) Line with plastic**



**3) Lay jute matting**



**4) Place Floc Logs (upstream end)**



**5) Apply Silt Stop (downstream end)**



**6) Ready for pumping**



## Stormwater Treatment

### Dewatering / Treatment Split-pipes

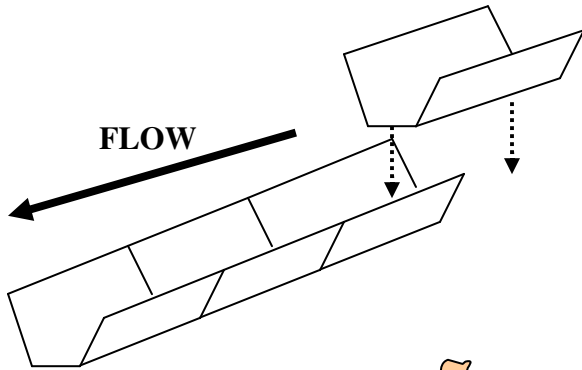
The Floc Logs are designed for use in flowing conditions for treating turbid water to remove suspended sediment. Polymer Enhanced Stormwater Treatment Split Pipes are used to introduce site-specific polymers to turbid waters in such a manner to facilitate mixing and reaction between the polymer and the suspended particles. Collection of the flocculated particulate will greatly reduce turbidity in stormwater.

Floc Logs are secured along the split pipe, allowing the water to mix with the site-specific polymer blend and begin reacting with the suspended sediment. Checks can be placed along the split pipe, forcing the water to flow over and around them, to increase turbulence and mixing with the Floc Logs. The split pipe is lined with jute or similar matting to provide surface area for the flocculated sediment to adhere to and help remove fine particulate from the water.

- i. This application can be used for dewatering applications or recirculation treatment systems.
- ii. Pitch or caulk may be used to seal the joints, but is not always necessary. It is suggested to seal the joints when the split pipe is placed on highly erosive soils.
- iii. Ensure only turbid water is entering the treatment ditch. The turbidity of the water flowing through the system should not exceed 4% solids. If the sediment load of the water is larger than this limit, a grit pit or settling tank may need to be installed to encourage primary settling before treatment.
- iv. Logs should be placed in a series, one after another. The number of logs is determined by the flow rate of the water, and the length of the split pipe trough is determined by the reaction time required for the polymer.
- v. Particle collection can be accomplished using jute matting in the split-pipe, as outlined here or by using another method of particle collection as outlined in the next section.

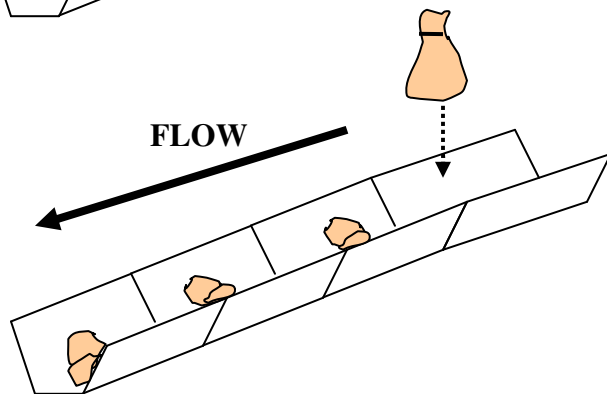


## Step-by-Step Stormwater Treatment Split Pipe



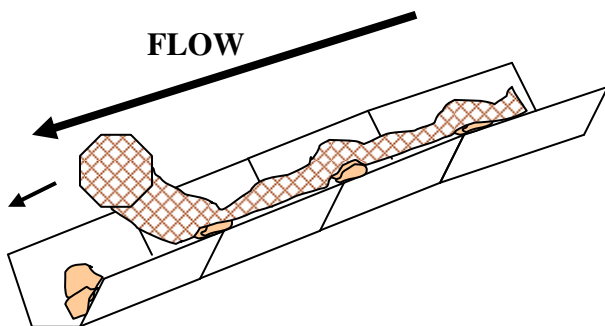
### Step 1: Install Split Pipe Trough.

Overlap the split pipe segments so that the up-stream piece overlaps the down-stream piece. Seal the joints if needed.



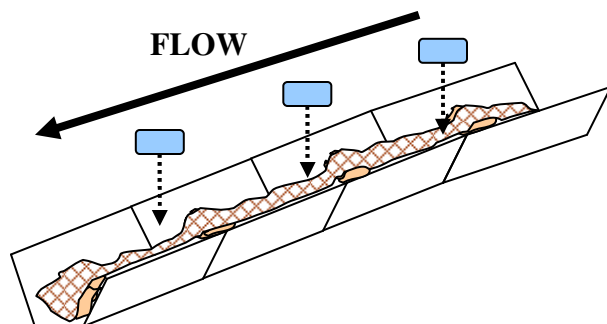
### Step 2: Install Checks.

These can be made from sandbags, plywood, or other materials. Their purpose is to cause turbulence and facilitate mixing.



### Step 3: Line with Jute Matting.

The jute matting provides a surface for the particulate formed during treatment to adhere onto. Place the matting to ensure it will be within the flow of water.



### Step 4: Place Floc Logs.

The Floc Logs are positioned in a line at the top of the trough, allowing the water to flow over and around them.

## Polymer Enhanced BMP Application Guide



## **Stormwater Treatment**

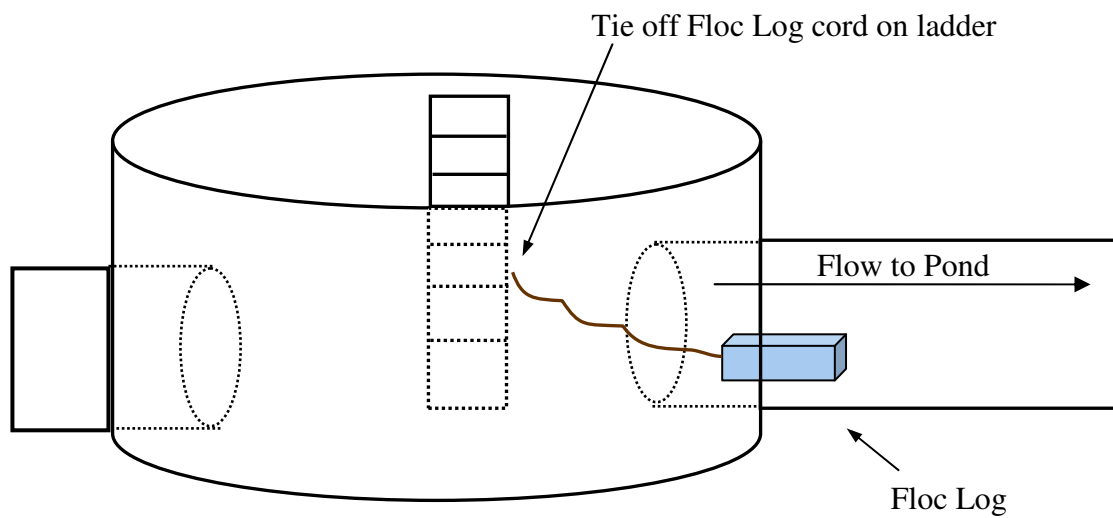
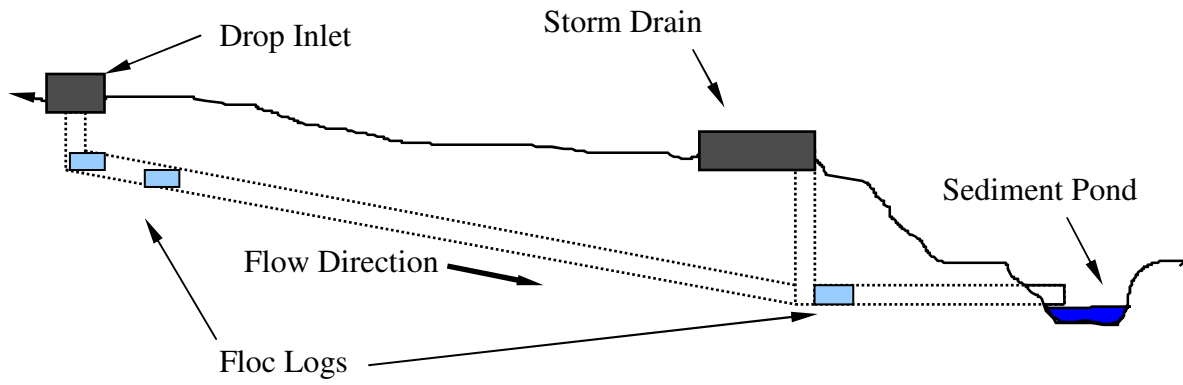
### **Storm-drain Applications**

Polymer Enhanced Stormwater Treatment Storm-drain Applications are used to introduce site-specific polymers to turbid waters in such a manner to facilitate mixing and reaction between the polymer and the suspended particles. Collection of the flocculated particulate will greatly reduce turbidity in stormwater.

Inserting the site-specific Floc Log at drop inlets within the storm-drain system will create a passive treatment system. The Floc Logs are secured within the pipe, allowing the water to mix with the site-specific polymer blend and begin reacting with the suspended sediment. Placement of the Floc Logs should be as close to the source of the particle suspension as possible, to allow adequate mixing and reaction with the polymers.

- i. Ensure only turbid water is entering the storm drain system. The turbidity of the water flowing through the system should not exceed 4% solids. Adequate protection of the inlets should ensure that the sediment load of stormwater is not over this limit.
- ii. Logs should be placed in a series, one after another. The number of logs is determined by the flow rate of the water and the reaction time required.
- iii. Particle collection can be accomplished using the methods of particle collection as outlined in the next section.





## Stormwater Treatment

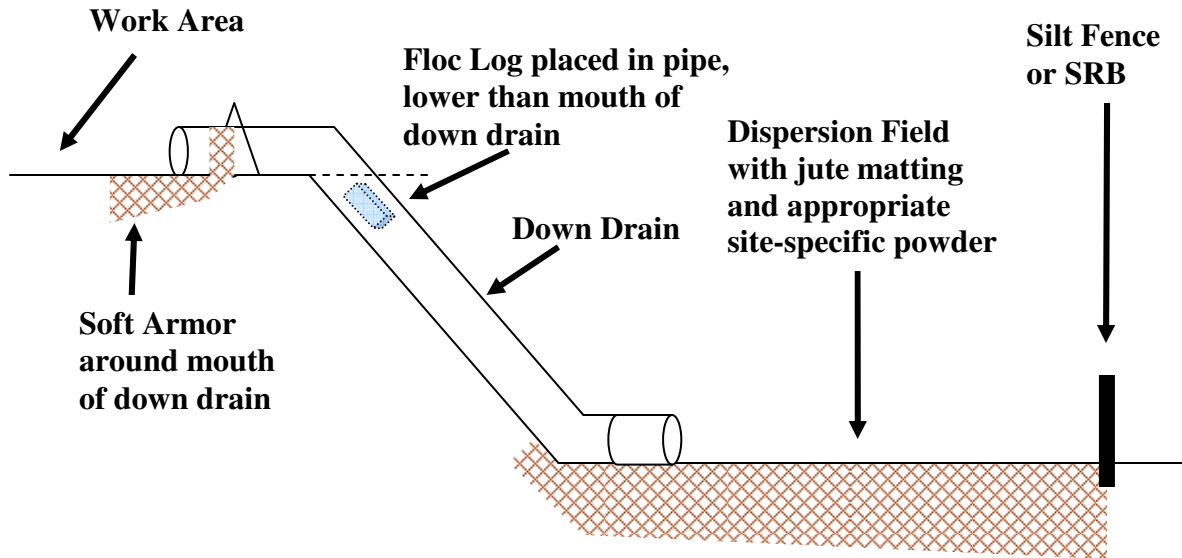
### Down Drains

A down drain is a temporary or permanent pipe used to convey stormwater safely down a slope. By introducing Floc Logs to the turbid water within the permanent storm water structure, the polymer reacts with the metals and clays within the soil to bind it into particulate. A layer of jute matting is laid around the outlet at the bottom of the slope and applied with a soil-specific polymer powder. The reacted sediment attaches to the matting creating a highly erosion-resistant surface and clarifying the runoff water.

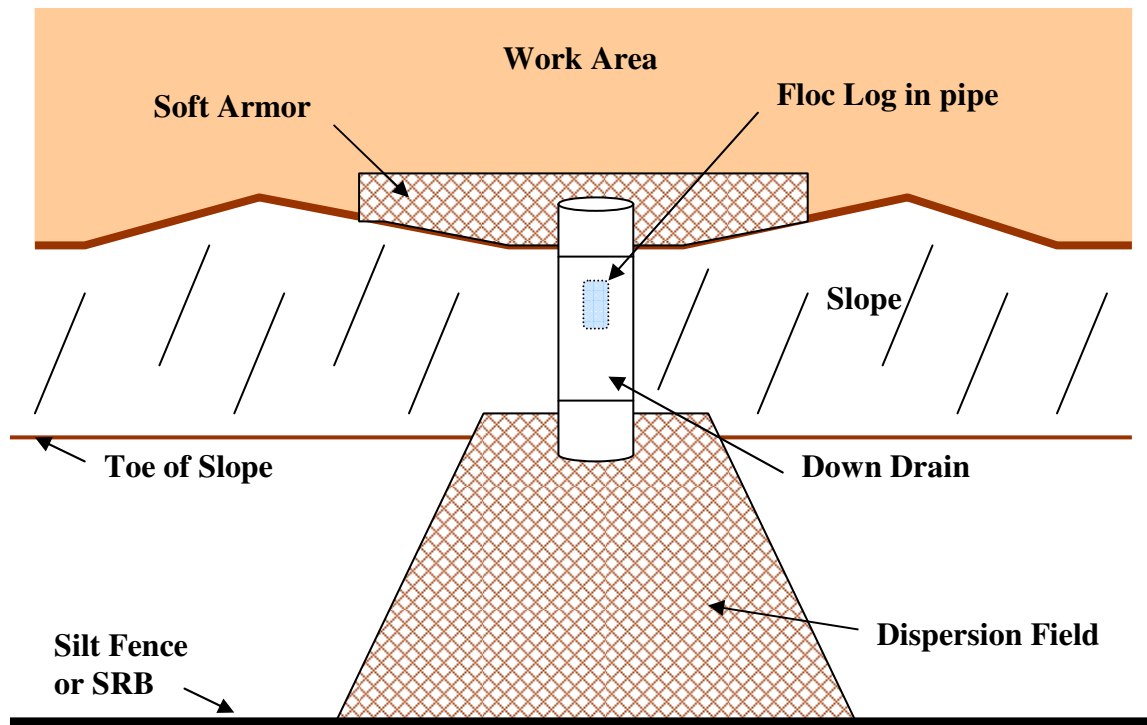
- i. Soft Armor the soil around the top of the down drain to prevent erosion and undercutting. Soft Armor application is outlined in the Soil Stabilization section of this guide.
- ii. The appropriate site-specific Floc Log should be placed in the down drain at the top of the slope to treat turbid runoff water.
- iii. At the bottom of the down drain, create a dispersion field by laying jute matting applied with the appropriate site-specific polymer powder, allowing the water to spread out and slow its velocity to 0.5 ft/sec before hitting the silt fence or Sediment Retention Barrier (SRB). **More information on dispersion fields can be found on page 35.**
- iv. The silt fence should be designed to allow water to pass through it. The silt fence shall allow water to pass at a rate of 70 GPM/ft<sup>2</sup> or greater.

Example Diagrams DISTANCES NOT TO SCALE

Side View

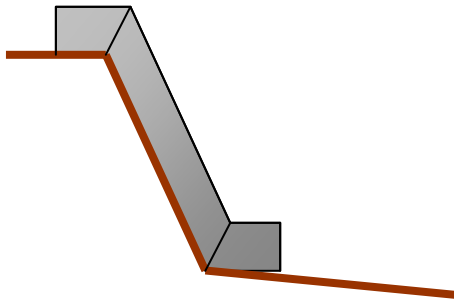


Top View



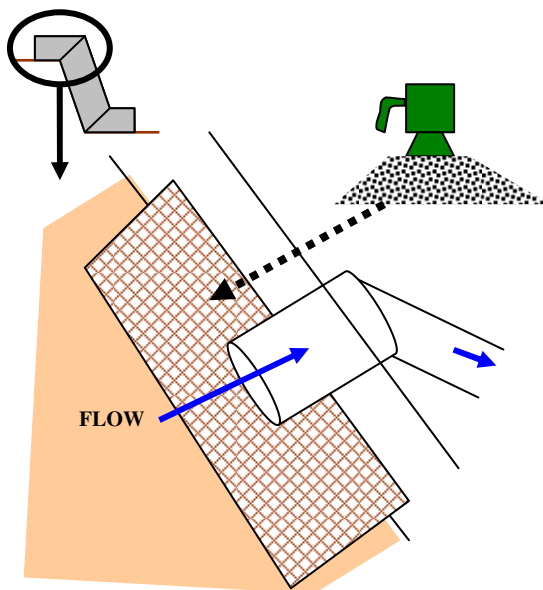


## Step-by-step Down Drains



Step 1: Install Down Drain.

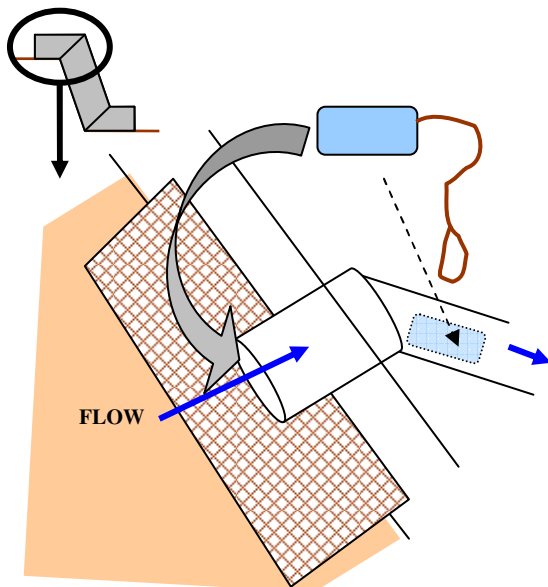
Install the stormwater conveyance down the slope.



Step 2: Stabilize Top Slope.

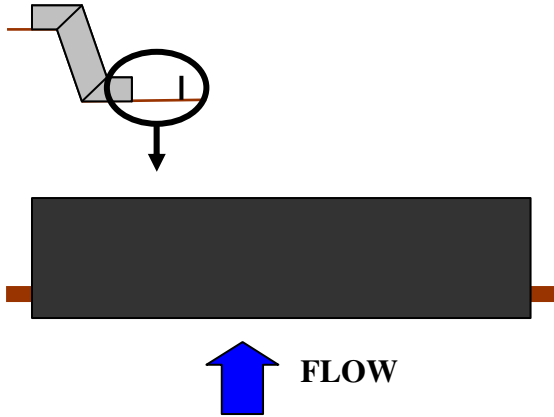
Soft Armor the soil around the mouth of the down drain.

Apply jute matting and Silt Stop powder to the area around the inlet to prevent erosion.



Step 3: Install Floc Log.

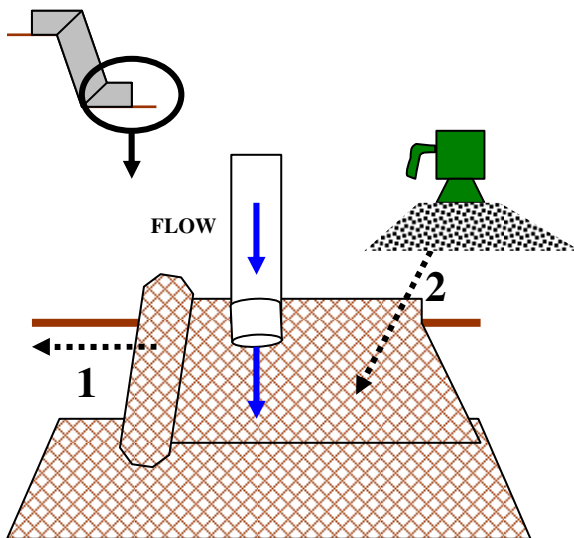
Secure the Floc Log inside the down drain such that it rests lower than the mouth of the drain.



### Step 4: Install Silt Fence or SRB.

Install silt fence or SRB as level as possible perpendicular to the flow of water as it exits the down drain.

More information on SRBs can be found in the Sediment Control section of this guide.



### Step 5: Install Dispersion Field.

Install jute matting and apply with Silt Stop powder. Wattles or checks can be placed beneath the matting to help slow the velocity.

Additional information on dispersion fields is found in the Section on Particle Collection.

## Stormwater Treatment

### In-stream Baskets

The Floc Logs are designed for use in flowing conditions for treating turbid water to remove suspended sediment. In-stream Baskets are used to introduce site-specific polymers to turbid waters in such a manner to facilitate mixing and reaction between the polymer and the suspended particles. Collection of the flocculated particulate that forms will greatly reduce turbidity created by in-stream work.

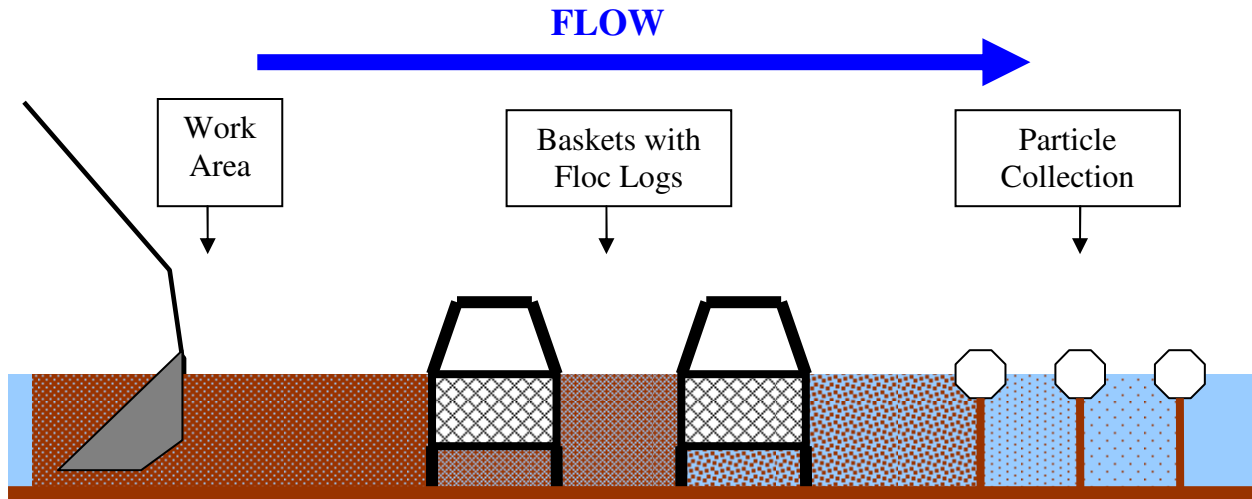
A large wire basket is constructed to hold site-specific Floc Log polymers, allowing water to pass over and around them. The basket with the polymer logs is placed just downstream of the work site, to allow the turbid water to mix with the polymer and react. Particle Curtains can be placed in a series downstream to collect the flocculated sediment and remove fine particulate from the water.

**Direct in-stream applications of polymer materials are not allowed everywhere, check state and local regulations before beginning project.**

- i. A wire basket system is used to introduce Floc Log polymer into an aquatic site, when diversion of the water is not feasible, such as storm water ditch and drain cleanout projects.
- ii. The wire basket is designed to hold a number of Floc Logs and allow water to flow over and around them. Multiple baskets may be needed to provide the correct dosage rate and allow for adequate mixing.
- iii. The basket(s) should be placed in a series, closest to the point of turbidity without interfering with the work site; to allow adequate mixing with the polymer as the sediment is introduced into the water column. Additional Floc Logs can be attached to the working equipment to provide additional dosing directly at the point of turbidity.
- iv. Additional mixing structures may need to be placed in the stream around the wire basket(s) to create turbulence to facilitate appropriate mixing.
- v. The number of Floc Logs needed is determined by the flow rate of the water and the soil characteristics of the suspended sediment.
- vi. Sediment collection system should be constructed or installed downstream of the work site and the basket(s), to collect the sediment that is flocculated.



## Polymer Enhanced BMP Application Guide



Handles allow for easy placement of basket with excavating equipment.

Wire mesh basket, open on the top.

Feet on bottom, to raise basket 4-6" out of sediment and allow water flow underneath.

## Stormwater Treatment

### Closed Pipe Systems

The Floc Logs are designed for use in flowing conditions for treating turbid water to remove suspended sediment. Closed Pipe Systems are used to introduce site-specific polymers to turbid waters in such a manner to facilitate mixing and reaction between the polymer and the suspended particles. Collection of the flocculated particulate that exits the pipe will greatly improve final clarity of the discharge water.

The site-specific Floc Logs are secured inside a closed pipe where the turbid water mixes over and around them. Fins, checks, or other partial obstructions inside the pipe can be used as needed to increase mixing potential.

If the pipe system will not be under pressure, holes or access points can be cut into the pipe to facilitate easy loading, monitoring, and replacement of the Floc Logs.

- i. Ensure only turbid water is entering the closed pipe system. The turbidity of the water flowing through the system should not exceed 4% solids. Primary settling ponds or grit pits can be used to ensure that the sediment load of stormwater is not over this limit.
- ii. High pressure flow and coarse suspended particles will wear down the Floc Logs at an accelerated rate. Inspection of the Floc Logs should be done intermittently during operations, and replacement of the Floc Logs should occur when decreased performance is evident.
- iii. Logs should be placed in a series, one after another. The number of logs is determined by the flow rate of the water and the reaction time required.
- iv. Particle collection can be accomplished using the methods of particle collection as outlined in the next section.

## Polymer Enhanced BMP Application Guide

