

BioPod™ HF

High Flow System with StormMix™ Media

Inspection and Maintenance Manual



BioPod™ High Flow (HF) Biofilter with StormMix™ Biofiltration Media

Description

The BioPod™ HF Biofilter System (BioPod HF) is a storm water biofiltration treatment system used to remove pollutants from storm water runoff. Impervious surfaces and other urban and suburban landscapes generate a variety of pollutants that can enter storm water and contaminate downstream receiving waters unless treatment is provided. The BioPod HF system uses proprietary StormMix™ biofiltration media to capture and retain pollutants including total suspended solids (TSS), metals, nutrients, gross solids, trash and debris.

Function

The BioPod HF system uses engineered, high-flow rate filter media to remove storm water pollutants, allowing for a smaller footprint than conventional bioretention systems. Contained within a compact precast concrete vault, the BioPod HF system consists of a biofiltration chamber and an optional integrated high-flow bypass. The biofiltration chamber is filled with horizontal layers of aggregate, biofiltration media and mulch. Storm water passes vertically down through the mulch and biofiltration media for treatment. The mulch provides pretreatment by retaining most of the solids or sediment. The biofiltration media provides further treatment by retaining finer sediment and dissolved pollutants. The aggregate allows the media bed to drain evenly for discharge through an underdrain pipe or by infiltration.

Inspection & Maintenance Overview

State and local regulations require all storm water management systems to be inspected on a regular basis and maintained as necessary to ensure performance and protect downstream receiving waters. Without maintenance, excessive pollutant buildup can limit system performance by reducing the operating capacity of the system and increasing the potential for scouring of pollutants during periods of high flow.

The BioPod HF may require periodic irrigation to establish and maintain vegetation. Vegetation will typically become established about two years after planting. Irrigation requirements are ultimately dependent on climate, rainfall and the type of vegetation selected.

Inspection & Maintenance Frequency

Periodic inspection is essential for consistent system performance and is easily completed. Inspection is typically conducted a minimum of twice per year, but since pollutant transport and deposition varies from site to site, a site-specific maintenance frequency should be established during the first two or three years of operation.

Inspection Equipment

The following equipment is helpful when conducting BioPod HF inspections:

- Recording device (pen and paper form, voice recorder, iPad, etc.)
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- PPE as required for entry
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Socket

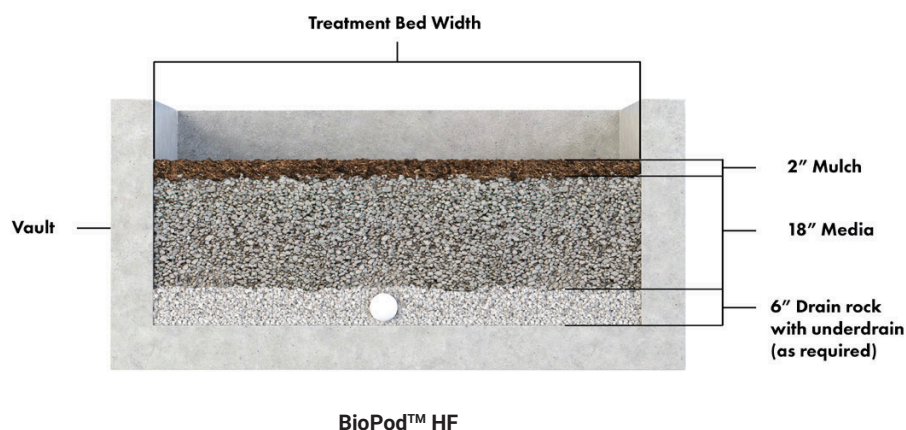
Inspection Procedures

BioPod HF inspections are visual and are conducted without entering the unit. To complete an inspection, safety measures including traffic control should be deployed before the access covers or tree grates are removed. Once the covers have been removed, the following items should be checked and recorded (see form provided on page 8) to determine whether maintenance is required:

- If the BioPod HF unit is equipped with an internal bypass, inspect the inlet chamber and outlet chamber and note whether there are any broken or missing parts. In the unlikely event that internal parts are broken or missing, contact Oldcastle Storm water at (800) 579-8819 to determine appropriate corrective action.
- Note whether the curb inlet or inlet pipe is blocked or obstructed.
- If the unit is equipped with an internal bypass, observe, quantify and record the accumulation of trash and debris in the inlet chamber. The significance of accumulated trash and debris is a matter of judgment. Often, much of the trash and debris may be removed manually at the time of inspection if a separate maintenance visit is not yet warranted.
- If it has not rained within the past 24 hours, note whether standing water is observed in the biofiltration chamber.
- Finally, observe, quantify and record presence of invasive vegetation and the amount of trash and debris and sediment load in the biofiltration chamber. Erosion of the mulch and biofiltration media bed should also be recorded. Often, much of the invasive vegetation and trash and debris may be removed manually at the time of inspection if a separate maintenance visit is not yet warranted. Sediment load may be rated light, medium or heavy depending on the conditions. Loading characteristics may be determined as follows:
 - **Light sediment load** – sediment is difficult to distinguish among the mulch fibers at the top of the mulch layer; the mulch appears almost new.
 - **Medium sediment load** – sediment accumulation is apparent and may be concentrated in some areas; probing the mulch layer reveals lighter sediment loads under the top 1" of mulch.
 - **Heavy sediment load** – sediment is readily apparent across the entire top of the mulch layer; individual mulch fibers are difficult to distinguish; probing the mulch layer reveals heavy sediment load under the top 1" of mulch.

Maintenance Indicators

Mulch acts as a prefilter to protect the StormMix™ media from sediment loading and subsequent loss of hydraulic capacity. As runoff carries sediment into the BioPod HF, the sediment will accumulate on top of the mulch layer and then, over time, begin to work its way down through the mulch and eventually into the media bed. Mulch replacement should be performed when the mulch layer is full of sediment but the StormMix media is still relatively clean. Maintenance personnel should observe sediment accumulation on the surface of the mulch layer and then dig down into the mulch and potentially into the media bed to the point where the mulch or media appears relatively clean. The sediment penetration depth can be used to rate the sediment load and determine maintenance requirements as follows:



Sediment Conditions	Inspection Rating	Maintenance Requirements
Little visible sediment	Light sediment load	None
Sediment on mulch surface only	Light sediment load	None
Sediment throughout mulch layer	Medium sediment load	Minor maintenance
Sediment less than 3" into media layer	Medium sediment load	Minor maintenance
Sediment less more 3" into media layer	Heavy sediment load	Full maintenance
Standing water on top of media layer	Heavy sediment load	Full maintenance

The following photographs help illustrate these conditions.

Light Sediment Load

- Little visible sediment or light sediment on mulch surface only
- Mulch layer appears relatively fresh, open, and fibrous
- No maintenance required



Medium Sediment Load

- Thick sediment throughout mulch layer and up to 3" into top of media layer
- Digging down 3" to 6" below the top of the mulch reveals relatively clean media with little sediment accumulation
- Minor maintenance required



Heavy Sediment Load

- Thick sediment throughout mulch layer and more than 3" into top of the media bed
- Digging down more than 6" below the top of the mulch layer reveals heavy sediment accumulation
- Full maintenance required



Heavy Sediment Load

- Thick sediment and standing water on surface of mulch layer more than 24 hours after a storm event
- Full maintenance required



Maintenance should be scheduled if any of the following conditions are identified during inspection:

- The concrete structure is damaged or the tree grate or access cover is damaged or missing
- The inlet obstructed
- Standing water is observed in the biofiltration chamber more than 24 hours after a rainfall event (use discretion if the BioPod HF is located downstream of a storage system that attenuates flow)
- Trash and debris in the inlet chamber cannot be easily removed at the time of inspection
- Trash and debris, invasive vegetation or sediment load in the biofiltration chamber is heavy or excessive erosion has occurred

Maintenance Equipment

- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- PPE as required for entry
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Rake, hoe, shovel and broom
- Bucket
- Pruners
- Vacuum truck (optional)
- Socket

Maintenance Procedures

Maintenance should be conducted during dry weather when no flows are entering the system. In most cases, maintenance may be conducted without entering. Entry may be required to maintain depending on system depth. Once safety measures such as traffic control are deployed, the access covers may be removed and the following activities may be conducted to complete maintenance:

- Remove all trash and debris from the inlet chamber manually or by using a vacuum truck as required.
- Remove all trash and debris and invasive vegetation from the biofiltration chamber manually or by using a vacuum truck as required.
- If the sediment load is medium or light but erosion of the biofiltration media bed is evident, redistribute the mulch with a rake or replace missing mulch as appropriate. If erosion persists, rocks may be placed in the eroded area to help dissipate energy and prevent recurring erosion.
- If the sediment load is heavy, remove the mulch layer using a hoe, rake, shovel and bucket, or by using a vacuum truck as required. If the sediment load is particularly heavy, inspect the surface of the biofiltration media once the mulch has been removed. If the media appears clogged with sediment, remove and replace one or two inches of biofiltration media prior to replacing the mulch* layer.
- Prune vegetation as appropriate and replace damaged or dead plants as required.
- Replace the tree grate and/or access covers and sweep the area around the BioPod HF to leave the site clean.
- All material removed from the BioPod HF during maintenance must be disposed of in accordance with local environmental regulations. In most cases, the material may be handled in the same manner as disposal of material removed from sumped catch basins or manholes.

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Operations and Maintenance Manual

* NoFloat cypress mulch should be used in the BioPod HF. Timely replacement of the mulch layer according to the maintenance indicators described above should protect the biofiltration media below the mulch layer from clogging due to sediment accumulation. However, whenever the mulch is replaced, the BioPod HF should be visited 24 hours after the next major storm event to ensure that there is no standing water in the biofiltration chamber. Standing water indicates that the biofiltration media below the mulch layer is clogged and must be replaced. Please contact Oldcastle Infrastructure at (800) 579-8819 to purchase the proprietary StormMix™ biofiltration media.



Biopod HF Planter



Biopod HF Tree

BioPod HF Inspection & Maintenance Log

BioPod HF Model _____ Inspection Date _____

Location _____

Condition of Internal Components

NOTES:

☐ Good ☐ Damaged ☐ Missing

Curb Inlet Blocked

NOTES:

☐ Yes ☐ No

Standing Water in Biofiltration Chamber

NOTES:

☐ Yes ☐ No

Trash and Debris in Inlet Chamber

NOTES:

☐ Yes ☐ No

Trash and Debris in Biofiltration Chamber

NOTES:

☐ Yes ☐ No

Invasive Vegetation in Biofiltration Chamber

NOTES:

☐ Yes ☐ No

Sediment in Biofiltration Chamber

NOTES:

☐ Light ☐ Medium ☐ Heavy

Erosion in Biofiltration Chamber

NOTES:

☐ Yes ☐ No

Maintenance Requirements

☐ YES - Schedule Maintenance ☐ NO - Schedule Re-Inspection

High Flow System with StormMix™ Media

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High Flow System with StormMix™ Media

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High Flow System with StormMix™ Media

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