

# **OPERATIONS & MAINTENANCE MANUAL**

**For**

## **STORMWATER MANAGEMENT SYSTEM**

Located at

**DUNKIN'**

**Lot 64 Block 28005**

**TOWNSHIP OF MONTGOMERY  
SOMERSET COUNTY, NEW JERSEY**

OCTOBER, 2020

Prepared by:



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N.J.P.E. Lic. No. 32978

## **Inspection and Maintenance of the Stormwater Management System**

Maintenance of the stormwater management facilities discussed in this manual will be the responsibility of:

Montgomery Route 206 Realty  
1714 Woodbridge Avenue  
Edison, New Jersey

Preventative and/or routine maintenance of the stormwater management system will include periodic inspections, maintenance and repairs of the various components of the system. Montgomery Realty 206 will contract out the various items of work required for the maintenance of the stormwater management system.

A copy of the maintenance log and inspection log shall be kept on file and made available to Township stormwater coordinator and County officials upon request.

## **II. Stormwater Management System Components**

- A. Underground Detention Pipes – This site contains one (1) underground detention system consisting of 36” diameter HDPE pipes. This system is intended to provide storage and quantity control for the parking lot and building runoff. The system will be constructed with water-tight solid pipes.
- B. Stormfilter© MTD – The Stormfilter© manufactured treatment device (MTD) unit provides a TSS removal rate of 80% as approved by the NJDEP. This site contains one (1) Stormfilter© unit. This unit will provide runoff quality control for a portion of the parking lot runoff.
- C. Outlet Control Structures – The underground detention system utilizes an outlet control structure to control discharges from the pipes. The outlet structure is a concrete manhole containing a weir with an orifice and rectangular weir.
- D. Stormwater Conveyance System – The site contains underground storm drains that handle runoff from the parking area. Runoff from the parking lot is collected by drainage inlets and is directed to the water quality unit and detention system. All curb line inlets contain grates and headpieces that prevent large trash and debris from entering the system.

## **III. Preventive Maintenance Procedures**

- A. Inspections – Outfall locations must be inspected annually for erosion and scour. All components of the underground detention system must be inspected for clogging and excessive debris and sediment accumulation at least four (4) times annually as well as after every storm exceeding 1-inch of rainfall. Components to be inspected on this schedule include the Stormfilter© unit; inlets; manholes; 36” detention pipes; outlet structure weirs and orifice devices; and the curblines. Outlet control structures, inlets and other concrete structures should be inspected for structural integrity on an annual

basis. The structures should be inspected for major cracking or spalling. Grates and rims should be inspected for proper attachment.

- B. Removal of Sediment, Trash and Debris – Sediment, trash and/or debris should be removed from inlets and manholes in order to minimize the potential for blockage of the storm pipe. Sediment removal should take place when the system is thoroughly dry. Disposal of sediment, debris, trash and other waste material should be done at a suitable disposal/recycling site and in compliance with all applicable local, state, and federal waste regulations. These tasks should be performed on a semi-annual basis, or more frequently if a noticeable buildup occurs.
- C. Reporting – The results of all inspections and subsequent maintenance work should be recorded utilizing the inspection logs contained the Appendices of this manual. Review of the inspection logs will help establish more efficient maintenance procedures and practices.

#### **IV. Corrective Maintenance Procedures**

- A. Structural Repairs – Structural damage to inlets, connecting pipe, outlet control structures, solid pipe, riprap aprons or other structural components, must be repaired promptly. Repairs may include patching spalled concrete, resetting inlet castings, resetting displaced mulch, or replacing structurally unsound items.
- B. Re-vegetation, Settlement, Erosion and Scour – Over time it may be necessary to re-establish vegetation in the grasses and add mulch. Any areas where settlement has occurred shall be brought to grade with suitable material, topsoil and seed. Such areas shall be monitored on a quarterly basis to verify the problem is isolated. Any outfall area showing signs of erosion and/or scour shall be re-established to its design state. Installation of haybales or other temporary control measures may be required to minimize concentrated runoff until these areas are established.
- C. Ice Removal – Accumulations of ice can hinder the function capacity of the stormwater inlets. It may be necessary during winter months to ensure that the drainage inlets remain free from any accumulated ice so that subsequent rainfall events can be properly controlled.

#### **V. Stormfilter© Unit Maintenance**

##### A. General Maintenance

All Stormfilter© unit components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding 1 inch of rainfall. Such components may include bottoms, inlets, outlets, chambers, and cleanouts.

Sediment removal should be conducted at least annually and with greater frequency if excessive accumulation is observed. Disposal of debris, trash, sediment, and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

B. Structural Components

All structural components must be inspected for cracking, subsidence, spalling, erosion, and deterioration at least annually.

**SEE FOLLOWING PAGE FOR SPECIFIC STORMFILTER© UNIT MAINTENANCE GUIDELINES**



# TABLE 1

## Maintenance Work Order and Checklist For Stormwater Management Facilities

Name of Facility: Montgomery Dunkin  
 Location: Intersection of Route 206 & Georgetown-Franklin Turnpike Date: \_\_\_\_\_  
 Crew: \_\_\_\_\_ Work Started: Date \_\_\_\_\_ Time \_\_\_\_\_  
 Equipment: \_\_\_\_\_ Work Completed: Date \_\_\_\_\_ Time \_\_\_\_\_  
 Weather: \_\_\_\_\_ Total Man-hours of Work: \_\_\_\_\_

### A. Preventive Maintenance

Work Item	Items Required (x)	Items Done (x)	Comments and Special Instructions
<b>1. Grass Cutting</b>			
A. Lawns (Annually, early fall)			
B. Embankments and Side Slopes (Annually, early fall)			
C. Grass Swales and Perimeter Areas (Monthly, or as required)			
D. Access Areas and Roads (Monthly or as required)			
E. Other:			

### 2. Ground Cover Maintenance

A. Re-Seeding			
B. De-Thatching			
C. Conduit Outlet Protection			
D. Other:			

### 3. Trash and Debris Removal

A. Detention system			
B. Embankments and Side Slopes			
C. Perimeter Areas			
D. Access Areas and Roads			
E. Inlets			
F. Outlets and Trash Racks			
G. STORMFILTER® Unit:			
H. Other:			

Work Item	Items Required (x)	Items Done (x)	Comments and Special Instructions
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**4. Sediment Removal**

A. Detention System			
B. Stormfilter© Units			
C. Outlet Structures			
D. Inlets and Manholes			
E. Other:			

**5. Structural Components  
(Inspect the following items)**

A. Outlet Structures			
B. Orifices & Weirs			
C. Trash Racks and Grates			
D. Stormfilter© Unit			
E. Detention system			
F. Other:			

**6. Other Preventive Maintenance**

A.			
B.			
C.			

**B. Corrective Maintenance**

Work Item	Items Required (x)	Items Done (x)	Comments and Special Instructions
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**1. Removal of Debris & Sediment**

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**2. Structural Repairs**

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**3. Detention System**

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**4. Erosion and Scour Repair**

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**5. STORMFILTER© Unit**

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Work Item	Items Required (x)	Items Done (x)	Comments and Special Instructions
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6. Snow & Ice Removal

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7. Other

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### C. Aesthetic Maintenance

Work Item	Items Required (x)	Items Done (x)	Comments and Special Instructions
1. Trash Removal			
2. Grass Trimming			
3. Weeding			
4. Other:			

Remarks (Refer to Item No., if Applicable):

Work Order Prepared By: \_\_\_\_\_

Work Completed By: \_\_\_\_\_

**TABLE 2**

**Maintenance Log  
For  
Stormwater Management Facilities**

Name of Facility: Montgomery Dunkin  
Location: Intersection of Route 206 & Georgetown-Franklin Turnpike Date:                     

**A. Preventive Maintenance**

Work Item

Date/Completed (x)

**1. Grass Cutting**

A. Lawns (Annually, Early Fall)							
B. Embankments and Side Slopes, (Annually, early fall)							
C. Perimeter Areas, (Monthly or as required)							
D. Access Areas and Roads (Monthly, or as required)							
E. Other:							

**2. Ground Cover Maintenance**

A. Re-Seeding							
B. De-Thatching							
C. Conduit Outlet Protection							
D. Other:							

**3. Trash and Debris Removal**

A. Detention system							
B. Embankments and Side Slopes							
C. Perimeter Areas							
D. Access Areas and Roads							
E. Inlets and STORMFILTER© Unit							
F. Outlets and Trash Racks							
G. Other:							

**4. Sediment Removal**

A. Detention system							
B. STORMFILTER© Unit							
C. Outlets Structures							



**3. Weeding**

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**4. Other:**

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TABLE 3  
**Inspection List**  
**For**  
**Stormwater Management Facilities**

Name of Facility: Montgomery Dunkin

Location: Intersection of Route 206 & Georgetown-Franklin Date: \_\_\_\_\_

Facility Item                      O.K.<sup>1</sup>    Routine<sup>2</sup>    Urgent<sup>3</sup>    Comments<sup>4</sup>

**1. Embankments and Side Slopes**

A. Vegetation				
B. Erosion				
C. Settlement				
D. Sloughing				
E. Trash and Debris				
F. Seepage				
G. Aesthetics				
H. Other:				

**2. Detention System**

A. Vegetation				
B. Erosion				
C. Settlement				
D. Sloughing				
E. Trash and Debris				
F. Infiltration Rate				
G. Aesthetics				
H. Other:				

**3. Outlet Structure**

A. Condition of Structure				
B. Erosion				
C. Trash & Debris				
D. Sediment				
E. Trash Rack and Grates				
F. Low Flow Device/Plates				
F. Aesthetics				

G. Other:				
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Facility Item                      O.K.<sup>1</sup>    Routine<sup>2</sup>   Urgent<sup>3</sup>    Comments<sup>4</sup>

#### 4. Outfall Conduit

A. Condition of End Section				
B. Riprap Apron				
C. Erosion				
D. Trash & Debris				
E. Other:				

#### 5. Perimeter

A. Vegetation				
B. Erosion				
C. Trash & Debris				
D. Fences & Gates				
E. Aesthetics				
F. Other:				

#### 6. Detention System

A. Sediment				
B. Trash and Debris				
E. Piping				
F. Other				

<sup>1</sup> The item checked is in good condition, and the maintenance program is adequate.

<sup>2</sup> The item checked requires attention, but does not present an immediate threat to the facility function or other facility components.

<sup>3</sup> The item checked requires immediate attention to keep the facility operational or to prevent damage to other facility components.

<sup>4</sup> Provide explanation and details if columns 2 or 3 are checked.

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Remarks (Refer to Item No., if Applicable):

**Inspector:** \_\_\_\_\_



Name of Facility: Montgomery Dunkin  
Location: Intersection of Route 206 & Georgetown-Franklin Date: \_\_\_\_\_

Indicate Condition (i.e. 1, 2 or 3)

[illegible][illegible][illegible]

#### 4. Outlet Structure

A. Condition of Structure										
B. Erosion										
C. Trash & Debris										
D. Sediment										
E. Mechanical Components										
F. Aesthetics										
G. Other:										

#### 5. Outfall Conduit

A. Vegetation										
B. Riprap Apron										
C. Erosion										
D. Trash & Debris										
E. Other:										

#### 6. Perimeter

A. Vegetation										
B. Erosion										
C. Trash & Debris										
D. Fences & Gates										
E. Aesthetics										

#### 7. Miscellaneous

A. Effectiveness of Exist. Maint. Program										
B. STORMFILTER© Unit Inspections										
C. Potential Mosquito Habitats										
D. Mosquitoes										
E.										
F.										

1. The item checked is in good condition, and the maintenance program is adequate.
2. The item checked requires attention, but does not present an immediate threat to the facility function or other facility components.
3. The item checked requires immediate attention to keep the facility operational or to prevent damage to other facility components.

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Remarks (Refer to Item No., if Applicable):

Inspector: \_\_\_\_\_

**TABLE 5**  
**SPILL RESPONSE NOTIFICATION FORM**  
**National Response Center 1-800-424-8802**

Note: It is not necessary to wait for all information before calling the NRC

REPORTER INFORMATION	
Reporter's Name	
Last	
First	
Reporter's Phone Number	
Company	
Organization Type	
Position	
Address	Street:
	City:
	State:
	Zip:
Materials Released	YES G or NO G
Confidential	YES G or NO G
Time Call Received	(use 24 hour time)
INCIDENT DESCRIPTION	
Source and/or Cause of Incident	
Date	
Time of Incident (use 24 hour time)	
Incident Address/Location	
Nearest City	
County	
State	
Zip Code	
Distance from City (miles)	
Section	
Township	
Range	
Container Type	
Tank Capacity (include units)	
Facility Capacity (include units)	
Facility Latitude	Degrees  Minutes  Seconds
Weather Conditions	
Facility Longitude	Degrees  Minutes

	Seconds
Materials Released	CHRIS Code Substance/Chemical Name
YES G or NO G	Quantity, Time & Duration of Release (include units)
EHS	Material Released into water?
YES G or NO G	YES G or NO G
	Quantity Released into Water (include units)
<b>RESPONSE ACTIONS</b>	
Actions taken to Correct Incident	
Actions Taken to Control Incident	
Actions Taken to Mitigate Incident	
<b>ACTION</b>	
Number of Injuries	
Number of Deaths	
Evacuation(s) Required	YES G or NO G
	Number Evacuated:
Was There and Damage	YES G or NO G
Damage in Dollars (estimated)	
Medium Affected	
Description of Effect, Including Any Known or Anticipated Acute or Chronic Health Risks (See MSDS)	
Additional Information about Medium	
<b>ADDITIONAL INFORMATION</b>	
Any information about the incident not recorded elsewhere in this report to include, if appropriate, information regarding medical attention necessary for exposed individuals and proper precautions to take as a result of spill or release.	
<b>CALLER NOTIFICATIONS</b>	
NRC	YES G or NO G
EPA	YES G or NO G
USCG	YES G or NO G
SERC	YES G or NO G
LEPC	YES G or NO G
NOSC	YES G or NO G
Other (List)	YES G or NO G
Other (List)	YES G or NO G
Other (List)	YES G or NO G

Note: State-specific forms may be available and required for use. Consult with your State Department of Environmental Resources.

# **Operation & Maintenance (OM) Manual v01**



**filtererra®**  
Bioretention Systems

**C<sup>o</sup>NTECH®**  
ENGINEERED SOLUTIONS



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### **Overview**

- Filterra® General Description
- Filterra® Schematic
- Basic Operations
- Design

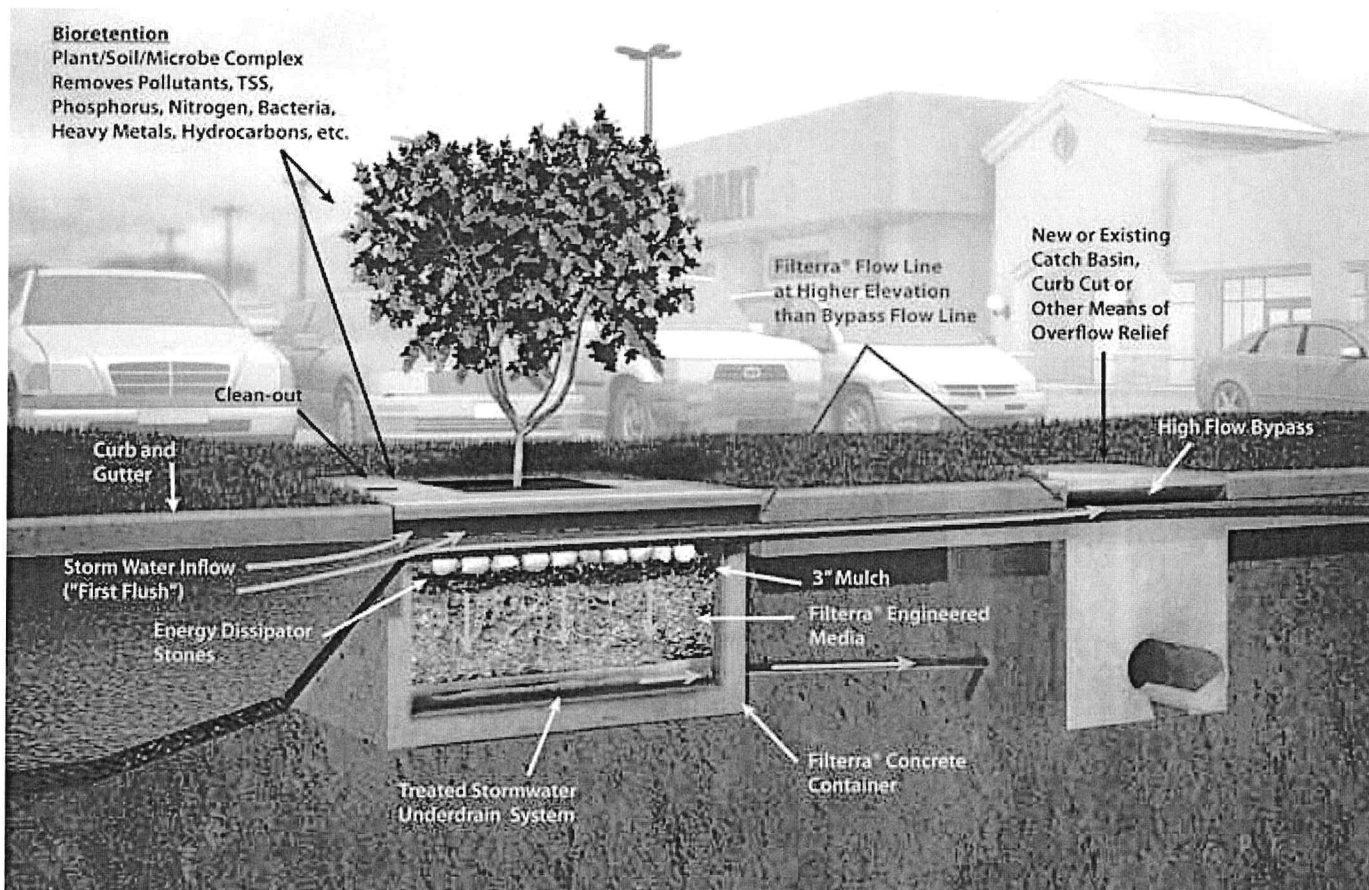
### **Maintenance**

- Maintenance Overview
  - » Why Maintain?
  - » When to Maintain?
- Exclusion of Services
- Maintenance Visit Summary
- Maintenance Tools, Safety Equipment and Supplies
- Maintenance Visit Procedure
- Maintenance Checklist



## General Description

The following general specifications describe the general operations and maintenance requirements for the Contech Engineered Solutions LLC stormwater bioretention filtration system, the Filterra®. The system utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban stormwater runoff. The treatment system is a fully equipped, pre-constructed drop-in place unit designed for applications in the urban landscape to treat contaminated runoff.



Stormwater flows through a specially designed filter media mixture contained in a landscaped concrete container. The mixture immobilizes pollutants which are then decomposed, volatilized and incorporated into the biomass of the Filterra® system's micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container, where the treated water is discharged. Higher flows bypass the Filterra® to a downstream inlet or outfall. Maintenance is a simple, inexpensive and safe operation that does not require confined space access, pumping or vacuum equipment or specialized tools. Properly trained landscape personnel can effectively maintain Filterra® Stormwater systems by following instructions in this manual.

## Basic Operations

Filtterra® is a bioretention system in a concrete box.

Contaminated stormwater runoff enters the filter box through the curb inlet spreading over the 3-inch layer of mulch on the surface of the filter media. As the water passes through the mulch layer, most of the larger sediment particles and heavy metals are removed through sedimentation and chemical reactions with the organic material in the mulch. Water passes through the soil media where the finer particles are removed and other chemical reactions take place to immobilize and capture pollutants in the soil media. The cleansed water passes into an underdrain and flows to a pipe system or other appropriate discharge point. Once the pollutants are in the soil, the bacteria begin to break down and metabolize the materials and the plants begin to uptake and metabolize the pollutants. Some pollutants such as heavy metals, which are chemically bound to organic particles in the mulch, are released over time as the organic matter decomposes to release the metals to the feeder roots of the plants and the cells of the bacteria in the soil where they remain and are recycled. Other pollutants such as phosphorus are chemically bound to the soil particles and released slowly back to the plants and bacteria and used in their metabolic processes. Nitrogen goes through a very complex variety of biochemical processes where it can ultimately end up in the plant/bacteria biomass, turned to nitrogen gas or dissolves back into the water column as nitrates depending on soil temperature, pH and the availability of oxygen. The pollutants ultimately are retained in the mulch, soil and biomass with some passing out of the system into the air or back into the water.

## Design and Installation

Each project presents different scopes for the use of Filtterra® systems. To ensure the safe and specified function of the stormwater BMP, Contech reviews each application before supply. Information and help may be provided to the design engineer during the planning process. Correct Filtterra® box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filtterra units as shown in approved plans. A comprehensive installation manual is available at [www.conteches.com](http://www.conteches.com).

## Maintenance

### Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement.

- Avoid legal challenges from your jurisdiction's maintenance enforcement program.
- Prolong the expected lifespan of your Filtterra media.

- Avoid more costly media replacement.
- Help reduce pollutant loads leaving your property.

Simple maintenance of the Filtterra® is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the throat. This may include trash, silt and leaves etc. which will be contained within the void below the top grate and above the mulch layer. Too much silt may inhibit the Filtterra's® flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

### When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated for full operation. Full operation is defined as the unit installed, curb and gutter and transitions in place and activation (by Supplier) when mulch and plant are added and temporary throat protection removed.

Activation cannot be carried out until the site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed). Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing).



## Exclusion of Services

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra® system.

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra® (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra®. The Supplier should be informed immediately.

## Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra® and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra®
7. Complete paperwork

## Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each unit size. Mulch should be a double shredded, hardwood variety; do not use colored or dyed mulch. Some visits may require additional Filterra® engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft <sup>2</sup> )	Volume at 3" (ft <sup>3</sup> )	# of 2 ft <sup>3</sup> Mulch Bags
4	4	16	4	2
6	4	24	6	3
8	4	32	8	4
6	6	36	9	5
8	6	48	12	6
10	6	60	15	8
12	6	72	18	9
13	7	91	23	12

# Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.



## 1. Inspection of Filterra® and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes	no
Damage to Box Structure	yes	no
Damage to Grate	yes	no
Is Bypass Clear	yes	no

If yes answered to any of these observations, record with close-up photograph (numbered).



## 2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra® box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

Record on Maintenance Report the following:

Silt/Clay	yes	no
Cups/ Bags	yes	no
Leaves	yes	no
# of Buckets Removed	_____	



## 3. Removal of debris, trash and mulch

- After removal of mulch and debris, measure distance from the top of the Filterra® engineered media soil to the bottom of the top slab. If this distance is greater than 12", add Filterra® media (not top soil or other) to recharge to a 9" distance

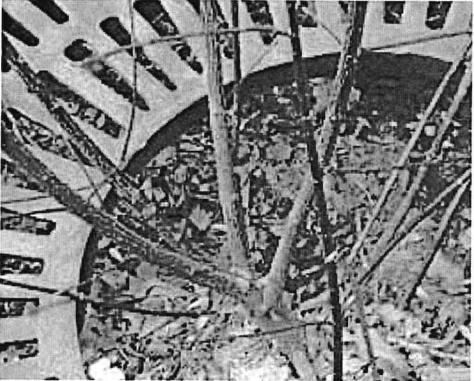
Record on Maintenance Report the following:

Distance of Bottom of Top Slab (inches)	_____
# of Buckets of Media Added	_____



#### 4. Mulch replacement

- Please see mulch specifications.
- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Ensure correct repositioning of erosion control stones by the Filterra® inlet to allow for entry of trash during a storm event.
- Replace Filterra® grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.



#### 5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if dead.
- Prune as necessary to encourage growth in the correct directions

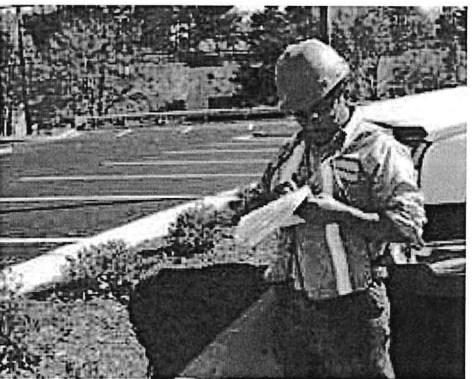
Record on Maintenance Report the following:

Height above Grate	_____ (ft)
Width at Widest Point	_____ (ft)
Health	alive   dead
Damage to Plant	yes   no
Plant Replaced	yes   no



#### 6. Clean area around Filterra®

- Clean area around unit and remove all refuse to be disposed of appropriately.



#### 7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

# Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				



## StormFilter Inspection and Maintenance Procedures





## Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

## Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

### 1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

### 2. Maintenance

- Cartridge replacement
- Sediment removal

## Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.



In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

## Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..



## Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

**Warning:** In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

**Important:** Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

## Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
  - a. If  $>4"$  of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
  - a. If  $>1/4"$  of accumulation, maintenance is required.
3. Submerged cartridges.
  - a. If  $>4"$  of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
  - a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
  - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
  - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
  - a. If pronounced scum line (say  $\geq 1/4"$  thick) is present above top cap, maintenance is required.



## Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

**Important:** If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

**Warning:** In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

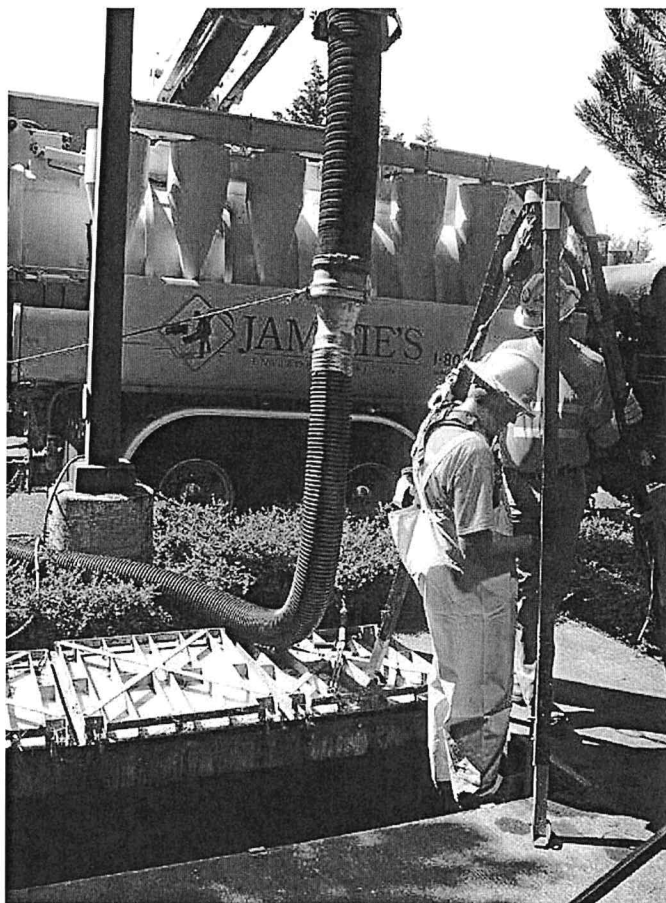
1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

### Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



**Important:** Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

### Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.



8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

## Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

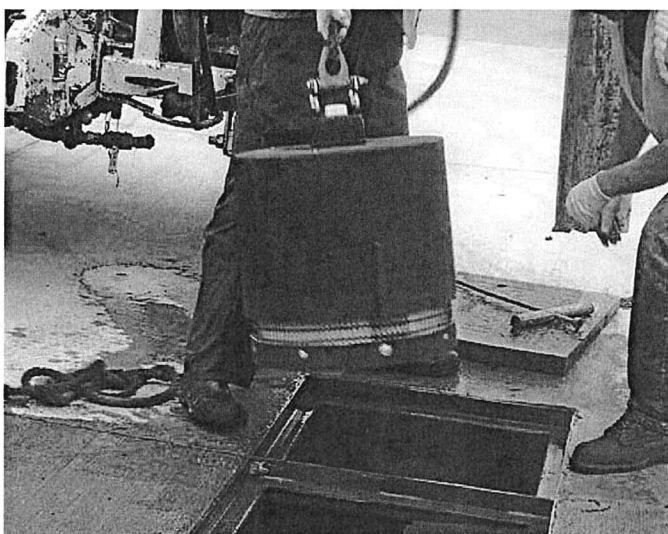
In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

## Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



# Inspection Report

Date: Personnel:

Location: \_\_\_\_\_ System Size: \_\_\_\_\_

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

Sediment Thickness in Forebay: \_\_\_\_\_ Date: \_\_\_\_\_

Sediment Depth on Vault Floor: \_\_\_\_\_

Structural Damage: \_\_\_\_\_

Estimated Flow from Drainage Pipes (if available): \_\_\_\_\_

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water: \_\_\_\_\_

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal: \_\_\_\_\_

☐ Minor Structural Repairs: \_\_\_\_\_

☐ Drainage Area Report \_\_\_\_\_

Excessive Oil Loading: Yes ☐ No ☐ Source: \_\_\_\_\_

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: \_\_\_\_\_

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: \_\_\_\_\_

Items Needing Further Work: \_\_\_\_\_

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

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Review the condition reports from the previous inspection visits.

# StormFilter Maintenance Report

Date: \_\_\_\_\_ Personnel: \_\_\_\_\_

Location: \_\_\_\_\_ System Size: \_\_\_\_\_

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

List Safety Procedures and Equipment Used: \_\_\_\_\_

## System Observations

Months in Service: \_\_\_\_\_

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): \_\_\_\_\_

Sediment Depth on Vault Floor: \_\_\_\_\_

Structural Damage: \_\_\_\_\_

## Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: \_\_\_\_\_

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: \_\_\_\_\_

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: \_\_\_\_\_

## StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: \_\_\_\_\_

Replace Cartridges: Yes ☐ No ☐ Details: \_\_\_\_\_

Sediment Removed: Yes ☐ No ☐ Details: \_\_\_\_\_

Quantity of Sediment Removed (estimate?): \_\_\_\_\_

Minor Structural Repairs: Yes ☐ No ☐ Details: \_\_\_\_\_

Residuals (debris, sediment) Disposal Methods: \_\_\_\_\_

Notes:

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