Stormwater360
BETWEEN SKY AND SEA

StormFilter Inspection and Maintenance Procedures

The Stormwater Management StormFilter®

Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter out 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 likely many effective maintenance options, we believe the following procedure is efficient and can be implemented using common equipment and existing maintenance protocols. A two-step procedure is recommended as follows:

Inspection

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

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 localised 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, in late summer to early autumn when flows into the system are not likely to be present.

Maintenance Frequency

The primary factor controlling timing of maintenance of 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 stabilised 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 Stormwater360 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 >100mm of accumulated sediment, maintenance is required.

2. Sediment loading on top of the cartridge.
   a. If >5mm of accumulation, maintenance is required.
3. Submerged cartridges.
   a. If >100mm of static water in the cartridge bay for more than 24 hours after a rain event, maintenance is required.
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 ≥ 5mm thick) is present above top cap, maintenance is required.

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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, WorkSafe 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 flow is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Stormwater360.

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 Stormwater360 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 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 the drain manifold and place them under the vault opening for lifting (removal). Unscrew (counter-clockwise rotations) each filter cartridge from the underdrain connector.
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 Stormwater360 for suggested attachment devices.

Important: Take care not to damage the manifold connectors. This connector should remain installed in the manifold and could be capped during the maintenance activity to prevent sediments from entering the underdrain manifold.

B. Remove the used cartridges 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 unless Stormwater360 performs the maintenance activities and damage is not related to discharges to the system.

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 the drain manifold and place them under the vault opening for lifting (removal). Unscrew (counter-clockwise rotations) each filter cartridge from the underdrain connector. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

B. Enter the vault using appropriate confined space protocols

C. Unscrew the cartridge cap.

D. Remove the cartridge hood and float.

E. At location under structure access, tip the cartridge on its side.

F. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.

G. Set the empty, used cartridge aside or load onto the hauling truck.

H. Continue steps A though G until all cartridges have been removed.

1. 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.
2. Once the sediments are removed, assess the condition of the vault and the condition of the connectors. The connectors are short sections of 50mm schedule 40 PVC, or threaded schedule 80 PVC that should protrude about 25mm above the floor of the vault. Lightly wash down the vault interior.
    a. If desired, apply a light coating of FDA approved silicon lube to the outside of the exposed portion of the connectors. This ensures a watertight connection between the cartridge and the drainage pipe.
    b. Replace any damaged connectors.
3. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
4. Close and fasten the door.
5. Remove safety equipment.
6. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used <u>empty</u> cartridges to Stormwater360.

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 travelled 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 wastewater treatment plant or on-site treatment and discharge.

Stormwater Management Device Inspection and Monitoring Field Guide for StormFilter

The configuration shown in this guide is based on a generic device layout. The actual layout of individual devices may be slightly different from that shown and certain elements may be missing or additional elements included.

StormFilter Purpose and Function

StormFilters work by filtering stormwater through cartridges full of filtration media. Stormwater passes through a hydrocarbon forebay to remove floating debris & rubbish, oil, grease and grit before reaching the filtration treatment bay to avoid clogging the filter.

During a storm, runoff enters the treatment bay and passes through the filter cartridge media, removing contaminants such as heavy metals and fine sediment on its way to the centre tube. Air below the hood is purged through a one- way check valve as the water rises. When water reaches the top of the float, buoyant forces pull the float free and allow filtered water to drain. The water is then collected in the underdrains before being discharged as treated runoff.

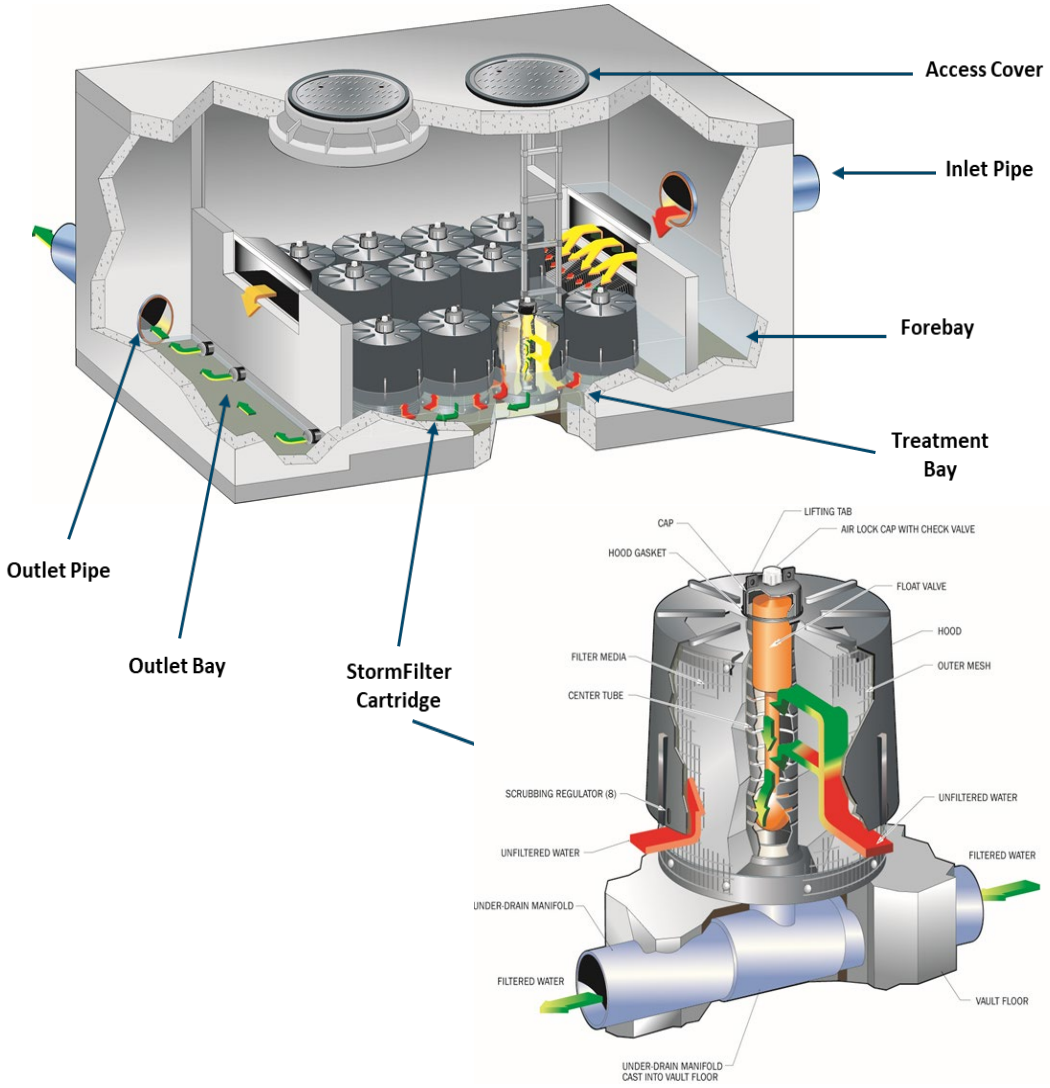
After the storm, the water level in the structure starts falling. A hanging water column remains under the cartridge hood until the water level reaches the scrubbing regulators. Air then rushes through the regulators releasing water and creating air bubbles that agitate the surface of the filter media, causing accumulated sediment to drop to the vault floor.

What to Look for

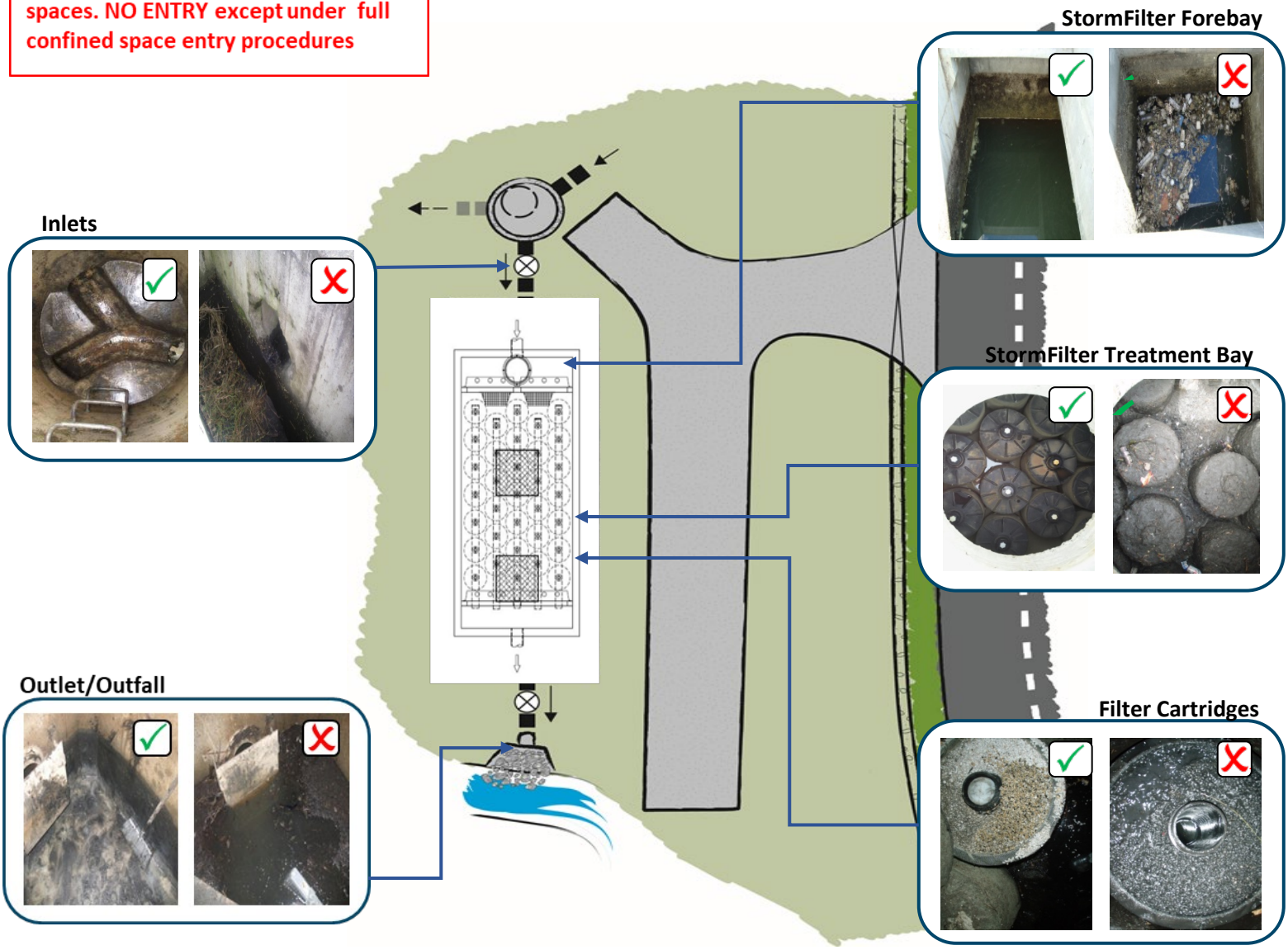
When inspecting StormFilters the main things to look for are rubbish or debris blocking the inlet/outlet pipes, clogging of the filter cartridge media with oil, grease or other contaminants and accumulated sediment on the manhole/vault floor.

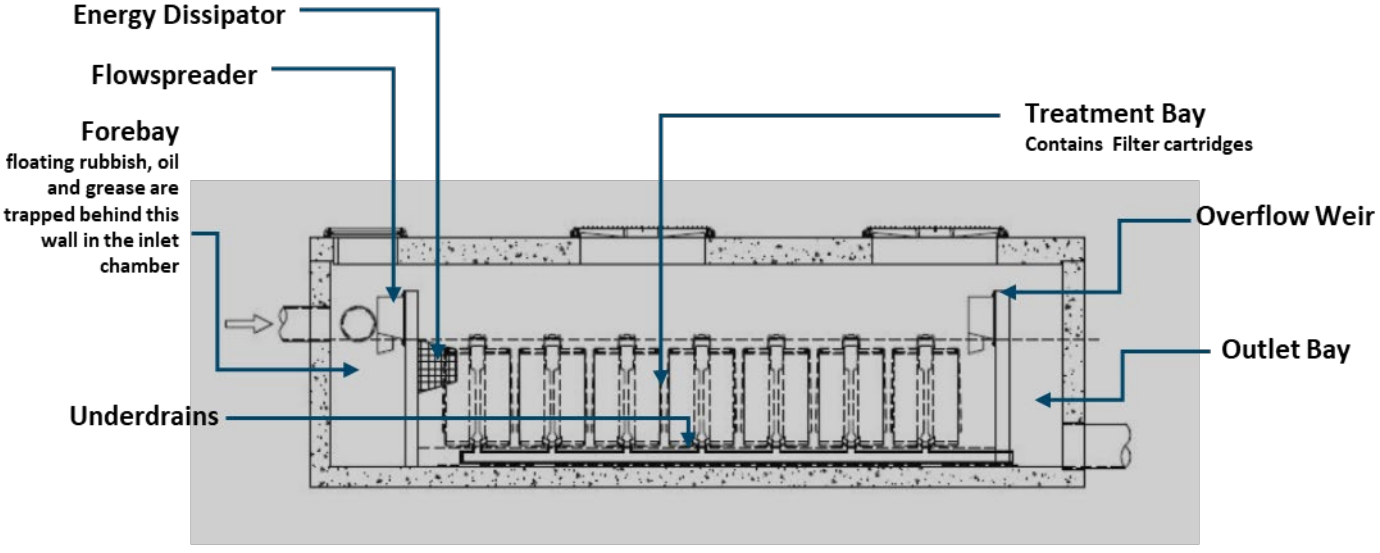
- If the inlets or outlets are blocked, water will bypass the device and may also cause flooding or ponding on the road surface.
- If the filter cartridge media is clogged, the runoff will not be filtered properly as water will not be able to flow through the filter cartridges and will overflow from the chamber untreated.
- If excessive accumulated sediment is present on the manhole/vault floor, the runoff will not be able to flow through the filter cartridges and will overflow from the chamber untreated.

StormFilter Vault and Filter Cartridge Diagrams



StormFilters are usually confined spaces. NO ENTRY except under full confined space entry procedures





Grade 1 - New

Grade 2 - Slightly Used

Grade 3 - Used

Grade 4 - Dirty

Grade 5 - Very Dirty

Join the many satisfied customers who use Stormwater360 as their maintenance and compliance providers.

Ph: 09 476 5586

Or email us for more information on our Maintenance Compliance Certification Program

Maintenance@stormwater360.co.nz

Support

- Drawings and specifications are available on request
- Site specific design support is available from our engineers