

# Maintenance Training Programme



## Guiding Philosophy

To create a maintenance programme that ensures certified contractors are sufficiently equipped and trained to successfully service our devices.

To help our contractors work towards a goal of achieving the most cost-effective methodologies towards maintenance of our devices and ensuring the best possible environmental outcomes.

To ensure a high standard of maintenance being carried out.

# Maintenance Training Programme

## Outcomes

- ▶ Provide a robust structure for our maintenance providers.
- ▶ Create a structure and format around training and providing updates on technology.
- ▶ Ensure we have national coverage.
- ▶ Build an equal platform for contractors, with pricing, training, and technical assistance.
- ▶ Help to make maintenance economically feasible for both our contractors and their customers.
- ▶ Provide assurances around quality of work.
- ▶ Ensure contractors maintain using best environment and disposal practices.



## Contractor Obligations

- ▶ **Contractors and Maintenance Staff must be Certified**
- ▶ Companies sign and agree with the Stormwater360 Contractor Certification Agreement outlining their obligations as a contractor with two yearly renewals.
- ▶ Staff must attend training (can be online) and then sit refreshers as required. They are then issued a certificate.
- ▶ Contractors must have certified staff on-site during the maintenance of any Stormwater360 device



## Contractor Obligations

- ▶ **Comply with Specifications and Resource Consents**
- ▶ Inspect and maintain Stormwater360 systems in accordance with the manufacturers specifications and guidelines (set out in the O&M guidelines and through training)
- ▶ Ensure the process for waste removal and disposal is done in accordance with Stormwater360 O&M guidelines and all local authorities' requirements.
- ▶ Use only Stormwater360 replacement cartridges and return exchange units to Stormwater360 as per the cartridge exchange guidelines.
- ▶ Communicate any faults or damage to Stormwater360 for advice on corrective action.

# Maintenance Training Programme

## Contractor Obligations

### Reporting

- ▶ Provide quality reports to owners. Before/After Photos are required on all maintenances.
- ▶ Reports must be available to Stormwater360 on request. Photos are required for any high contamination generating activities in the catchment.

### Right to Audit

- ▶ Allow Stormwater360 personnel to audit maintenance events as reasonably requested.
- ▶ Must be able to provide evidence (receipts) to Stormwater360 showing responsible waste removal and disposal from any given job if requested.

### STORMFILTER INSPECTION REPORT

SITE DETAILS			
PROJECT NAME	JOB ID #	UNIT ID #	INSPECTION DATE (DD/MM/YYYY)
PROJECT ADDRESS		GPS CO-ORDINATES (LAT. , LONG.)	
UNIT SIZE (eg SF69-03-MH-1215-PER)	MEDIA TYPE	ACCESS COVER	UNIT DEPTH
UNIT OBSERVATIONS			
LAST MAINTAINED (DD/MM/YY)	MONTHS IN SERVICE	INLET MANHOLES	OUTLET MANHOLES
<b>FOREBAY</b>			
INLET PIPE(S) ST/INLET PIPE SILT	FOREBAY WATER DEPTH	FOREBAY SILT DEPTH	FOREBAY SILT TYPE
INLET SKI JUMP STATE	INLET SPREADER STATE	INLET DISSIPATOR STATE	OTHER INLET PARTS
<b>TREATMENT BAY</b>			
CARTRIDGES ON SPIGOT / OFF SPIGOT	CARTRIDGES SUBMERGED	CART MESH BLOCKED	MEDIA CLEAN / BLOCKED
TREATMENT BAY SEDIMENT TYPE	TREATMENT WATER DEPTH	TREATMENT BAY SILT DEPTH	OIL/GREASE
AIR RELIEF VALVES STATE	TOP CAP O-RING STATE	SOCK RUBBER BAND STATE	
<b>OUTLET BAY</b>			
OUTLET PIPE(S) \$BLOCKED?	OUTLET SPREADER STATE	OUTLET BAY SILT DEPTH	OTHER PARTS STATE?
UNIT SURROUNDS			
OIL & GREASE	SOURCE	COMMENTS	
SEDIMENT BUILD	SOURCE	COMMENTS	
SOIL EROSION	SOURCE	COMMENTS	
RECOMMENDATIONS			
CLEAN REQUIRED:			
NEXT INSPECTION:			
REPAIRS REQUIRED:			
NOTES:			
AUTHOR	TITLE	COMPANY	DATE

## Online Training Portal (Moodle)

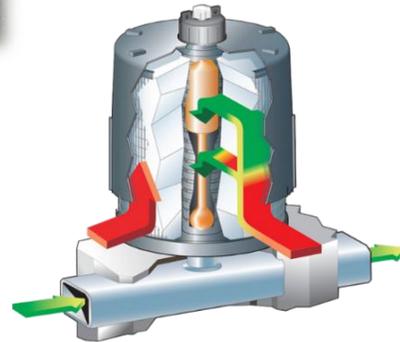
- ▶ Training provided online
- ▶ Each person provided an online login and can work through in their own time.
- ▶ Certificate provided after successful completion of a test
- ▶ Expected to be online 1<sup>st</sup> July
- ▶ Current training online and in person via teams.



## Online Training Portal (Moodle)

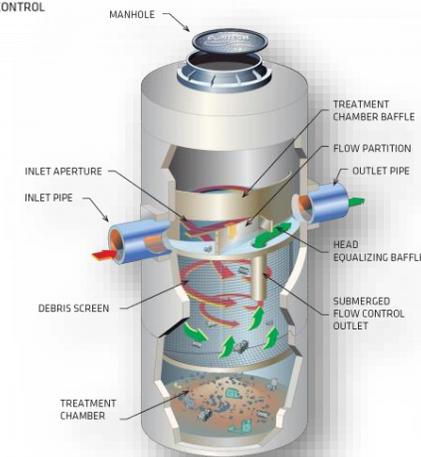
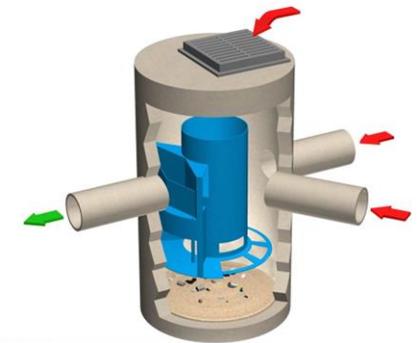
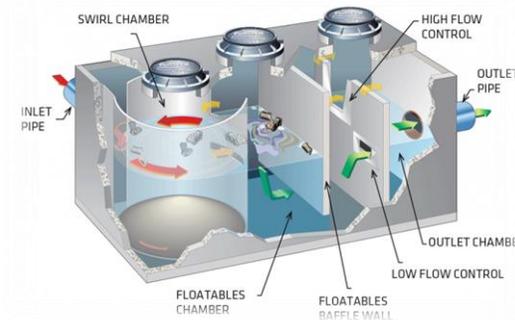
### Filtration devices

- ▶ Filterra
- ▶ StormFilter
- ▶ Jellyfish



### Gross Pollutant Traps

- ▶ Vortechs
- ▶ Cascade Separator
- ▶ VortCapture

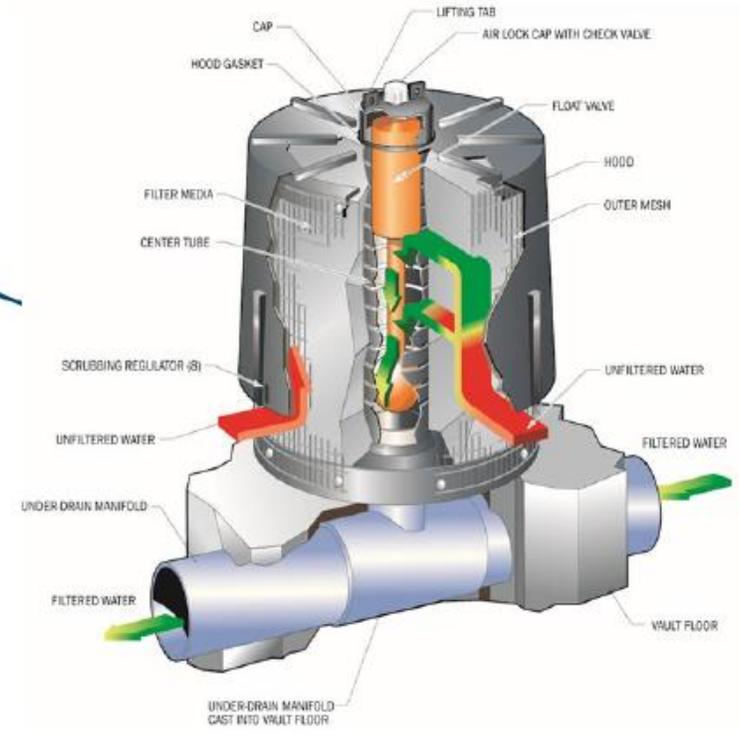
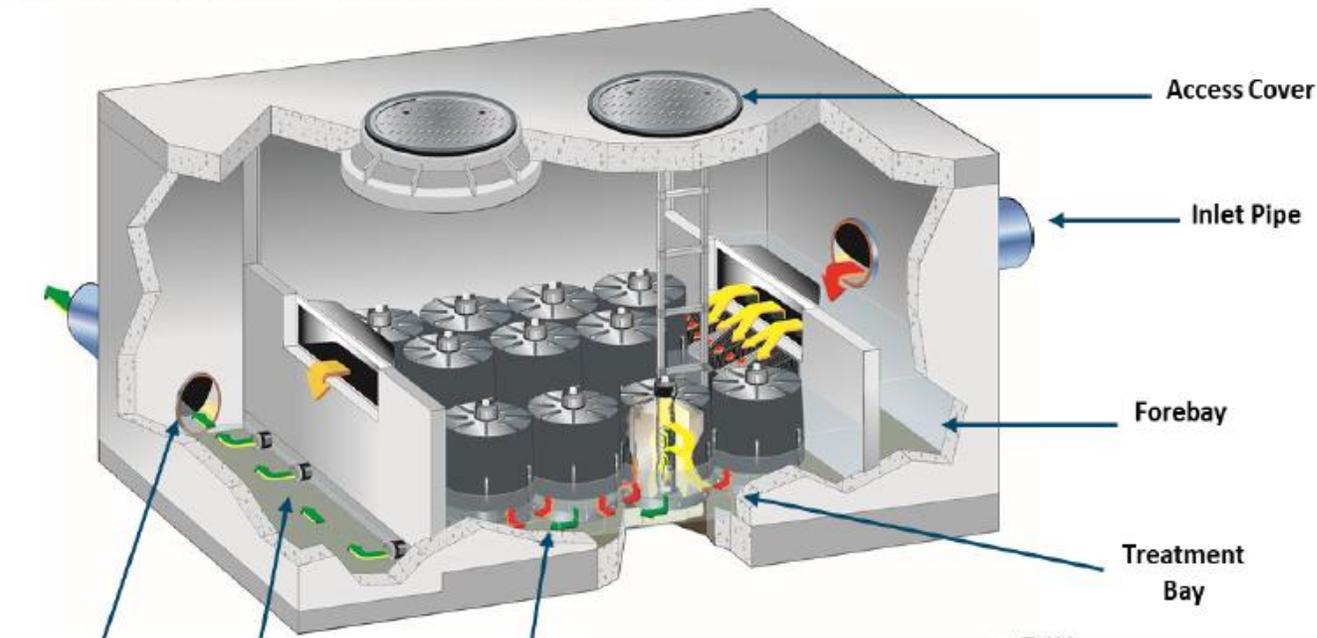




# StormFilter Operation & Maintenance

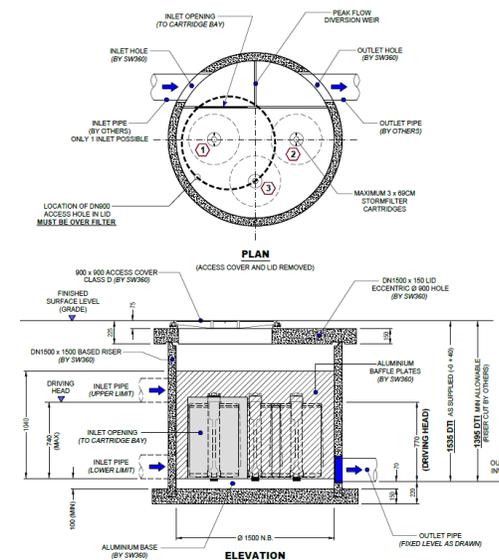
# StormFilter Vault and Filter Cartridge Diagrams

## StormFilter





# StormFilter



- ▶ Scalable from one to multiple cartridges
- ▶ Media customizable to target contaminants
- ▶ Perlite: sediment, ZPG: metals
- ▶ Three cartridge sizes with different hydraulic effects
- ▶ Auckland Council and Christchurch City Council approvals

## STORMFILTER INSPECTION REPORT

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OIL & GREASE	SOURCE	COMMENTS	
SEDIMENT BUILD	SOURCE	COMMENTS	
SOIL EROSION	SOURCE	COMMENTS	
RECOMMENDATIONS			
CLEAN REQUIRED: NEXT INSPECTION: REPAIRS REQUIRED: NOTES:			

AUTHOR	TITLE	COMPANY	DATE
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# StormFilter Inspection

Inspect to Maintain philosophy

- ▶ For a standard design we recommend a minimum of one annual inspection for the first two to three years to determine the appropriate maintenance frequency
- ▶ Inspect after a large storm event or chemical/oil spill

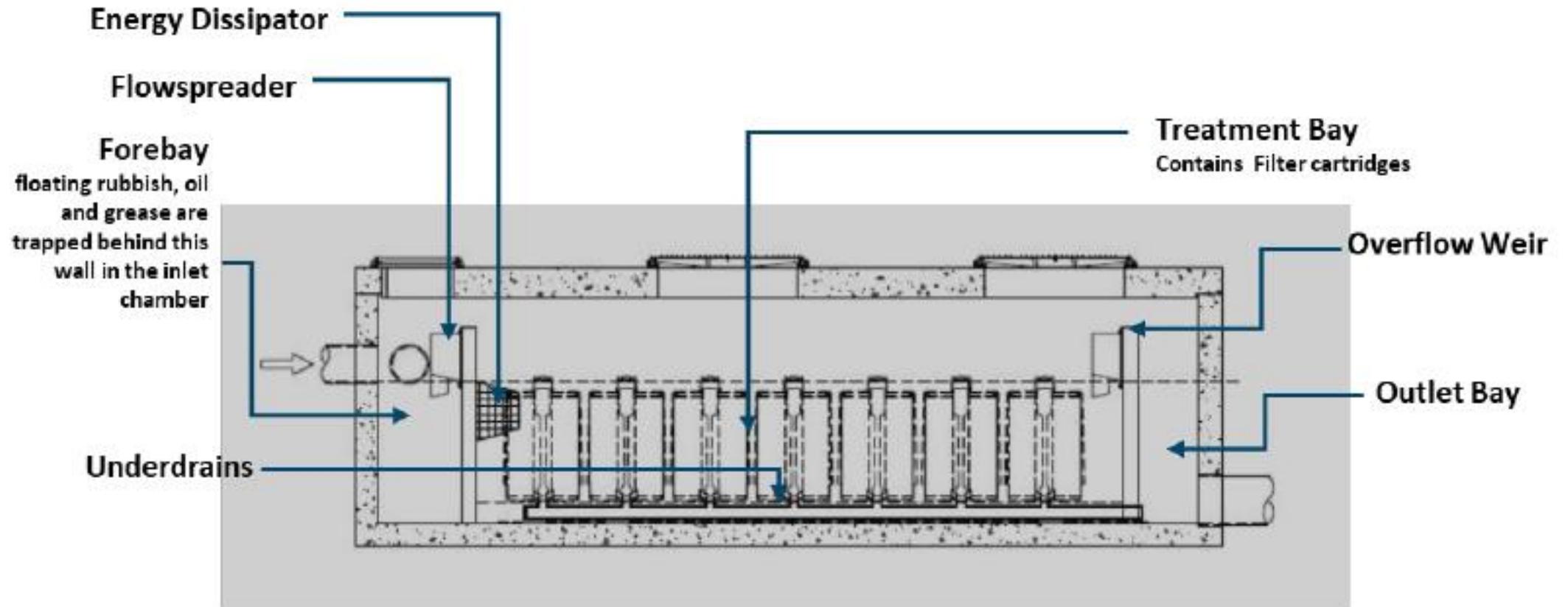
# StormFilter Inspection

As per maintenance:

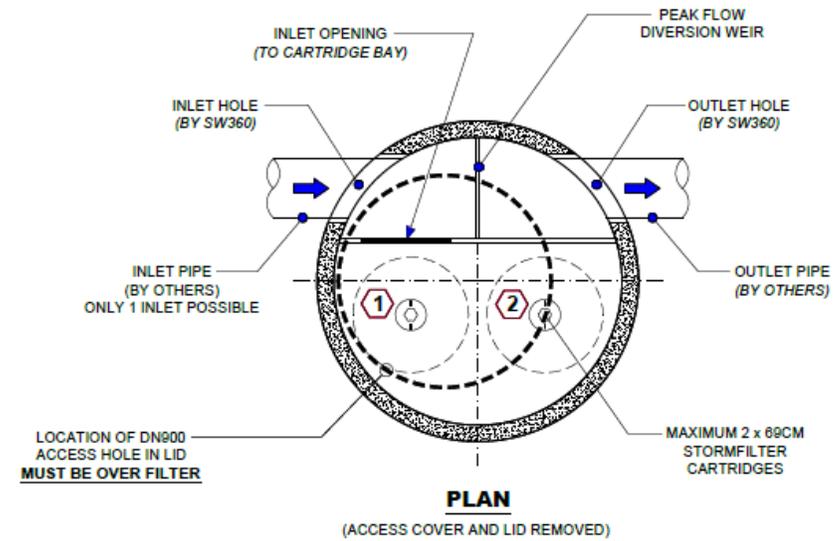
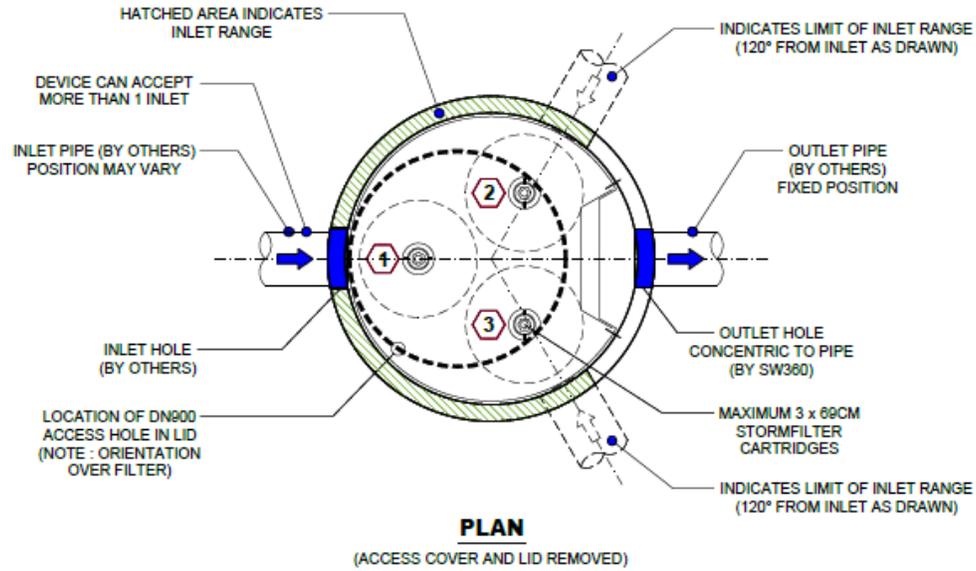
- ▶ Confined space/working at heights/site safe accreditations
- ▶ Notify WorkSafe at least 24 hours prior to commencing work
- ▶ JSA/Pre-start
- ▶ Asset Owner Permit/Site Induction
- ▶ Equipment
  - ▶ Traffic management gear (cones, barriers, signage)
  - ▶ Gas detector
  - ▶ Tripod & harness



# StormFilter Inspection



# StormFilter Inspection



## TREATMENT BAY

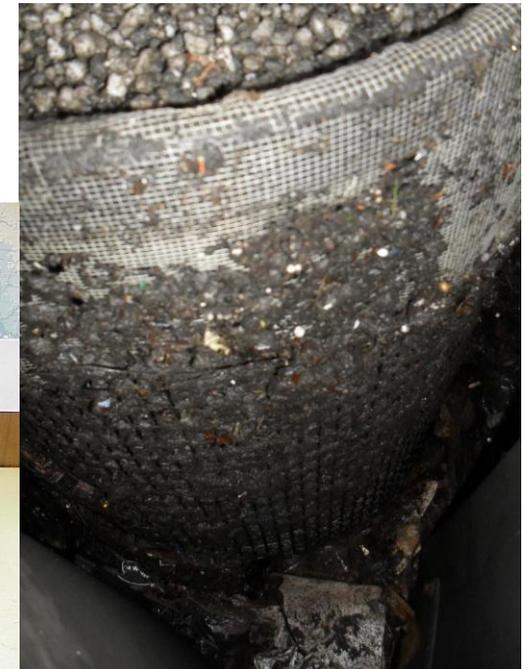
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# Treatment Bay

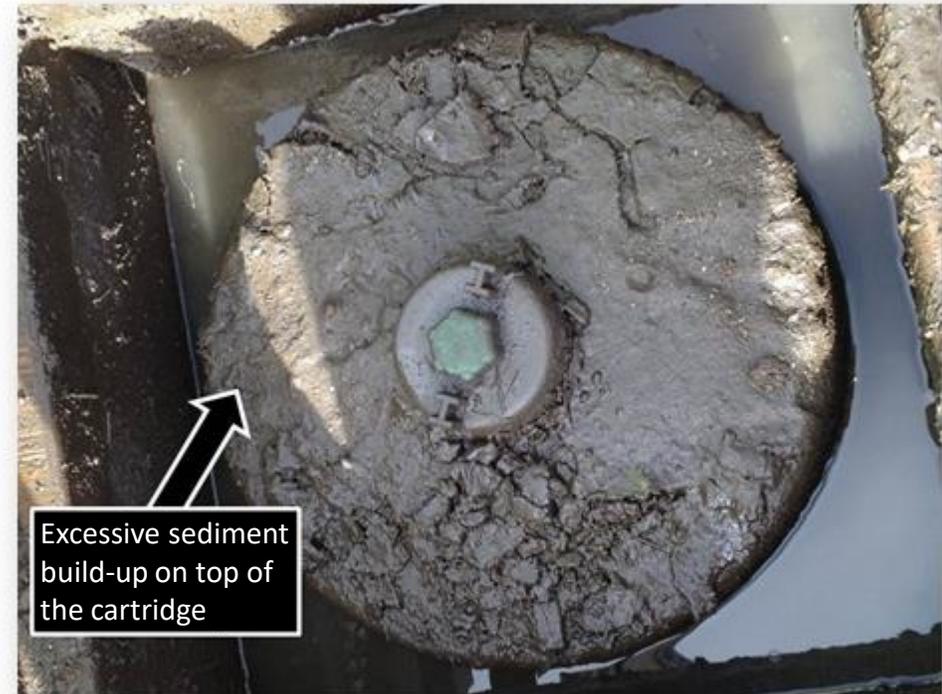
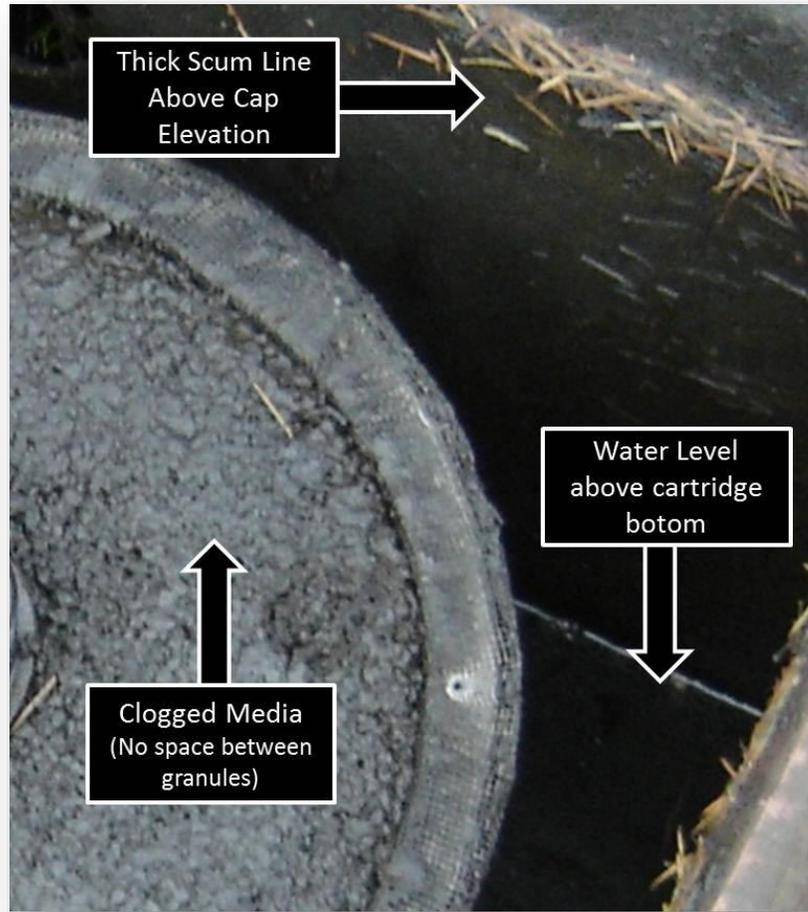


- ▶ Accumulated sediment depth
- ▶ Media condition
- ▶ Oil & grease
- ▶ Floatables
- ▶ Standing water

Media State 1-5



# Treatment Bay



# Treatment Bay



# Forebay

FOREBAY			
INLET PIPE(S) ST/ INLET PIPE SILT	FOREBAY WATER DEPTH	FOREBAY SILT DEPTH	FOREBAY SILT TYPE
INLET SKI JUMP STATE	INLET SPREADER STATE	INLET DISSIPATOR STATE	OTHER INLET PARTS



Energy dissipator



Ski Jump



Flow Spreader



# Outlet Bay

## OUTLET BAY

OUTLET PIPE(S) BLOCKED?      OUTLET SPREADER STATE      OUTLET BAY SILT DEPTH      OTHER PARTS STATE?



# Unit Surrounds

UNIT SURROUNDS		
OIL & GREASE	SOURCE	COMMENTS
SEDIMENT BUILD		COMMENTS
SOIL EROSION	SOURCE	COMMENTS



- ▶ Good practice to check the upstream manhole and outfall
- ▶ If an issue exists, or something doesn't feel right, document it.
- ▶ Photos, photos, photos!

# StormFilter Maintenance



- ▶ Typically designed to a maintenance interval of 18 months
- ▶ Confined space/working at heights/site safe accreditations
- ▶ Notify WorkSafe at least 24 hours prior to commencing work
- ▶ JSA/Pre-start
- ▶ Asset Owner Permit/Site Induction
- ▶ Equipment
  - Vacuum truck
  - Traffic management gear (cones, barriers, signage)
  - Gas detector
  - Tripod & harness

## Maintenance

- ▶ 1. Removing cartridges
- ▶ 2. Cleaning vault (vacuum and waterblast)
- ▶ 3. Replacing Cartridges

# StormFilter components



## Maintenance Steps

### 1. Removing Used Cartridges

- ▶ Remove cartridge cap
- ▶ Remove cartridge hood and float
- ▶ Vacuum used media
- ▶ Unscrew cartridge from spigot
- ▶ Tip remaining used media on to vault floor
- ▶ Block the exposed spigot
- ▶ Reassemble empty cartridge
- ▶ Attach empty cartridge to lifting apparatus to be hoisted up by an above ground operator
- ▶ Repeat above until all cartridges have been removed



# StormFilter Maintenance



# StormFilter Maintenance



# StormFilter Maintenance



## Maintenance Steps

### 2. Clean Manhole/Vault

- ▶ Vacuum excess spent media and sediment/trash from vault floor
- ▶ Vacuum forebay/outlet bay as required
- ▶ Waterblast vault clean (continuing to vacuum while doing so)



## Maintenance Steps

### 3. Replace Cartridges

- ▶ Lower cartridges using a tripod and pulley system
- ▶ Install replacement cartridges
- ▶ Exit the vault and secure the access covers

*Waste disposal should be done in accordance with local guidelines*



## StormFilter Maintenance

Consider all components!



# Stormfilter Cartridge Exchange

## Cartridge Cleaning



## Cartridge Refurbishment



1. The land use and sediment loading of the site does not have an influence on the maintenance frequency of a treatment device (StormFilter).

- A. True
- B. False

2. What needs to be considered during an inspection?

- A. Inlet bay
- B. Outlet bay
- C. Treatment Bay
- D. All the above

3. The media state is rated from 1-5, 1 being newly installed and 5 being very dirty. Maintenance is recommended if the media condition is rated from grade 4 and above.

- A. True
- B. False

4. Which of the following indicates maintenance is required?

- A. Accumulated sediment greater than 100 mm on the vault floor.
- B. Clogged media
- C. sediment on top of cartridge greater than 5mm
- D. All the above.

5. Which of the statements is incorrect?

- A. StormFilter has three different cartridge sizes.
- B. The media is customizable.
- C. Every site will have the same maintenance frequency requirement.
- D. StormFilter is scalable.

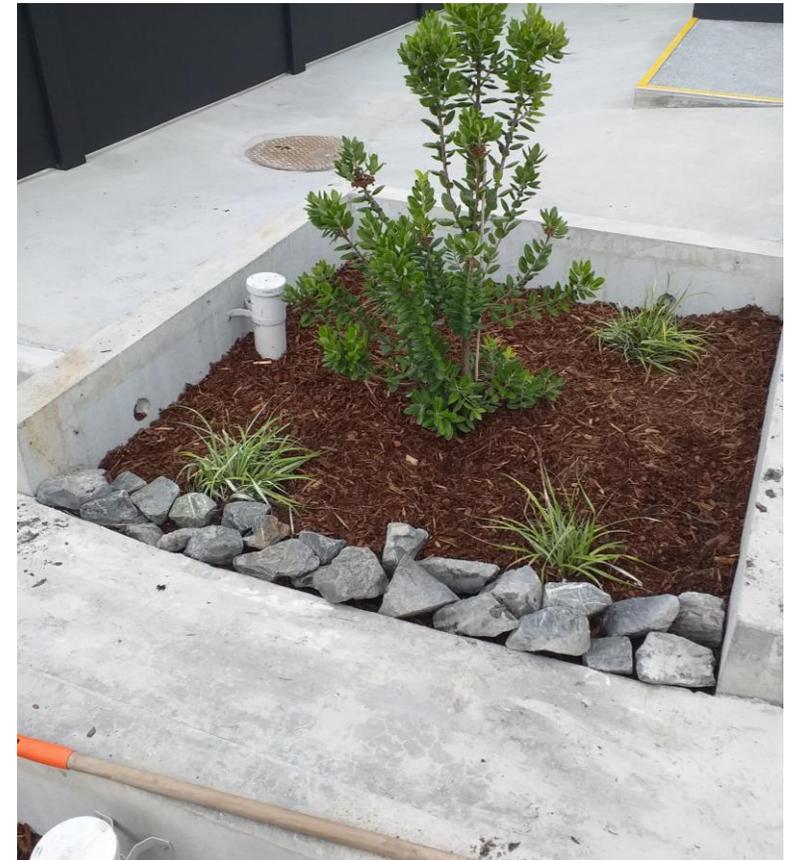


# Filterra Operation & Maintenance

## Overview

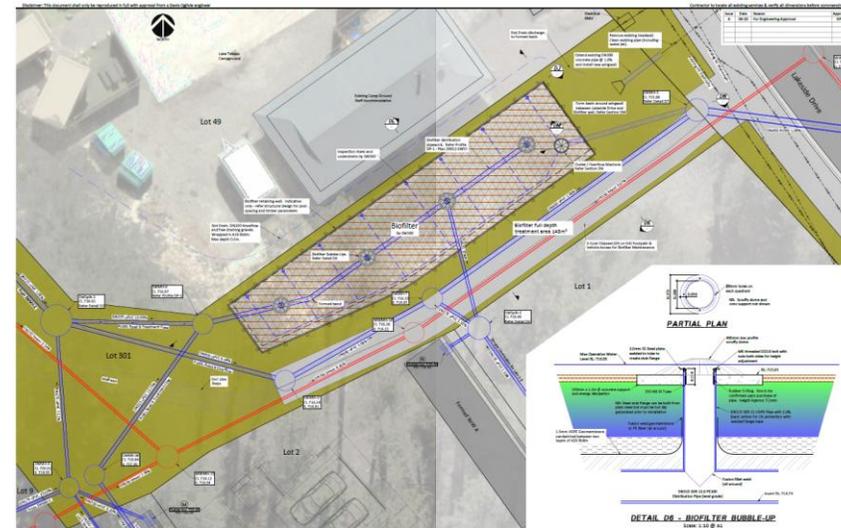


- ▶ High flow engineered media (infiltration rate of 2,540mm/hr and greater)
- ▶ Small footprint: 1/6th to 1/10th size of conventional biofiltration devices
- ▶ Removes trash, sediment, nutrients, metals, and more
- ▶ Auckland, Christchurch, Waikato & Wellington approvals
- ▶ Many international approvals such as the Washington State Department of Ecology's approval for Basic, Oil, Phosphorus, and Enhanced Treatment (dissolved heavy metals)





# Filterra - Bioscape



- ▶ Custom Filterra
- ▶ Large catchment areas >10,000m<sup>2</sup>
- ▶ Accepting piped network
- ▶ Collaborative approach between Stormwater360, Engineer & Contractors



## Filterra – The Mulch Factor

- ▶ Pretreatment
- ▶ Media Sustainability: media will last decades with proper maintenance
- ▶ Disposable/consumable: Mulch layer is designed to be replaced as key component of Filterra maintenance, usually every 6 months (12 months where annual rainfall is less than 800mm)
- ▶ Stormwater360 approved mulch only to be used

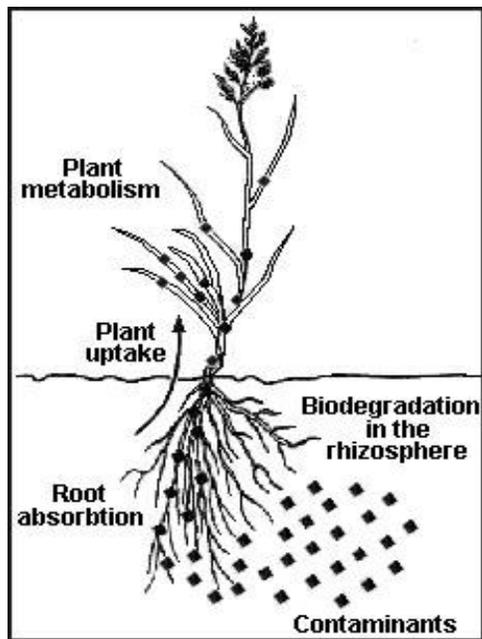


## Filterra – The mulch effect



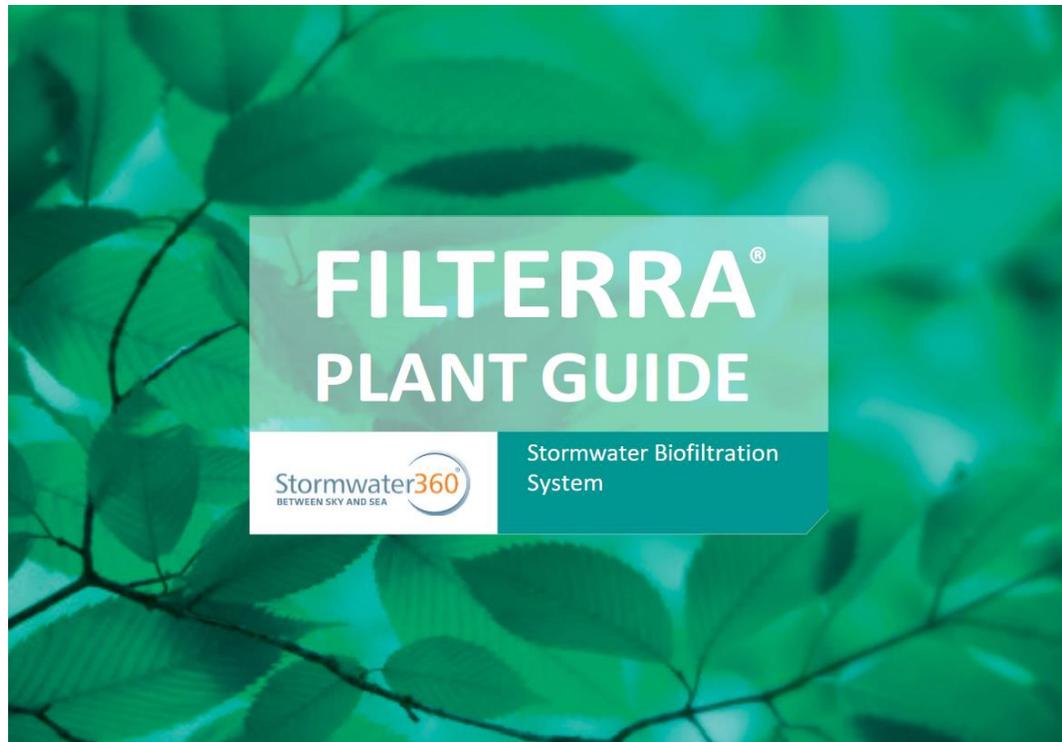
## What does the plant do?

- ▶ Enhance pollutant removal through nature's complex physical, chemical and biological process.
- ▶ Supports flow rates and improves the media's lifecycle
- ▶ Dead plants must be replaced, refer to Stormwater360's plant guide



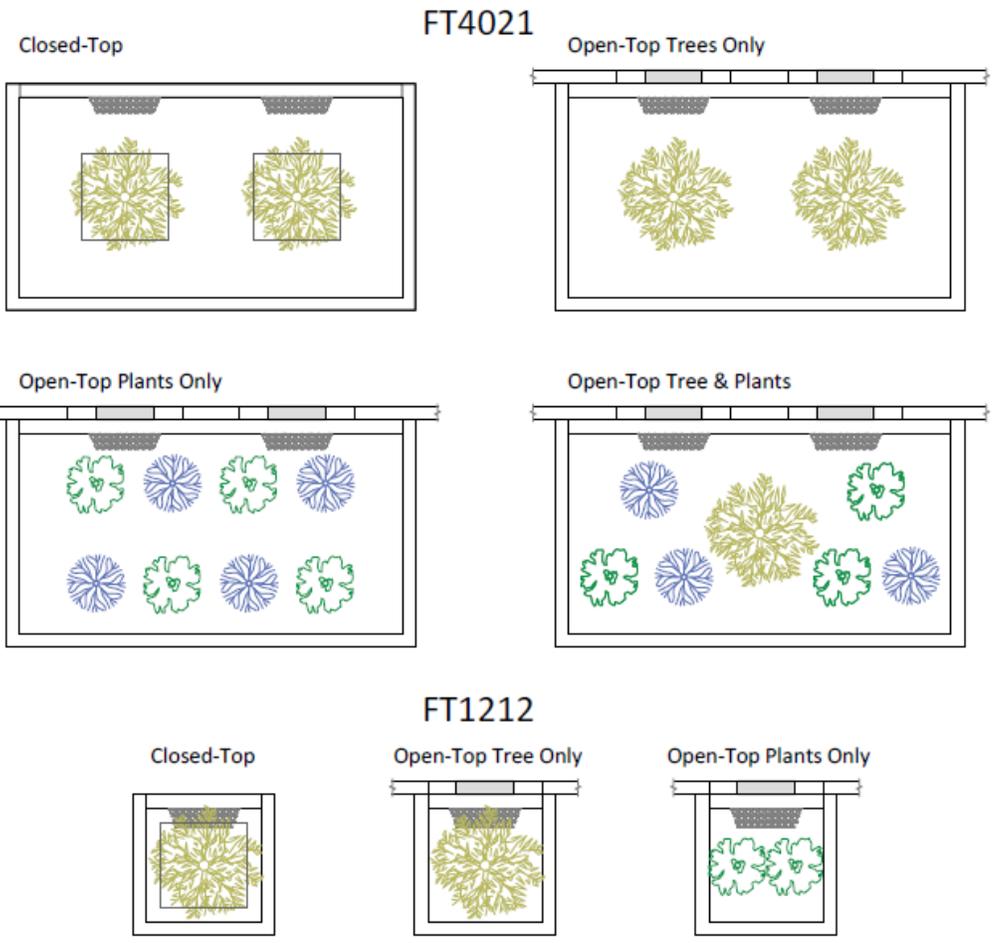
Only specific plants should be used within the Filterra. Key characteristics:

- ▶ hardy, native, non-spreading trees/plants.
- ▶ Tolerance to free-draining soils and occasional dry periods.



# Plant Guide

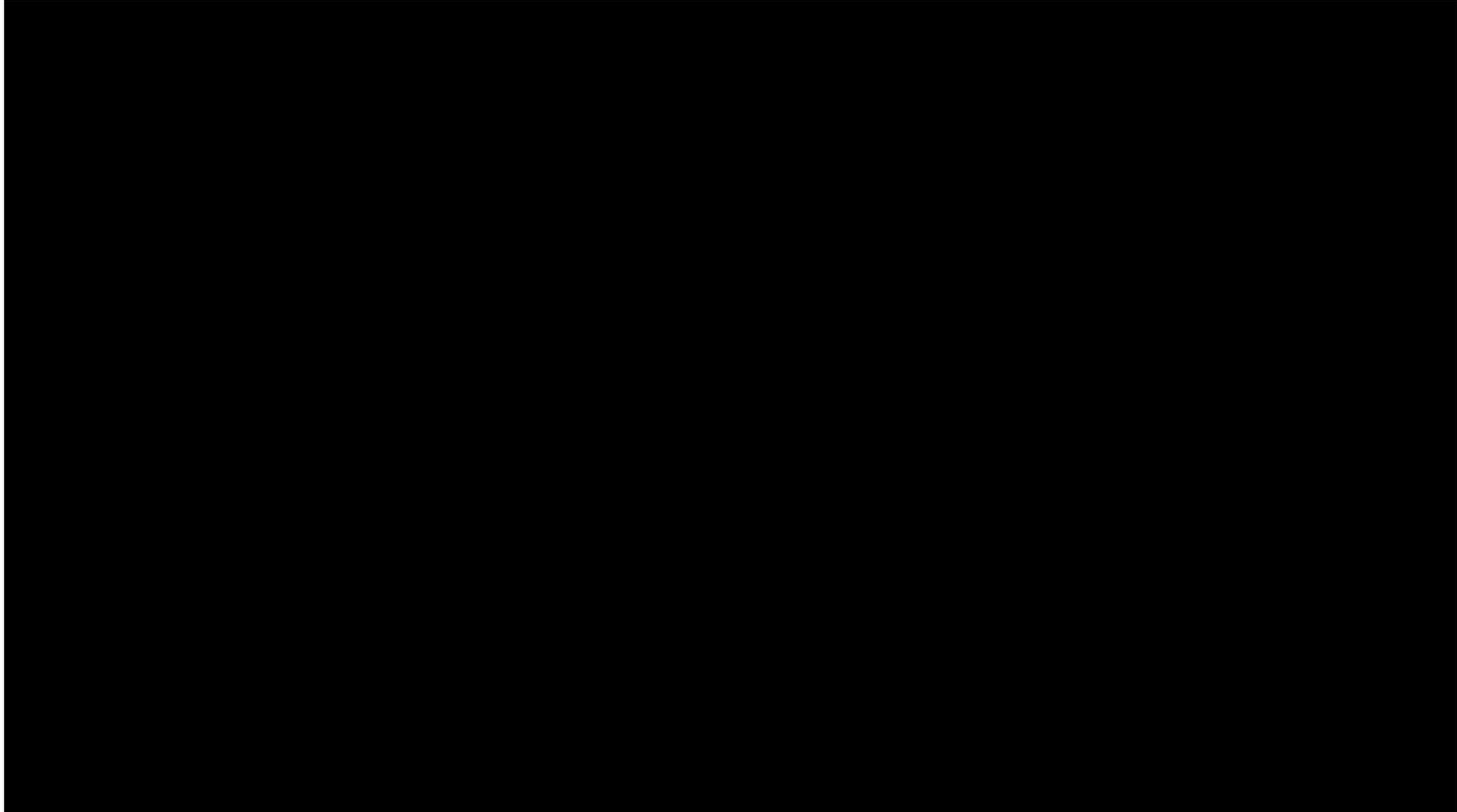
- ▶ Recommended plant quantities are provided in the plant guide to enable ease of maintenance



## Filterra maintenance

- ▶ First year maintenance included
- ▶ Remove trash/mulch twice per year (except in Christchurch which is once a year)
- ▶ Easy access – no confined space
- ▶ No specialized equipment needed
- ▶ Minimal cost First-year





## Filterra maintenance summary

- ▶ Visual inspection
- ▶ Removing energy dissipating rocks to be reused
- ▶ Removing trash, debris, mulch to be disposed
- ▶ Pruning vegetation
- ▶ Replacing mulch
- ▶ Replacing energy dissipation rock
- ▶ DO NOT FERTILIZE



# Filterra Rock Placement



## Troubleshooting a neglected Filterra



- ▶ Filterra systems are like all other Stormwater BMP's and require regular maintenance to ensure they continue to operate efficiently

## Standing Water

- ▶ Check to see if there is standing water located inside the inspection port
  - ▶ If water is present inside the inspection port, the media is saturated, and the unit is not draining properly. This is likely the result of downstream issues.



## Occluded Media



## Dead Tree?

- ▶ Some plants may lose their leaves during dormant periods
- ▶ Check to see if it's still alive by scraping the bark and exposing the flesh. If the flesh is green then the plant is alive.



## Surroundings

- ▶ Observe the surroundings
- ▶ Check upstream and downstream
- ▶ Document concerns with pictures



# Sediment control

- ▶ Standard Filterra units delivered sealed
- ▶ Install sediment control until the site is fully established
- ▶ Install across inlet/around the system



1. Which of the following statements is true?

- A. Maintenance is required every six months except in Christchurch where hydrology allows to be done annually.
- B. Stormwater360 approved mulch only should be used.
- C. Plant guide specifies plant quantities to enable ease of maintenance.
- D. All the above

2. What is required to be replaced in routine maintenance?

- A. Plant
- B. Media
- C. Mulch
- D. Energy dissipation rocks

3. For an inspection/maintenance of Filterra confined space entry is required

- A. False
- B. True

4. Which of the following equipment is not required to conduct Filterra maintenance?

- A. Shovel
- B. Vacuum Truck
- C. Rake
- D. Bucket/container

5. What are some of the characteristics of plants the plant guide recommends?

- A. Plants should be native & hardy.
- B. Plants should be non-spreading.
- C. Plants should be tolerant to free-draining soils and occasional dry periods.
- D. All the above

Thank You For Attending!!  
Any Questions?

Contact us for more information at  
[Maintenance@stormwater360.co.nz](mailto:Maintenance@stormwater360.co.nz)

