

# Appendix D

## Operation and Maintenance Forms

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**FORM "OSM-O&M-PLAN"**

**(A) SITE & OSM DEVICE DETAILS:**

(1) Site Address: \_\_\_\_\_

(2) Owners Name: \_\_\_\_\_

**(3) Details of OSM Device(s):**

Ref. No	Type	Size (eg m <sup>2</sup> or m <sup>3</sup> )	Location	Runoff Source*
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

\* eg roof, paved area

**(4) Name & Address of Parties Responsible for Inspecting and Maintaining the Devices:**

\_\_\_\_\_  
\_\_\_\_\_

**(B) O&M PLAN PREPARED BY:**

(1) Firm: \_\_\_\_\_

(2) Responsible Individuals Name: \_\_\_\_\_

(3) Firms Address: \_\_\_\_\_

**(C) ATTACHED FORMS:**

(1) Form "OSM-O&M-Routine"

(2) Forms "DEVICE-SPECIFIC O&M DETAILS":

(one for each OSM device)

Ref. No	Type
_____	_____
_____	_____
_____	_____
_____	_____

\_\_\_\_\_  
**Signed**

\_\_\_\_\_  
**Date**

**ACE Office Use:**

Reference No. \_\_\_\_\_

Checked by: \_\_\_\_\_ Date: \_\_\_\_\_

Entered by: \_\_\_\_\_ Date: \_\_\_\_\_

**FORM "OSM-O&M-ROUTINE"**  
**List of Routine Maintenance Requirements**

(a) Monitoring & Inspection Programme:

Routine monitoring and inspections are required to:

- Develop a condition history
- Improve scheduling efficiency
- Apply preventative maintenance

Inspection records are to be used to:

- Determine where special maintenance conditions exist
- Determine optimal frequencies for future inspection and maintenance
- Establish scheduled and unscheduled maintenance provisions
- Assure OSM device operation and aesthetics

Specific requirements cover:

- The owner will be responsible for conducting inspections (or having them done on his/her behalf) with the OSM device "as-built" plans in hand, generally at the following intervals (noting that this may vary, depending on site-specific conditions):
  - quarterly basis for the first 2 years
  - minimum of semi-annually thereafter
- The owner will be responsible for keeping inspection records to track the progressive development of the OSM device(s) over time, covering (note that these are to be available to the maintenance contractor noted in Section 11.2 and/or the City/ACE as may be required):
  - general condition of vegetation area(s), predominant plant species, distribution, and success rate (where applicable)
  - sediment condition and depth in forebay (or other pre-treatment structure), treatment facility, bench planting zones, and other sediment removal components
  - water elevations/observations (sheen, smell, etc.)
  - condition of the inlet, outlet, and overflow structures/devices, etc
  - unscheduled maintenance needs
  - components that do not meet performance criteria and require immediate maintenance
  - common problem areas, solutions, and general observations
  - aesthetic conditions

(b) Soils in Stormwater Planters & Rain Gardens:

The following requirements apply:

- Test the pH of planting bed soils in areas where vegetation has died:
  - if the pH is below 5.2, apply limestone
  - if the pH is above 7.0, add iron sulfate plus sulfur to reduce the pH
- Use core aeration of unvegetated areas if the surface of the bed becomes clogged with fine sediments over time: redesign plantings to correct problems, and re-establish soil coverage

(c) Vegetation Management:

Vegetated stormwater facilities may require a number of control practices, especially during the 2-year establishment period. Corresponding required practices cover:

- Maintain plantings for a period of 2 years after date of the Building Consent final inspection
- During the establishment period, remove undesired vegetation with minimal (or preferably no) use of toxic herbicides and pesticides at least three times in year 1, and once or twice in the summer of year 2; replace plants that die during this period within 3 months
- At the end of the second year, healthy plant establishment shall be achieved for at least 90% of the vegetation
- Selectively irrigate if necessary during the establishment period, during times of drought, or until the vegetation becomes established: it is preferred that the facility be designed to sustain its function without a permanent irrigation system
- Replenish mulch at least annually, and specify the mulching schedule in the O&M Plan; noting also that mulching shall be done to retain topsoil, heat, and moisture, and to inhibit weed growth
- Schedule maintenance outside sensitive wildlife and vegetation seasons
- Minimise plant disturbance during maintenance activities
- Do not use fertilisers, herbicides, or pesticides for vegetation maintenance, unless it is specifically called for in the O&M Plan
- Use replacement plants that conform with the initial planting plan

(d) Sediment Management/Pollutant Control:

Sediment and other pollutants that degrade water quality will accumulate in OSM devices and require removal to ensure proper operational performance. Corresponding requirements cover:

- Remove sediment when accumulations reach 100 mm in depth, or 50% of the designed sediment storage depth, or if sediment accumulation inhibits facility operation
- Dispose of the sediment in a safe manner
- If sediment and/or other pollutants are accumulating more rapidly than assumed when the O&M Plan was formulated, investigate and rectify the cause

(e) Access and Safety:

O&M programmes must provide for safe and efficient access to a facility. The following are general requirements; specific conditions may require site-specific modifications:

- Secure easements necessary to provide facility and maintenance access (if applicable)
- Use only suitably trained personnel to access confined spaces
- Maintain ingress/egress routes to design standards, in a manner that allows efficient maintenance of the facility
- Ensure that fencing is in good repair

**FORM "OSM-O&M-CERT"**

**(A) SITE & OSM DEVICE DETAILS:**

Site Address: \_\_\_\_\_

Owners Name: \_\_\_\_\_

Device(s):	Ref. No	Type	Size	Date Installed
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

**(B) MAINTENANCE CONTRACTOR'S DETAILS:**

Firms Name: \_\_\_\_\_

Firms Address: \_\_\_\_\_

Name of Serviceperson: \_\_\_\_\_

Date(s) of Service: \_\_\_\_\_

**(C) SERVICE DETAILS:**

Device Ref No	Checklist Completed*	MAINTENANCE ACTION	
		Item	Action (describe, eg "pipe replaced")
1		(a) _____	_____
		(b) _____	_____
		(c) _____	_____
		(d) _____	_____
2		(a) _____	_____
		(b) _____	_____
		(c) _____	_____
		(d) _____	_____
3		etc....(continue on a separate sheet)	

\* on attached form "Device-Specific O&M Details"

**(D) CERTIFICATION:**

I/we hereby certify that:

- The OSM device inspection and maintenance programme has been undertaken in accordance with the provision of Section 11 of the City's "OSM Manual" dated 2002
- The details above and on the attached form(s) are a full and correct record of the work performed
- The OSM device(s) are in sound working order
- The owner has been advised of the problems found (if any) and alerted as to the need to inspect for any recurrences and rectify such promptly

\_\_\_\_\_  
**Signed**

\_\_\_\_\_  
**Date**

**ACE Office Use:**

Reference No. \_\_\_\_\_

Checked by: \_\_\_\_\_ Date: \_\_\_\_\_

Entered by: \_\_\_\_\_ Date: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM001"- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF ONEHUNGA SOAKHOLE**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF ONEHUNGA SOAKHOLE**

The Onehunga soakhole is a scoria filled pit that has a cavity constructed from either concrete or brick, called the "main chamber". The scoria filled part is covered with at least 300mm of soil, but the main chamber normally extends to the surface with a steel lid to allow access. Rainwater enters the main chamber through pipes, and then seeps away into the ground.

**(B) OPERATIONAL POINTS**

- The main chamber provides storage space, and helps catch silt and dirt that would otherwise travel into the scoria filled pit. While cleaning the chamber is an added expense, it will increase the lifetime of the soakage device.
- The soakhole should be empty 24 hours after a storm event. This can be checked by observing the water level in the main chamber.
- Any site runoff (from paved areas) feeding to the soakhole must first pass through a pre-treatment device. Maintenance of the pre-treatment device is covered under a separate O&M form, which also covers maintenance of any catchpits or stormwater pipes feeding to the pre-treatment device.

- Roof runoff flows through a separate smaller chamber before entering the main chamber (does not apply to soakholes installed prior to 2003). The small chamber will be connected to the pipework between the spouting and the soakhole.

**(C) GENERAL O&M NEEDS**

- Maintenance of flow through the spouting and downpipe system.
- Removal of leaves and sediment from the small chamber.
- Removal of accumulated sediment from the main chamber.
- Checking the soakage capacity of the soakhole.

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an "OSM-O&M Cert" form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM001"- PAGE 2 OF 2**  
**CHECKLIST – ONEHUNGA SOAKHOLE**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
√	√	√	√	<b>Spouting, downpipes and small chamber:</b> <ul style="list-style-type: none"> <li>• Check for debris accumulation, blockages and leaks.</li> <li>• Remove waste material and maintain as necessary.</li> </ul>	
			√	<b>Soakhole and main chamber:</b> <ul style="list-style-type: none"> <li>• Check sediment level in chamber. Keeping sediment depths below 300mm will help extend the life of the soakhole.</li> <li>• Remove sediment as necessary. This is best achieved using an air vacuum system, and should be carried out at least every 4 years on commercial sites or 6 years on residential sites.</li> <li>• Check the water level in the chamber. Providing there has been no heavy rainfall for 24 hours, the chamber should be dry. If there is standing water in the soakhole, it should be repaired or replaced.</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM002"- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF FILTERSTRIP SOAKHOLE**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF FILTERSTRIP SOAKHOLE**

The Filterstrip soakhole is a rock filled pit that extends to the surface. There is 200mm of clean gravel or river rock on the top of the soakhole, followed by a filter fabric layer and then a scoria layer extending to the base. The soakhole also has an observation well, and this should be visible on the surface.

Rainwater from paved areas first flows over a grass filterstrip before entering the soakhole through the gravel or river rock layer. If the soakhole accepts rainwater from roof areas, this will be piped to a small chamber (for litter removal) then directly into the soakhole.

**(B) OPERATIONAL POINTS**

- The soakhole should be empty 24 hours after a storm event. This can be checked by observing the water level in the observation well.
- Maintenance of the filterstrip is covered under a separate O&M form.

**(C) GENERAL O&M NEEDS**

- Removal of debris and sediment from the top of the soakhole.
- Checking the soakage capacity of the soakhole.
- Maintenance of flow through the spouting, downpipe system and small chamber (if roof areas are connected).

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an "OSM-O&M Cert" form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM002"- PAGE 2 OF 2**  
**CHECKLIST – FILTERSTRIP SOAKHOLE**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
	√	√	√	<b>Spouting, downpipes and small chamber:</b> <ul style="list-style-type: none"> <li>• Check for debris accumulation, blockages and leaks.</li> <li>• Check that the overflow is not obstructed.</li> <li>• Carry out maintenance as necessary.</li> </ul>	
		√	√	<b>Soakhole:</b> <ul style="list-style-type: none"> <li>• Check for debris and sediment accumulation.</li> <li>• Remove debris and sediment as necessary.</li> </ul>	
			√	<b>Soakhole:</b> <ul style="list-style-type: none"> <li>• Check the water level in the inspection well. Providing there has been no heavy rainfall for 24 hours, the inspection well should be dry.</li> <li>• If there is standing water in the soakhole it should be repaired or replaced.</li> <li>• Remove top 200mm of stones to check filter fabric layer and sediment build up in stones.</li> <li>• Remove sediment and replace filter fabric as necessary.</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM “DEVICE SPECIFIC O&M DETAIL SM003”- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF RAINGARDEN FOR SOAKAGE**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF RAINGARDEN**

Raingardens are scoria filled pits covered with a layer of sand and a thick layer of sandy soil (500mm or more). The sandy soil is planted with suitable plants, and rainwater from paved areas is directed onto the surface. The rainwater percolates down through the sandy soil layer to the scoria, and contaminants are filtered out in the process.

Raingardens for soakage have a large scoria layer in the base and function both as a pre-treatment and soakage device. An overflow is provided so that the sandy soil layer can be by-passed during large storm events. The overflow is a standard concrete or plastic catchpit.

**(B) OPERATIONAL POINTS**

- The plants growing in the sandy soil are a key part of the raingarden operation. They remove contaminants and help maintain the permeability of the soil.
- When the flow of water onto the raingarden exceeds the amount that can drain away through the soil, water will begin to pond. When the ponding exceeds a depth of 100 to 200 mm, water will begin to flow through the catchpit overflow.
- The catchpit pipes the water directly into the scoria layer at the base of the soakhole.

- The raingarden should be empty 24 hours after a storm event. This can be checked by observing the water level in the observation well.
- The raingarden may accept roof runoff. The roof runoff is piped directly to the scoria layer and bypasses the soil.
- Roof runoff normally flows through a small chamber before being piped directly into the scoria. The small chamber will be connected to the pipework between the spouting and the soakhole.

**(C) GENERAL O&M NEEDS**

- Maintenance of flow to the soil layer.
- Maintenance of flow through the spouting, downpipe system and small chamber (if roof areas are connected).
- Maintenance of vegetation.
- Removal of debris and sediment from the top of the raingarden.
- Checking the soakage capacity of the raingarden.

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an “OSM-O&M Cert” form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form “OSM-O&M-Plan”): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM003"- PAGE 2 OF 2**  
**CHECKLIST-RAINGARDEN FOR SOAKAGE**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
√	√	√	√	<b>Spouting, downpipes and small chamber (for litter removal):</b> <ul style="list-style-type: none"> <li>• Check for debris accumulation, blockages and leaks.</li> <li>• Check that the catchpit overflow is not obstructed.</li> <li>• Carry out maintenance as necessary.</li> </ul>	
		√	√	<b>Catchpit (for overflow):</b> <ul style="list-style-type: none"> <li>• Remove leaves and debris</li> </ul>	
		√	√	<b>Vegetation:</b> <ul style="list-style-type: none"> <li>• Add mulch and fertiliser as necessary.</li> <li>• Remove leaves, debris and weeds.</li> <li>• Replace dying plants.</li> </ul>	
			√	<b>Soil and Scoria layers:</b> <ul style="list-style-type: none"> <li>• Check that the soil layer is draining adequately. If water ponds for longer than 24 hours, the soil layer is clogged and maintenance will need to be carried out.</li> <li>• Maintenance of the soil layer involves removing sediment that is clogging the layer. This may involve removing plants and removing clogged soil layers. Following the maintenance, the soil layers and plants should be restored to original conditions.</li> <li>• Check the water level in the inspection well. Providing there has been no heavy rainfall for 24 hours, the inspection well should be dry.</li> <li>• If there is standing water in the inspection well, the scoria layer may require rehabilitation.</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM004"- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF RAINGARDEN FOR PRETREATMENT**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF RAINGARDEN**

Raingardens are scoria filled pits covered with a layer of sand and a thick layer of sandy soil (500mm or more). The sandy soil is planted with suitable plants, and rainwater from paved areas is directed onto the surface. The rainwater percolates down through the soil layer to the scoria, and contaminants are filtered out in the process.

Raingardens for pre-treatment have only a shallow scoria layer in the base, and may have an underflow connected to a soakhole. There will also be an overflow to carry rainwater directly to the soakhole during large storm events. The overflow is a standard concrete or plastic catchpit.

**(B) OPERATIONAL POINTS**

- The plants growing in the sandy soil are a key part of the raingarden operation. They remove contaminants and help maintain the permeability of the soil.
- When the flow of water onto the raingarden exceeds the amount that can drain away through the soil, water will begin to pond. When the ponding exceeds a maximum depth of 100 to 200 mm, water will begin to flow through the overflow.
- The overflow will pipe the water to a separate soakhole.

- The raingarden should be empty 24 hours after a storm event. This can be checked by observing the water level in the observation well.

**(C) GENERAL O&M NEEDS**

- Maintenance of flow to the soil layer.
- Maintenance of vegetation (including removal of undesirable vegetation).
- Removal of debris and sediment from the top of the raingarden.
- Checking the flow out the base of the raingarden (this is either soakage into surrounding soils or flow to a soakhole via an underdrain).

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an "OSM-O&M Cert" form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM004"- PAGE 2 OF 2**  
**CHECKLIST – RAINGARDEN FOR PRETREATMENT**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
	√	√	√	<b>Catchpit (for overflow):</b> <ul style="list-style-type: none"> <li>Remove leaves and debris.</li> </ul>	
	√	√	√	<b>Vegetation:</b> <ul style="list-style-type: none"> <li>Add mulch as necessary.</li> <li>Fertilise if required, and remove weeds.</li> <li>Remove leaves and debris.</li> <li>Replace dying plants.</li> </ul>	
			√	<b>Soil and Scoria layers:</b> <ul style="list-style-type: none"> <li>Check that the soil layer is draining adequately. If water ponds for longer than 24 hours, the soil layer is clogged and maintenance will need to be carried out.</li> <li>Maintenance of the soil layer involves removing sediment that is clogging the layer. This may involve removing plants and removing clogged soil layers. Following the maintenance, the soil layers and plants should be restored to original conditions.</li> <li>Check the water level in the inspection well. Providing there has been no heavy rainfall for 24 hours, the inspection well should be dry.</li> <li>If there is standing water in the inspection well, the scoria layer may require rehabilitation.</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM “DEVICE SPECIFIC O&M DETAIL SM005”- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF ROCKBORE SOAKHOLE**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF ROCKBORE SOAKHOLE**

The rockbore soakhole is a concrete chamber with a borehole extending down into fractured rock beneath the chamber. The chamber normally extends to the surface with a steel lid to allow access. The top of the borehole is lined with a PVC liner that ends in syphon or a coil of perforated pipe. Rainwater is piped into the concrete chamber, and flows into the borehole through the syphon or perforated pipe.

**(B) OPERATIONAL POINTS**

- Any site runoff (from paved areas) feeding to the soakhole will first pass through a pre-treatment device, such as a raingarden or a sandfilter. Maintenance of the pre-treatment device will be covered under a separate O&M form, and this will also cover maintenance of any catchpits or stormwater pipes feeding to the pre-treatment device.
- Roof runoff flows through a small chamber before entering the soakhole (does not apply to soakholes installed prior to 2003). The small chamber will be connected to the pipework between the spouting and the soakhole.

**(C) GENERAL O&M NEEDS**

- Maintenance of flow through the spouting and downpipe system.
- Removal of leaves and sediment from the small chamber.
- Removal of accumulated sediment from the soakage chamber.
- Cleaning of the rockbore soakage surface.
- Checking the soakage capacity of the soakhole.

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an “OSM-O&M Cert” form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form “OSM-O&M-Plan”): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM005"- PAGE 2 OF 2**  
**CHECKLIST – ROCKBORE SOAKHOLE**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
√	√	√	√	<b>Spouting, downpipes and small chamber:</b> <ul style="list-style-type: none"> <li>• Check for debris accumulation, blockages and leaks.</li> <li>• Remove waste material and maintain as necessary.</li> </ul>	
			√	<b>Rockbore and soakage chamber:</b> <ul style="list-style-type: none"> <li>• If chamber is dry, remove sediment manually (eg using a shovel and bucket).</li> <li>• If chamber is wet, remove sediment using an air-vacuum system.</li> <li>• Check syphon or perforated pipe for clogging and correct operation. Clean and repair as necessary.</li> <li>• Remove borehole cap (if present) and check borehole is dry.</li> <li>• Carry out rockbore cleaning as required and at least every 4 years on commercial sites and 6 years on residential sites (process detailed below).</li> </ul> <hr style="border-top: 1px dashed black;"/> <b>Rockbore cleaning:</b> <ul style="list-style-type: none"> <li>• Remove accumulated sediment from borehole using an air-vacuum system.</li> <li>• Hydro-blast borehole.</li> <li>• Use the air vacuum system to remove sediment loosened by hydroblasting.</li> <li>• Check that rockbore is draining correctly (if not, it may require replacement).</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM006"- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF POROUS PAVING**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF POROUS PAVING**

Porous paving is a permeable paving surface covering a layer of gravel or no-fines concrete. Rain falling on the porous paving percolates through the paving surface, is temporarily stored in the gravel or no-fines concrete, and then seeps away into the ground. There is a layer of filter sand underneath the paving, and this helps filter out any contaminants in the rainwater. There is an observation well extending down into the gravel layer (normally installed beneath a plastic or metal cover).

**(B) OPERATIONAL POINTS**

- The gravel layer should be dry 24 hours after a storm event. This can be checked by observing the water level in the observation well.
- The porous paving can only accept runoff from grassed areas, not other paved areas paved with conventional paving.

**(C) GENERAL O&M NEEDS**

- Maintenance of plants overhanging the paving surface.
- Removal of debris and sediment from the permeable paving surface.
- Removal of debris and sediment from the overflow.
- Checking the soakage capacity of the gravel or no-fines concrete layer.

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an "OSM-O&M Cert" form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM006"- PAGE 2 OF 2**  
**CHECKLIST – POROUS PAVING**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
	√	√	√	<b>Paving Surface:</b> <ul style="list-style-type: none"> <li>Remove debris and sweep, vacuum or mechanically brush surface as appropriate.</li> </ul>	
			√	<b>Paving Drainage:</b> <ul style="list-style-type: none"> <li>Check that paving is draining adequately, with no ponding on the surface.</li> <li>Testing may be required to show that the pavement structure has a minimum permeability of <math>2.4 \times 10^{-5}</math> m/s.</li> <li>If necessary, lift paving and replace sand layer.</li> </ul>	
			√	<b>Gravel/ no-fines concrete layer:</b> <ul style="list-style-type: none"> <li>Check the water level in the inspection well. Providing there has been no heavy rainfall for 24 hours, the inspection well should be dry.</li> <li>If there is standing water in the layer, it will need to be dug up and rehabilitated or replaced</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM007"- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF SAND FILTER**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF SAND FILTER**

Sand filters are designed to treat site runoff. They are normally concrete structures installed below ground and have a sedimentation chamber and a chamber filled with filter sand. Rainwater from paved areas flows into the sedimentation chamber and then passes through the filter sand. Both the sedimentation chamber and the filter sand remove contaminants.

**(B) OPERATIONAL POINTS**

- Sand filters have an overflow so that the sand layer is bypassed during large storm events. This means that if the sand filter becomes clogged (due to poor maintenance), the overflow will operate continuously and there will be no treatment of the stormwater
- Rainwater passing through the sand layer is called the underflow. Both overflow and underflow are normally piped to the formal stormwater system in the same pipe.

The filtration chamber should be empty 24 hours after a storm event. This can be checked by manually observing the water level in filtration chamber

(note that it is normal for the sedimentation chamber to remain full of water).

**(C) GENERAL O&M NEEDS**

- Maintenance of flow to the sandfilter
- Replacing clogged sand layers
- Removing debris and sediment

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an "OSM-O&M Cert" form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM007"- PAGE 2 OF 2**  
**CHECKLIST – SAND FILTER**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
	√	√	√	<b>Catchpit:</b> check for debris accumulation, blockages, leaks, etc & rectify	
		√	√	<b>Filter chamber:</b> <ul style="list-style-type: none"> <li>Inspect for clogging with sediment.</li> <li>Rake sediment from the sand surface and remove.</li> <li>Remove clogged/dicoloured sand, using a flat-bottomed shovel.</li> <li>Add new sand if sand depth is less than 400 mm.</li> </ul>	
			√	<b>Concrete structures:</b> <ul style="list-style-type: none"> <li>Check for structural deficiencies, leaks, etc &amp; rectify.</li> </ul>	
		√	√	<b>Sedimentation chamber:</b> <ul style="list-style-type: none"> <li>Inspect the sediment level in the chamber - if sediments are within 100 mm of the sand layer in the filter chamber, or if the flow is obstructed in any way, the maintenance interval should be reduced.</li> <li>Remove sediment as detailed below. This must be carried out at least every 4 years.</li> </ul> <hr/> <b>Sedimentation chamber cleaning:</b> <ul style="list-style-type: none"> <li>Remove sediment using a vacuum system and suck chamber clean.</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM “DEVICE SPECIFIC O&M DETAIL SM008”- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF SWALE OR FILTER STRIP**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF SWALE / FILTER STRIP**

Swales and filter strips are open channels, generally grassed, that act as stormwater treatment devices. The swale is longer and narrower and may have a gravel base. These devices remove contaminants by slowing flows and allowing particles to settle out.

**(B) OPERATIONAL POINTS**

- Filter strips are often preceded by a spreader device (such as a gravel filled pit) to create sheet flow of rainwater. Alternatively, impervious areas may be designed to drain evenly onto the filter strip.
- Grassed swales or filter strips are designed to operate with a grass length of 50 mm to 150 mm - it is important that the grass length is kept within this range.

**(C) GENERAL O&M NEEDS**

- Removal of debris and sediment from the swale or filter strip and its inlet/outlet
- Rectification of erosion
- Care of grass, including watering, mowing, fertilising and weed removal
- Care of gravel check-dams (applies to swales only)
- Maintenance of correct slope

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an “OSM-O&M Cert” form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form “OSM-O&M-Plan”): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM008"- PAGE 2 OF 2**  
**CHECKLIST – SWALE OR FILTER STRIP**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
	√	√	√	<b>General:</b> Remove any debris accumulations and waste vegetation	
	√	√	√	<b>Inlets &amp; outlets:</b> remove sediment	
√	√	√		<b>Grass:</b> mow (with catcher) to maintain grass length 50 – 150 mm	
	√	√	√	<b>Grass:</b> <ul style="list-style-type: none"> <li>• remove nuisance weeds</li> <li>• fertilise or treat to maintain vigorous growth, as required</li> <li>• fill any erosion holes &amp; re-seed</li> </ul>	
	√	√	√	<b>Gravel (gravel-bed swale &amp; check-dams only):</b> rectify any erosion holes and/or check-dam damage (with larger stones)	
		√	√	<b>Flow spreader (filter strip only):</b> <ul style="list-style-type: none"> <li>• remove sediment</li> <li>• replace aggregate if necessary</li> </ul>	
			√	<b>Flow spreader (filter strip only):</b> <ul style="list-style-type: none"> <li>• check alignment &amp; re-level if necessary</li> </ul>	
	√	√	√	<b>Pipework (if any):</b> check for debris/blockages/leaks & rectify	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM “DEVICE SPECIFIC O&M DETAIL SM009”- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF RAINWATER TANK**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF RAINWATER TANK**

Rainwater tanks can be constructed in concrete, steel, plastic or fibreglass. The tank is fed from roof runoff and comprises two “zones”, namely:

- “Temporary Storage” (or “air space”):
  - the upper part of the tank, dedicated to retaining runoff in short duration, high intensity storm events
  - has an orifice outlet at the bottom (i.e. this defines the interface between the temporary and permanent storage zones); this serves to “throttle” the flow
  - has an overflow at the top of the tank, connected to the City’s stormwater system
- “Permanent Storage” (or “rainwater space”):
  - the bottom portion, dedicated to storing water for re-use
  - **water can be plumbed to the dwelling for the following uses, but must not be used for drinking water:**
    - **toilet**
    - **outdoor use**
    - **cold water feed to the clothes washing machine (where the machine has a fixed connection to the cold water supply)**
  - to ensure continuity of supply in dry periods, it includes a mains connection for “topping-up” the storage

**(B) GENERAL O&M NEEDS**

Aside from routine inspections to identify and rectify minor problems, the main maintenance needs relate to:

- ensuring that there are no cracks/leaks in the tank, pipework, etc
- checking that the first-flush diverter is functioning properly
- checking the quality of the water in the tank is adequate for the re-use requirements to which it is put (eg check clarity, smell, etc)

Refer also to the additional information given in “Code of Practice—Private Rainwater Supplies” (this is reproduced in Appendix B of the OSM Manual [6]).

**(C) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an “OSM-O&M Cert” form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form “OSM-O&M-Plan”): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM009"- PAGE 2 OF 2**  
**CHECKLIST – RAINWATER TANK**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
√	√	√	√	<b>Spouting &amp; downpipes:</b> check for problems such as debris /blockages and leaks & rectify	
√	√	√	√	<b>First-flush diverter device:</b> check for blockages; empty debris/sediment	
	√	√	√	<b>Tank water quality:</b> check for clarity and odour	
	√	√	√	<b>Tank inlet/outlet pipework, orifice, float valve &amp; backflow preventer :</b> perform visual check for problems such as debris/blockages/leaks & rectify	
		√	√	<b>Tank structure:</b> check for leaks & rectify	
		√	√	<b>Pump &amp; electrical system:</b> check & carry out any necessary maintenance	
			√	<b>Float valve, backflow preventer &amp; first-flush device:</b> test for correct functioning; repair/replace where faulty or badly worn	
			√	<b>Tank water quality:</b> collect water sample (before emptying tank, as below), submit for testing & copy test results to ACE	
			√	<b>Tank cleaning :</b> empty the tank & clean out any sediment accumulations and growths	
			√	<b>Plumbing:</b> examine plumbing from the tank to the dwelling to check that tank water is not connected to any unauthorised taps/fixtures (refer list of suitable uses in B above); rectify any faults	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM010"- PAGE 1 OF 2**  
**OPERATION AND MAINTENANCE OF SCORIA TRENCH**

Note: One form required for each OSM device on a site

**(A) DESCRIPTION OF SCORIA TRENCH**

The scoria trench is a pre-treatment device to treat stormwater runoff from paved areas, and is essentially a trench filled with scoria. The trench may be topped with alternative material such as decorative rock, and will normally run along the down-slope edge of paved areas.

The scoria trench is not intended to function as a stand-alone soakage device, and will normally have an overflow connected to a separate soakhole. During small storms the stormwater will infiltrate through the base of the trench, but during large storms stormwater will be transferred to the soakhole.

**(B) OPERATIONAL POINTS**

- The trench has a layer of filter fabric beneath the top 200mm of drainage material. This is a design point of failure to keep the underlying stone clean, and the fabric will need regular inspection and eventual replacement.
- The top layer of stones (and filter fabric beneath) must be kept clean if the trench is to function correctly. If this layer becomes clogged, stormwater will not feed into the trench correctly and flooding may occur.

**(C) GENERAL O&M NEEDS**

- Removal of leaves and debris from the top of the trench.
- Inspection of the filter fabric layer and replacement when necessary.
- Checking the infiltration capacity of the trench.

**(D) RECORD KEEPING**

- Completed form must be submitted to ACE. For 2 yearly inspections, the form must be submitted with an "OSM-O&M Cert" form.
- A copy of the completed form (and any additional inspection records) is to be kept on-site and made available to the plumber/drainlayer.

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

Date Installed: \_\_\_\_\_

**FORM "DEVICE SPECIFIC O&M DETAIL SM010"- PAGE 2 OF 2**  
**CHECKLIST-SCORIA TRENCH**

Frequency				Action	Notes
After storm	Every 3 months	Every year	Every 2 years*		
√	√	√	√	<b>Surface of trench:</b> <ul style="list-style-type: none"> <li>Remove any debris or vegetation</li> </ul>	
			√	<b>Filter fabric layer and scoria:</b> <ul style="list-style-type: none"> <li>Inspect the top layer of stones and filter fabric surface. If clogging has occurred, remove the entire top layer and replace the filter fabric. Reinstall the stones, cleaning or using fresh material where necessary.</li> <li>Check the water level in the inspection well. Providing there has been no heavy rainfall for 24 hours, the chamber should be dry. If there is standing water in the well, the trench may need to be dug out and clogged layers replaced.</li> </ul>	

\* Plumber/Drainlayer Checklist

Plumber/Drainlayer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Reg Number: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Site Address: \_\_\_\_\_

Building Consent Number: \_\_\_\_\_

Reference Number (from Form "OSM-O&M-Plan"): \_\_\_\_\_

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