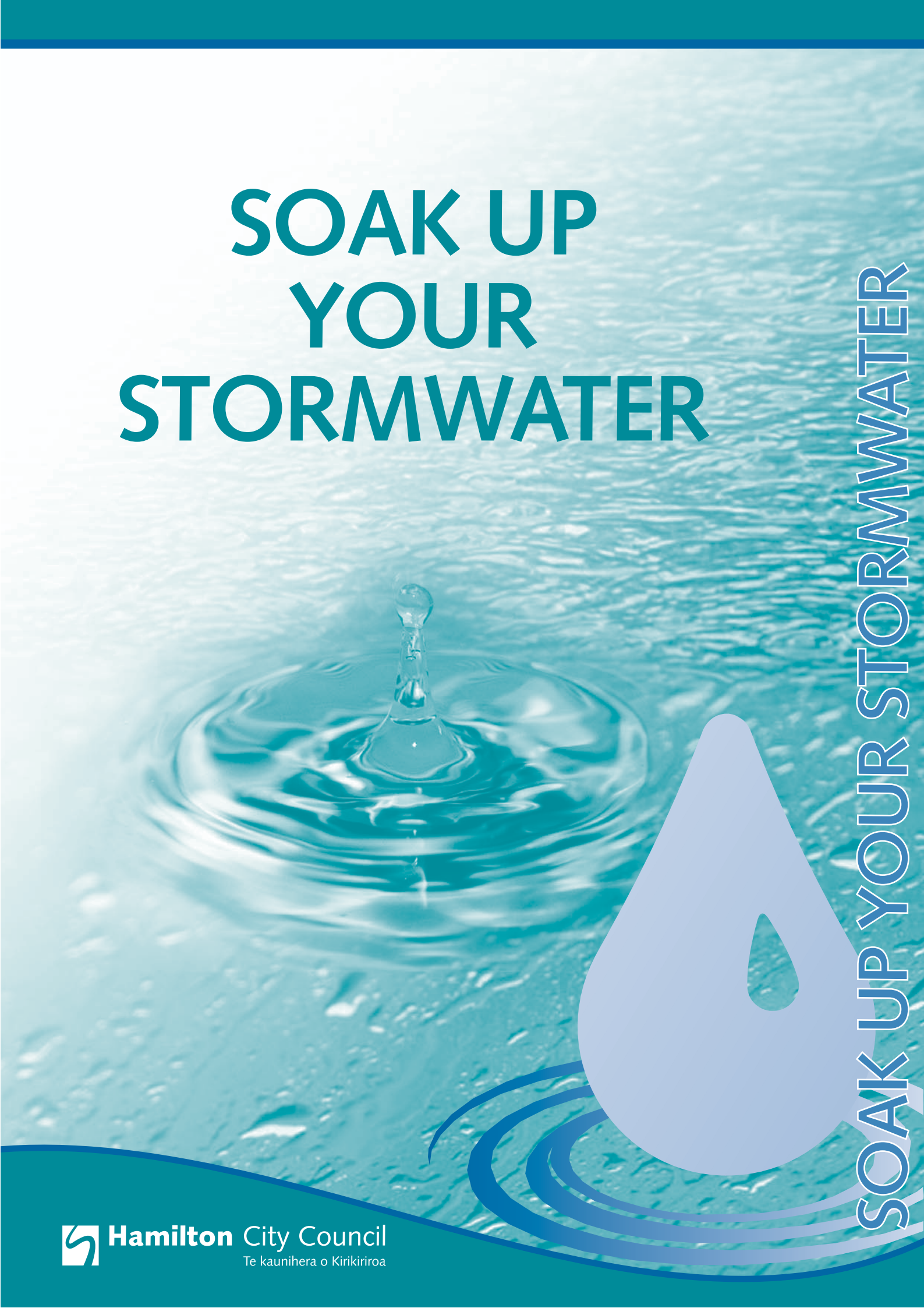
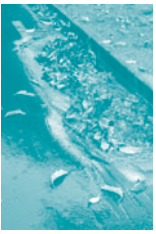
SOAK UP YOUR STORMWATER



SOAK UP YOUR STORMWATER

Hamilton City Council
Te kaunihera o Kirikiriroa



SOAK UP YOUR STORMWATER

This booklet explains how you can apply soakage on your property to achieve efficient disposal of stormwater.

The following information on soakage is intended as a guide only. All soakage device installations within Hamilton city boundaries require specific design and approval from Hamilton City Council's Building Control Unit.

Commonly-used terms

Building Code	Acceptable solutions and verification methods set out under the Building Code. For more information, contact Council's Building Control Unit on (07) 838 6677.
Infiltrate	Water soakage into the soil.
Impervious	A surface that water is not able to readily pass through.
Percolation Rate	The rate at which water is able to soak into the soil.
Pre-treatment	Cleaning of stormwater prior to entry into the soakpit.
Porous	A surface that water is able to pass through.
Soakage device	A mechanism designed to encourage water to infiltrate the soil.
Stormwater	Rainwater collected on impervious surfaces e.g. roofs, roads, driveways, paths and hard ground areas (also called runoff).

Background

What is soakage?

Soakage is the process of encouraging stormwater to soak into the ground via specially designed soakage devices. These devices are either soakpits or surface soakage features.

Soakpits provide volume for storage and soil area for stormwater to infiltrate the surrounding ground.

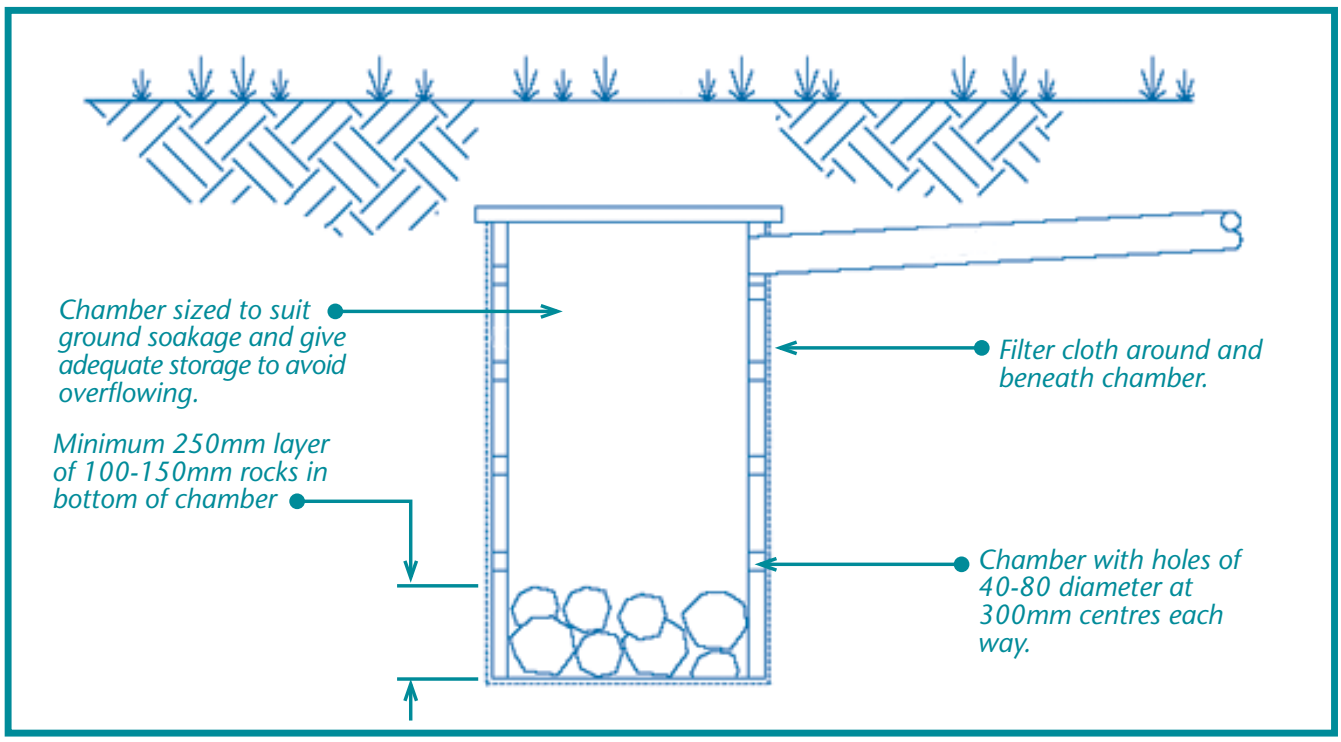
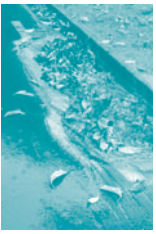


Figure 1 - TYPICAL CHAMBER SOAKPIT



How to make soakage devices work

The soakpit must be of sufficient size to provide adequate porous area for water to drain away at a suitable rate. It must also provide enough storage volume for stormwater in a storm event where the rate of water entering the soakpit is greater than the rate at which the water is able to infiltrate the soil.

It is also a good idea to make sure that the stormwater runoff is pre-treated. Pre-treatment uses a mechanism to incept stormwater before it enters a soakpit and remove debris that might clog and block the soakpit. This process includes a sand filter or filter sock. They are very effective in maintaining the intended soakage capacity and reduce frequency of regular maintenance.

Sandfilters can be easily installed. Materials required for a sandfilter are similar to those in **Surface Soakage Devices** (refer next page). An experienced drainlayer can provide you with more information.

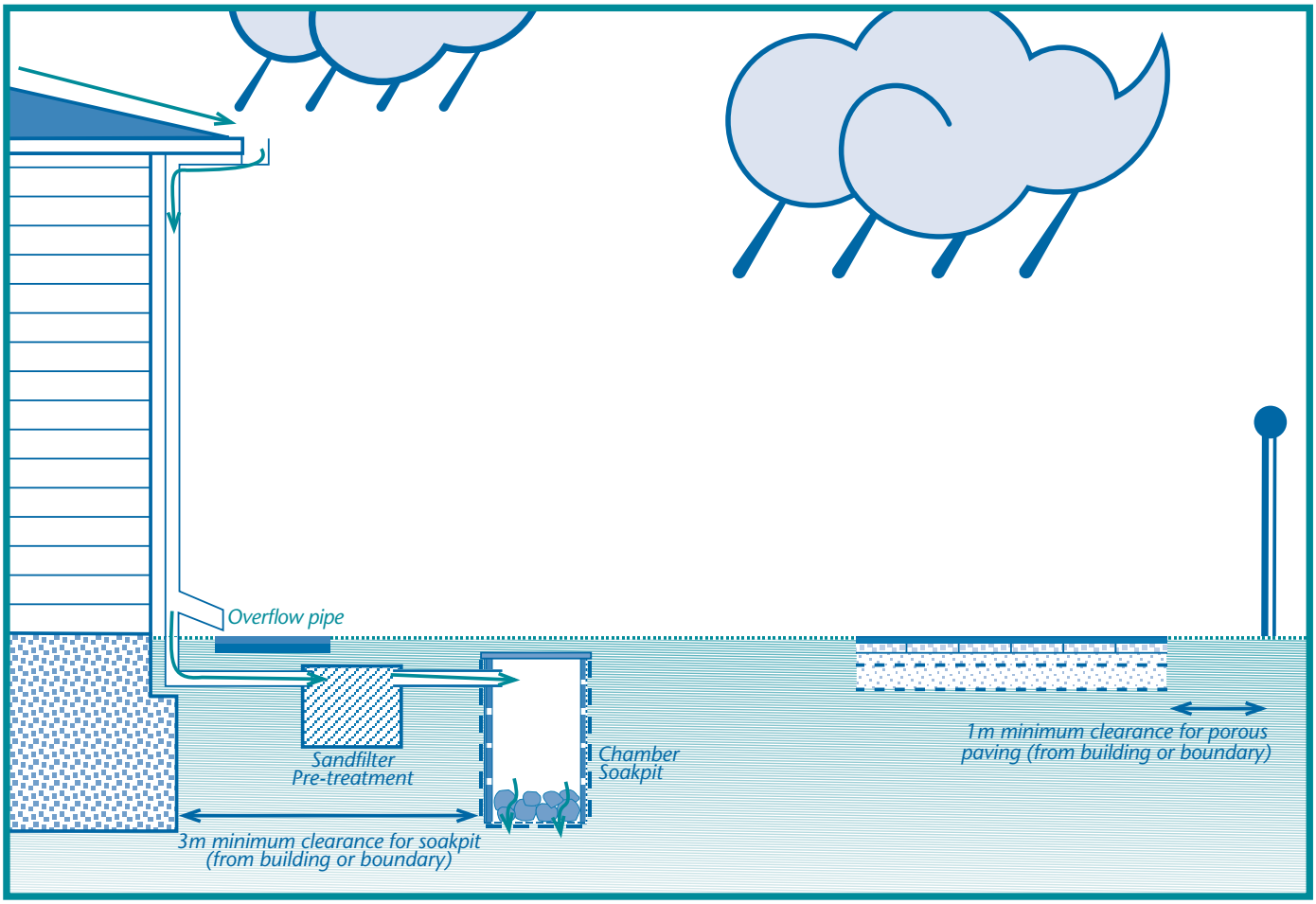


Figure 2 - TYPICAL RESIDENTIAL SOAKAGE SYSTEM

You can also use a surface soakage method to provide pre-treatment and interception of stormwater, allowing infiltration to the soil below.

The advantage of surface soakage devices is that they include pre-treatment before the stormwater infiltrates the ground. Their ability to provide water storage is dependent on their designed dimensions.

Surface Soakage Devices

Examples of surface soakage devices that may be considered are shown below:

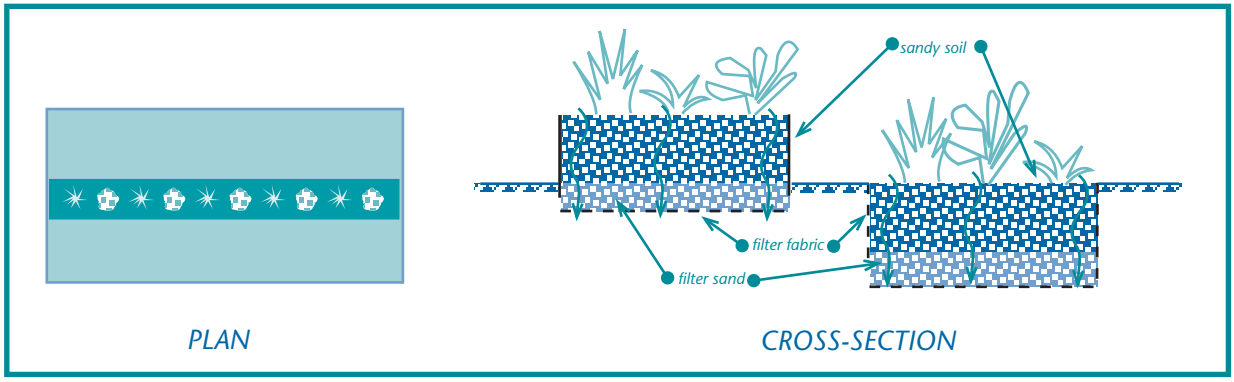


Figure 3 - RAIN GARDEN

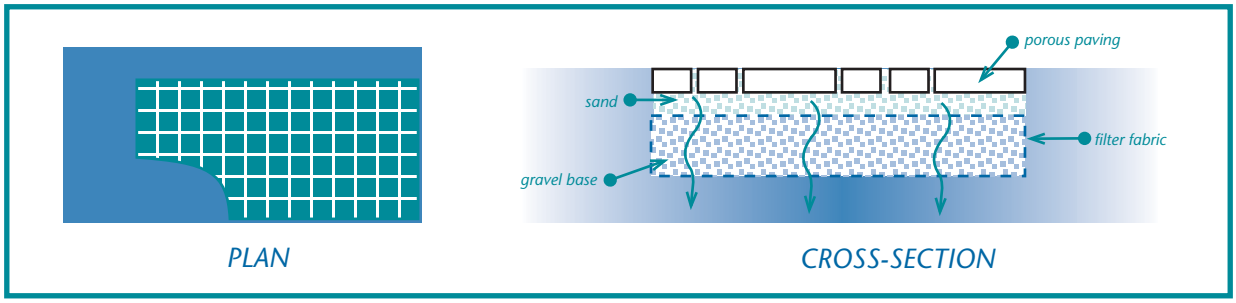


Figure 4 - POROUS PAVING

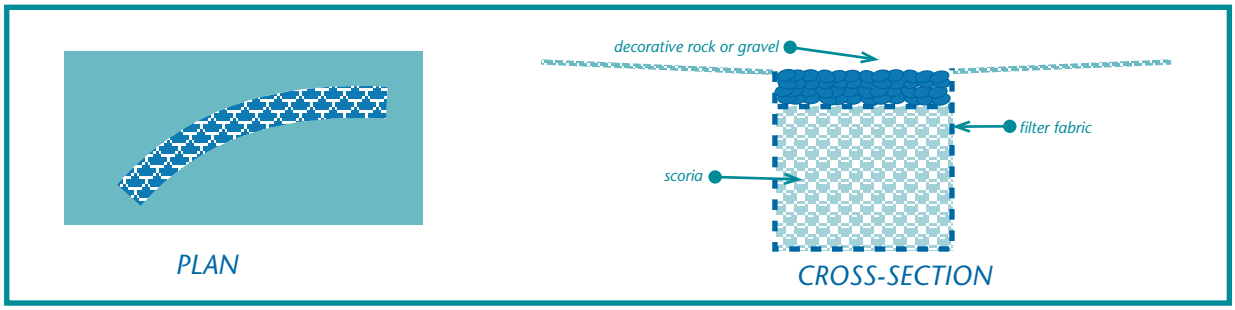


Figure 5 - FILTER STRIP

What do I need to consider for soakage on my property?

Location

Before examining soil conditions and sizing the soakpit, thought should be given to the possible location of a soakage device on your property. To gain an idea of an appropriate location consider the following points:

- Soakage devices should not be located within a stormwater secondary flow path or one-in-10 year flood plain. A one-in-50 year flood plain should also be avoided if possible. Hamilton City Council can provide you with information that shows whether your property lies in such a region.
- Soakage devices require maintenance so locate them in an accessible position.
- Generally, a soakage device should be at least 3m from any building or property boundary. This may be reduced to 1m for porous paving. If space restrictions mean this is not possible, professional site-specific design must also consider possible effects on your building's foundations and neighbouring properties.
- Clearance from retaining walls must be equal to the height of the wall plus 1.5m if the wall is 2m or less. If the retaining wall is greater than 2m, site-specific design will be required.
- For properties alongside waterways or in peat soils, professional consultation is advised. It is not recommended to place soakage devices near banks for stability reasons.
- Soakage devices must be at least 2m from wastewater pipes or manholes.
- The soakage device should ideally be located above the winter water table. This level should be confirmed by a soil test hole taken at the appropriate time of year.
- Position the soakage device so that all stormwater from the site can be directed to it.

For further information regarding a specific property, please contact Council's Building Control Unit regarding the points mentioned above.

Soil conditions

Depending on the location of your property, the soil condition can vary. The principal characteristics of the soil profile determine overall soil drainage capability.
This following table is a brief guide to soil soakage suitability. The information given in the table is based on Soil Survey Report 31 published by New Zealand Soil Bureau in 1979. Please refer to it for the legend of soil types.

To view the map, you can visit or contact Council's Building Control Unit phone: (07) 838 6677 or
Water and Waste Services Unit phone: (07) 838 6999.

Soil types in Hamilton city and their suitability for soakage

Please note that the soil map does not always provide an adequate level of detail for you to determine specific types of soil present on your property. To confirm soil type or suitability for soakage, you can follow the instruction given in this booklet to carry out a test. If in doubt, ask advice from a professional or a certified drainlayer. The cost of this should be minimal.

	SOIL TYPE* LEGEND ON MAP	SOIL TYPE/DESCRIPTION	OCCURRENCE	COMMENTS
UNSUITABLE	Kn	Kainui silt loam	Mainly in eastern part of city	Soil of the Low Rolling Hills
	Hm	Hamilton clay loam	Mainly in southern and western parts of the city	
	O	Ohaupo silt loam	Southern part of the city	
	Rk	Rotokauri clay loam	Small pockets all over the city	
	Rkv	Rotokauri clay loam, Very gently sloping phase	Small area near Dinsdale	
	K	Kaipaki peaty loam and loamy peat	Mainly west of the Waikato River	Soil of the plain
	V	Tamahana soils	Hinuera Terrace	Soils of Gully Bottoms
	Kk	Kirikiriroa complex	Waikato River flood plain	Soil of the Terrace Scarps and Gully Sides
SUBJECT TO SOIL TEST	Tk	Te Kowhai silt loam and clay loam	Mainly east of the Waikato River	Soil of the plain. Refer to your engineer and Building Code for test results.
	Tkp	Te Kowhai peaty clay loam	Near Ruakura	
	R	Rukuhia peat	Outskirts of the city west of Melville	
SUITABLE	H	Horotiu sandy loam	Mainly central city area and Hamilton East	Soil of the plain Generally suitable for soakage. **Initial site investigation is recommended.**
	Ha	Horotiu mottled sandy loam	Major areas between Kent Street, Frankton Railway and Bankwood	
	Hb	Horotiu sandy clay loam	Refer soil type H	
	Hs	Horotiu sand	Normally adjacent to soil type H	
	Hsg	Horotiu sand with gravels	Normally adjacent to soil type H	
	T	Te Rapa peaty loam	Frankton, Te Rapa and Ruakura	
	Tp	Te Rapa peaty sandy loam	Mainly west of Te Rapa	
	Ts	Te Rapa peaty sand	Near Sunshine Ave, west of the main trunk railway	
	Mh	Tamahere gravelly sand (on Horotiu soils)	Adjacent to Waikato river at Te Rapa, Chartwell. Smaller areas at Melville and south of Hillcrest	
	W	Waikato loamy sand, sand, and sandy loam	Adjacent to Waikato River	Soil of the low river terraces. Generally suitable for soakage. **Initial site investigation is recommended.**
	Mw	Tamahere gravelly sand (on Waikato soils)	Mainly near Chartwell and St Andrews	

Soil Tests

Soil tests are required to check that the soil on your property is capable of achieving the minimum percolation rate. A test for this is described in the Building Code part E1, which covers surface water. The test should be conducted by someone with the appropriate expertise such as a drainlayer or geotechnical professional.

A step-by-step guide to this test is available on the Department of Building and Housing website: *www.building.dhb.govt.nz*

Soakage is allowable if the percolation rate is 0.5 litres/min/m^2 to 1.0 litres/min/m^2

What if soakage is not appropriate for my property?

Soakage is **not appropriate** for your property if the percolation rate is less than **0.5 litres/min/m2.**

You should consult a professional or an experienced drainlayer to discuss alternatives. Professional findings and recommendations should be provided to Hamilton City Council for final approval of a feasible option.

Volume of soakage device required

The Building Code advises that soakage should be designed to accommodate a 60-minute storm of the size that might be expected once every 10 years. In Hamilton, this means a rainfall of 36mm over an hour.

What does this mean for a typical property?

Take a 350m^2 section with an average size house.

Use the Building Code method to calculate the stormwater runoff:

Volume of stormwater = Area m^2 *run-off coeffcient (C) * rainfall intensity (m/hr)

For residential areas in Hamilton city typically C=0.55, rainfall intensity is as described above. Therefore:

Stormwater volume = 350m^2 * 0.55 * 0.036m/hr = 6.93m^3

Across the whole section (considering the roof, driveways and paths) 6.93$m^3$of stormwater will be collected.

If it is assumed that negligible soakage occurs over the hour-long rainfall and storage is required for this total volume, this volume can be provided in multiple soakpits.

Example A - a 200m^2 house (include all roof, carport, sealed drive and any other paved surface)

Volume of stormwater = Area (m^2) *rainfall intensity (m/hr)

Stormwater collected 200m^2 x 0.036 = 7.20m^3

A standard 0.9m diameter, 1.8m deep can store = x $(0.9/2)^2$ π x 1.8 = 1.13m^3 water

Example B - a Single Garage or Sleep-out about 6m by 5m

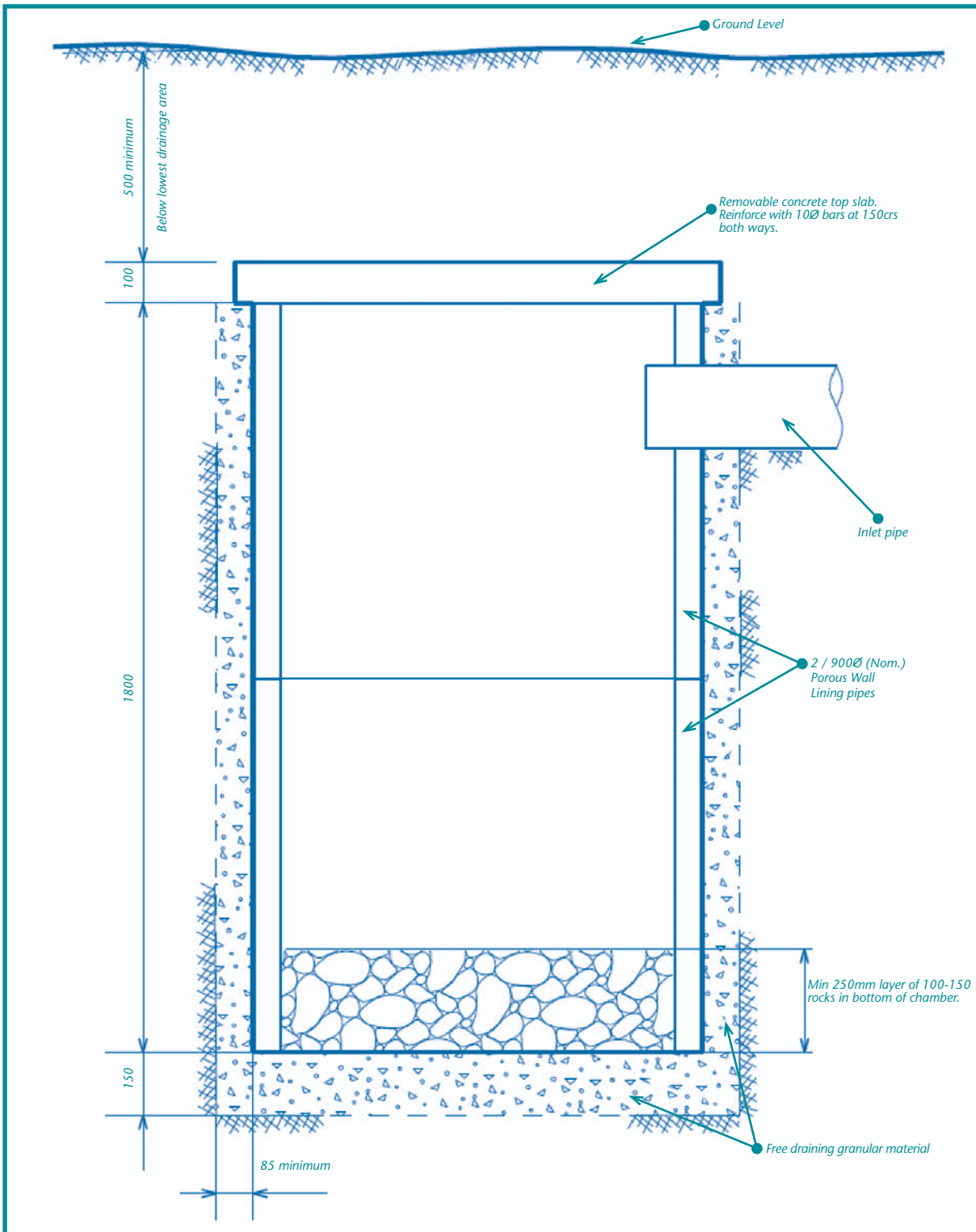
Stormwater collected 30m^2 x 0.036 m/hr = 1.08m of water

A standard 0.9m diameter, 1.8m deep can store = π x $(0.9/2)^2$ x 1.8 = 1.13m^3 water

Therefore:
Number of chambers needed = 1.08 / 1.13 $\approx$ 1 (of the type shown next page)

Both of these examples are conservative. When percolation rates have been determined, the soakpit volume may be reduced because some water will infiltrate the ground during the storm and there will be a smaller storage requirement. Professional consultants will account for this in site-specific design.

It may be appropriate in some cases to provide soakage for a separate area such as a garage independent of the property's main stormwater system. For a completely impervious area, the stormwater volume collected is simply the area multiplied by the rainfall intensity.



HAMILTON CITY COUNCIL
BUILDING CONTROL

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TYPICAL STORMWATER SOAKPIT

Approved:

Building Control Manager
Version: Oct. 05

NOTE:

- Suitable for up to a 40m^2 building with no consideration of ground percolation.
- *If building exceeds 40m^2 then 2x soakpits are required*
- Please read in conjunction with Stormwater Solutions for Hamilton City booklet.

Points to consider for soakage on your property

- You can decrease the soakpit volume required by converting impervious surfaces to soakage devices such as porous paving or filter strips. For surface soakage devices, the diagrams at the start of this booklet may be adapted to suit. Refer **Surface Soakage Devices.**

- Storage may also be provided above ground in some form. For example, an existing rainwater tank may be employed so that some of its volume is used for short-term stormwater storage that is subsequently released to soakage at a slower rate. This will decrease the volume of the underground device required.

- Think of other ways that you might be able to reduce the cost of your soakage installation. Perhaps an out-of-use septic tank (this will require expert inspection to verify suitability) or another existing feature might be converted to assist with storage and/or soakage.

Why is my soakage failing?

Soakage devices should be inspected every two years to check that they have not become clogged up with debris. If your soakage device is not working, this should be the first thing that is checked. Pay particular attention to the pipe work leading to the soakage device as this may be clogged independently of the device.

If a soakpit is clogged debris can, on occasion, be removed by vacuum pumping. Engage an experienced contractor with the appropriate equipment to perform this procedure. Alternatively, the soakpit may need to be re-excavated and the stone material replaced.

Do I need a building consent?

Your soakage device must be consented either as part of the whole site's building consent or as a separate building consent.

For details on building consents please contact Hamilton City Council's Building Control Unit phone: (07) 838 6677.

Where can I find more information?

Local consulting engineers and contractors should be able to provide advice and guidance on soakage appropriate to your property based on their technical knowledge of soakage devices they have previously specified for Hamilton city properties.

Consulting engineers are also able to provide site-specific design services appropriate in difficult locations and soil situations. If in doubt as to what is appropriate for your property, consultation with such professionals is advised. The Yellow Pages contain a comprehensive list of consulting engineers. For soakage design, talk to engineers with geotechnical capabilities and experience.