

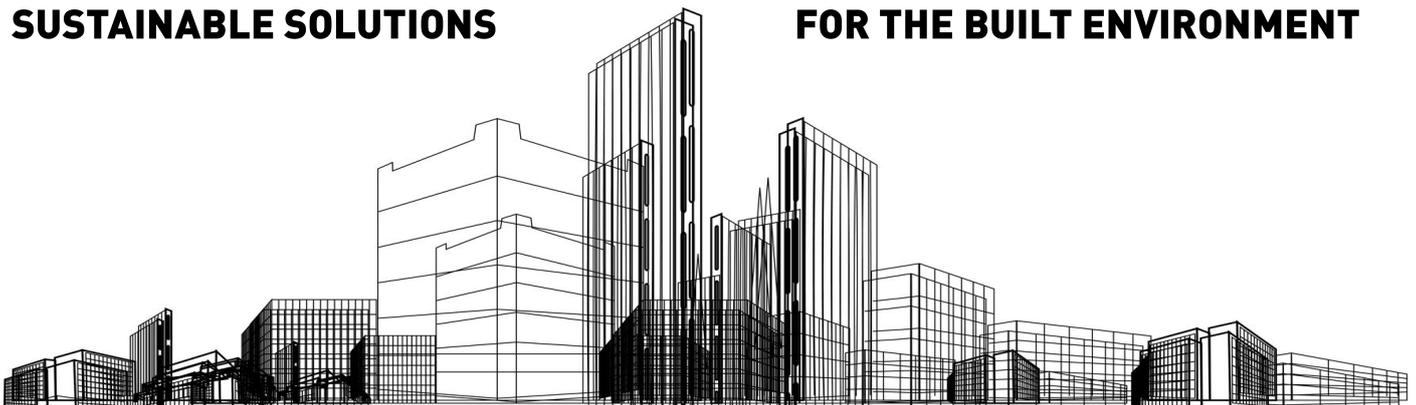
**OUR LADY OF THE IMMACULATE CONCEPTION SUNSHINE
PRIMARY SCHOOL**

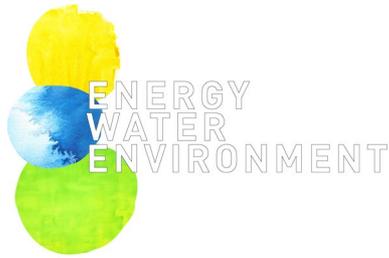
WATER SENSITIVE URBAN DESIGN REPORT V1-DRAFT

21ST JUNE, 2021

SUSTAINABLE SOLUTIONS

FOR THE BUILT ENVIRONMENT



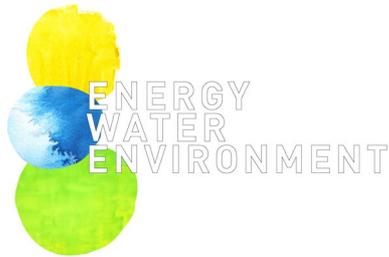


Date: 21/6/2021
Project Number: PJ526
Project Title: Our Lady of the Immaculate Conception
To: Gabrielle Lewis (Clarke Hopkins Clarke)
Brimbank City Council
From: Patrick Phelan

Document Title: Water Sensitive Urban Design Report Version 1

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Date: 21/6/2021
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Document Title: WSUD Version 1 - Draft

1. Introduction

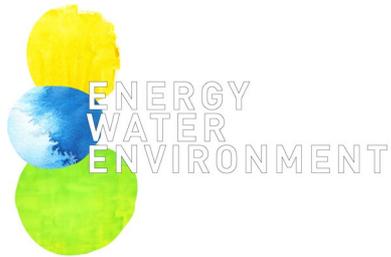
The purpose of this Water Sensitive Urban Design (WSUD) Report is to show the compliance of the Our Lady of the Immaculate Conception Sunshine Primary School development with Clause 53.18 Stormwater Management in Urban Development of the Brimbank Planning Scheme. Clause 53.18 stipulates that water sensitive urban design must be integrated into the proposed design and measured with an accepted WSUD performance measurement tool. The tool used to undertake the calculation for the Our Lady of the Immaculate Conception proposed design is Melbourne Water's STORM tool.

Brimbank City Council recognizes the importance of stormwater management and the effects on the surrounding environment. Part of the SMP includes addressing how the proposed development responds to the principles and requirements of Water Sensitive Urban Design (WSUD). The main objectives for WSUD are:

- To achieve the best practice water quality performance objectives as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999 (as amended). Currently, these water quality performance objectives are:
 - o Suspended Solids - 80% retention of typical urban annual load;
 - o Total Nitrogen - 45% retention of typical urban annual load;
 - o Total Phosphorus - 45% retention of typical urban annual load; and
 - o Litter - 70% reduction of typical urban annual load.
- To promote the use of water sensitive urban design, including stormwater re-use.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new developments.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.
- To reintegrate urban water into the landscape to facilitate a range of benefits including microclimate cooling, local habitat and provision of attractive spaces for community use and wellbeing.

2. Results

The minimum STORM rating for an effective WSUD is 100% using the STORM rating calculator. The STORM rating for the proposed Our Lady of the Immaculate Conception development is 101%. Refer to Appendix A for the STORM Rating Report which shows all inputs and the STORM Rating Score.

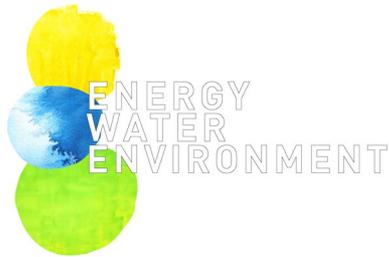


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The rating is achieved by the utilisation of a 9m² raingarden treating 740m² of the roof area and learning courts. Note that flow and detention requirements of Clause 53.18 are being undertaken by others. These are attached in Appendix C.

3. Conclusion

The proposed Our Lady of the Immaculate Conception development complies with Clause 53.18 by meeting the minimum STORM rating requirement of 100%. It achieves a STORM rating of 101% via the implementation of 9m² raingarden treating 740m² of the roof area and learning courts.



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Appendix A Stormwater Treatment Calculations and Requirements

A.1 STORM Rating Report

The Melbourne Water STORM Rating Tool report is shown below. Refer to architectural drawings for locations and sizes of raingardens.

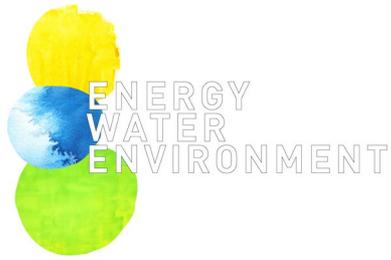


STORM Rating Report

TransactionID: 1139410
Municipality: BRIMBANK
Rainfall Station: BRIMBANK
Address: 32 Station Place

Sunshine
VIC 3020
Assessor: Patrick Phelan
Development Type: Other
Allotment Site (m2): 11,355.00
STORM Rating %: 101

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Roof Area and Learning Courts	740.00	Raingarden 100mm	9.00	0	117.75	0.00
Deck and Hard Surface Around Sandpit	126.00	None	0.00	0	0.00	0.00



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A.2 Treatment Areas

Total Catchment of roof and learning courts are shown on the attached drawings together with raingarden location.

BUILDING 4: MARY MACKILLOP CENTRE

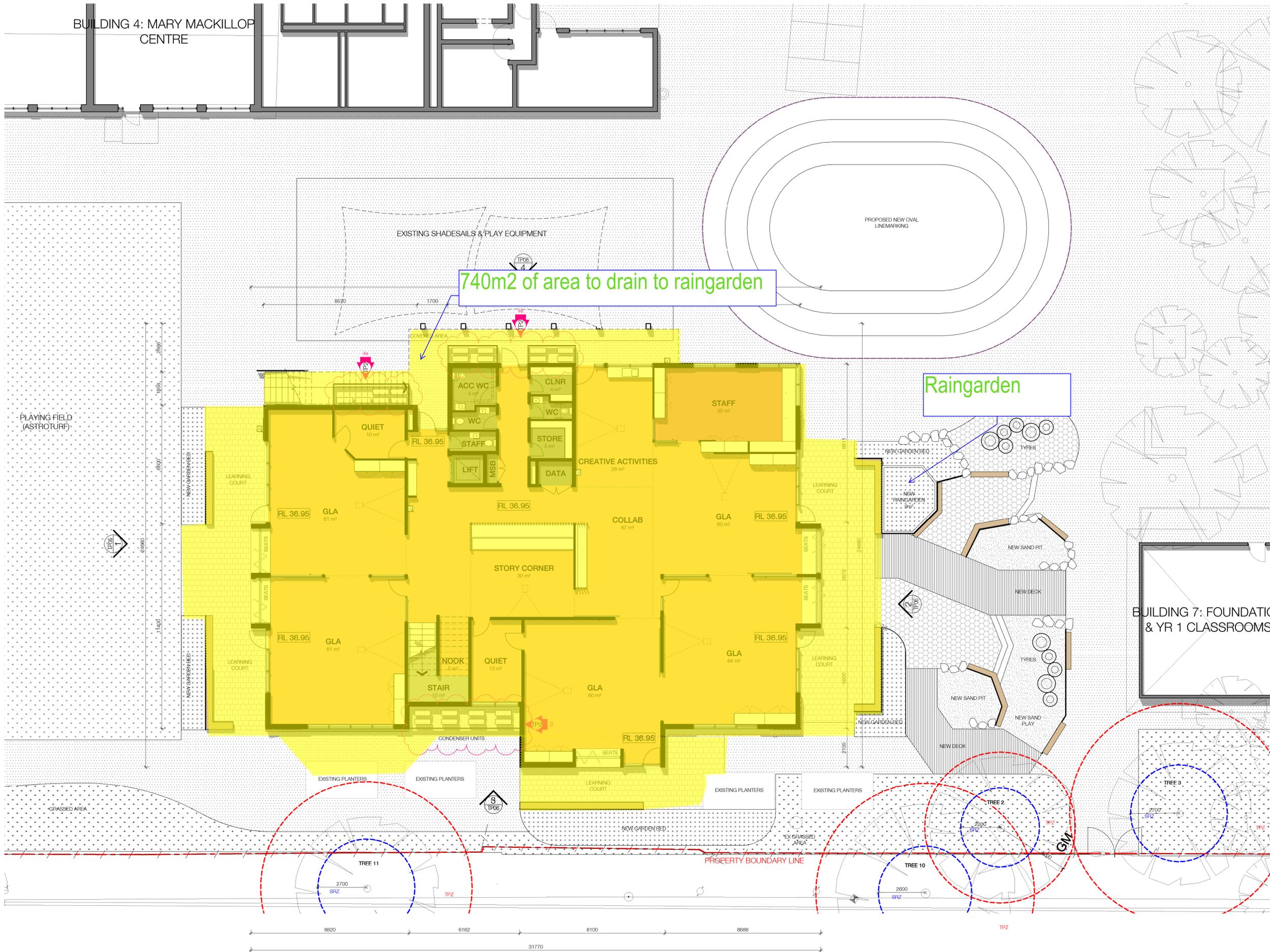
Legend -

- ASPHALT PAVING
- CONCRETE PAVING
- PAVING UNITS
- RUBBER SURFACE
- SANDPIT
- GARDEN BED AREA
- GRASSED AREA
- SYNTHETIC TURF
- FFL 79.40 FLOOR LEVEL

740m² of area to drain to raingarden

Raingarden

BUILDING 7: FOUNDATION & YR 1 CLASSROOMS



Revision/Issue	Date
TP1 Town Planning Application	30.04.2021
TP2 Town Planning RFI	02.08.2021

Clarke Hopkins Clarke
 Melbourne
 115 Sackville Street
 Collingwood Victoria 3066
 Telephone (03) 94119 4340
 Email studio@chc.com.au
 www.chc.com.au

Sydney
 3/78 Campbell Street
 Surry Hills NSW 2010
 Telephone (02) 9221 9200
 Email studio@chc.com.au
 www.chc.com.au

Scale	Date	Drawn	Architect
As indicated @ A1	January 2021	W.L.	S.L.

Project
 Our Lady of the Immaculate Conception Sunshine
 Primary School, 32 Station Place, Sunshine

Drawing
 Proposed Ground Floor Plan

Drawing No.
 200174/TP03 TP2

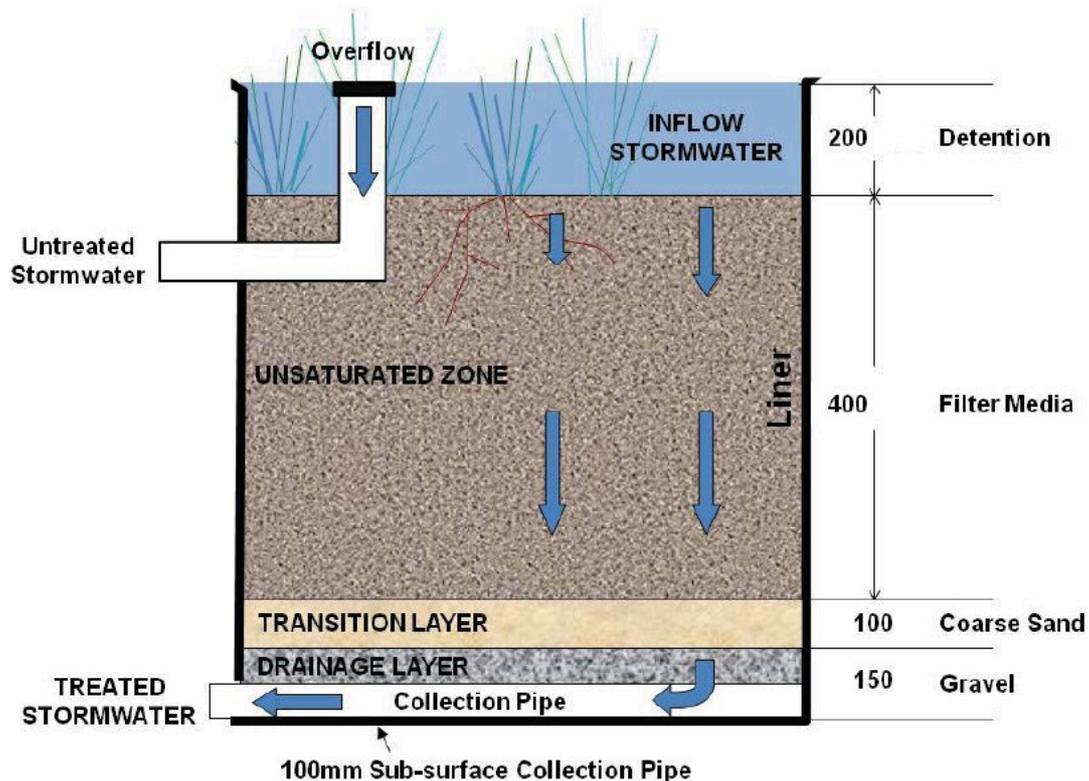
TOWN PLANNING

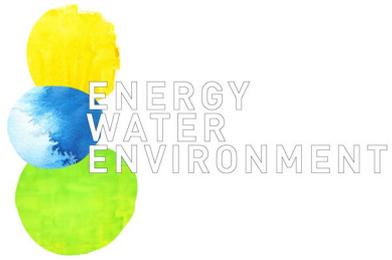
A.3 Details of Water Treatment

Confirming that the water treatment quality standards of Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999 are met by this design.

The diagrams on the overleaf show the cross section and isometric section of the rain gardens proposed for the development. The raingardens will be built and maintained in accordance with the document on Melbourne Water’s website. Refer to overleaf for attached document.

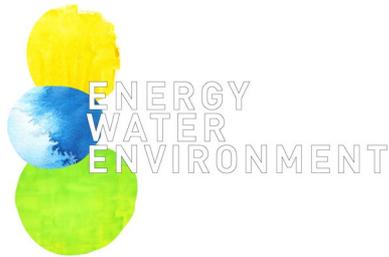
Raingardens will be maintained half yearly as a part of the body corporate maintenance plan.





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A.4 Raingarden Quality, Filtration and Maintenance

The filtration of the raingardens will meet the water quality standards as per 1 point in the Green Star Design and As Built V1.3 tool. The following table shows the standards.

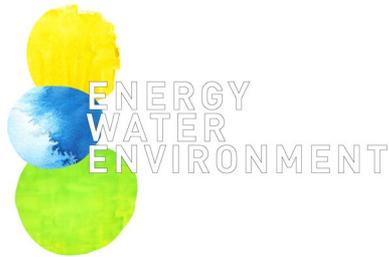
Pollutant	Reduction Target (% of the typical urban annual load).
	A
Total Suspended Solids (TSS) ¹	80%
Gross Pollutants	85%
Total Nitrogen (TN) ²	30%
Total Phosphorus (TP) ²	30%
Total Petroleum Hydrocarbons ²	60%
Free Oils ²	90%

¹ Load based on the following particulate size distribution (by mass): 20% <20 µm; 20% 20-60 µm; 20% 60-150 µm; 20% 150-400 µm; 20% 400-2000 µm

² Load includes particulate and dissolved fraction.

³ This requirement is not applicable where the site contains less than a total of 200m² of uncovered areas where vehicles are likely to transit and/or park e.g. roads, loading docks, refuelling bays, car parking etc.

A raingarden maintenance plan has been specified for the proposed OLOTICSPS Learning Building and is attached on the overleaf.



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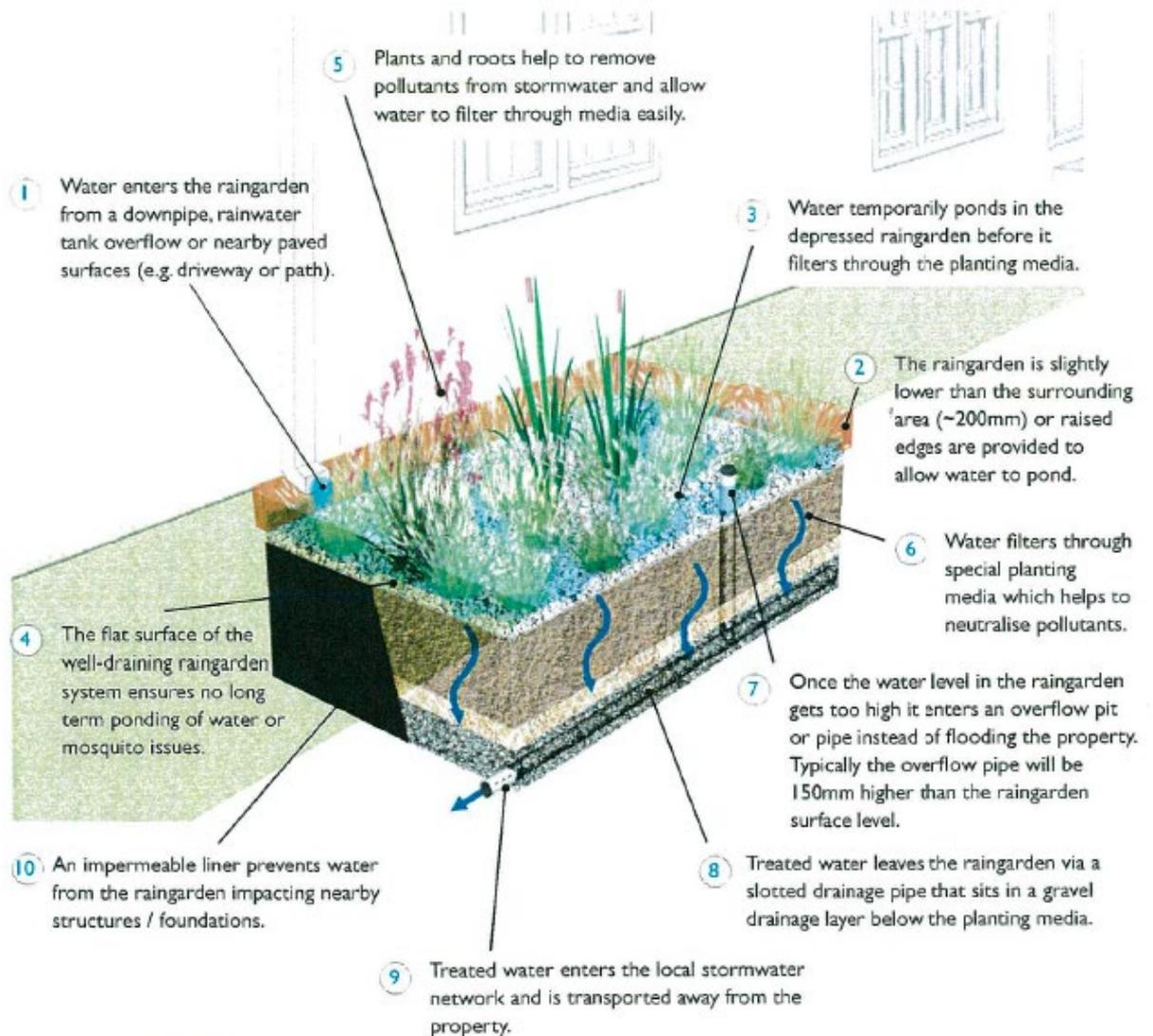
Tips for undertaking maintenance

Things to look for and how to fix them.

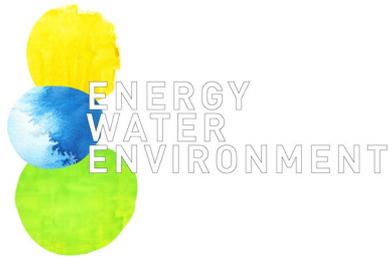
<p>Scour or erosion</p> <p>Erosion and scour reduce the overall area of treatment by directing flows to certain areas only. Erosion or scour can be re-profiled with hand tools, limiting the damage to adjacent vegetation. If fill material is required to create a flat surface, use an appropriate raingarden planting media mix. If erosion / scour keeps happening at the inlet, place some small rocks where erosion occurs.</p>	<p>Weeds</p> <p>Weeds can take over the plants which are needed in the raingarden for treatment. Hand pull weeds and dispose of appropriately. Plant bare patches if needed. Weeding should take place before the plants flower to reduce the likelihood of seed dispersal and further regeneration.</p>
<p>Rubbish, leaf litter or sediment</p> <p>A lot of rubbish or leaf litter at the inlet or on the surface of the raingarden can affect how well water can enter and filter through the raingarden. This material can be removed easily by hand or with tongs / rakes. Collected litter should be placed into bags or similar for disposal.</p>	<p>Moss or clay on surface</p> <p>Moss or clay on the surface of the raingarden can result in a crust forming which prevents water from filtering and being treated. Use hand tools to scrape off the clay or moss and dispose of appropriately. Check raingarden drains.</p>
<p>Uneven surface</p> <p>An uneven surface may result in some areas not getting wet during rain events, reducing the area of treatment. Depressions or mounds can be flattened with hand tools, limiting the damage to vegetation.</p>	<p>Raingarden outlets not draining</p> <p>Blockages of outlet pits and pipes can cause a flooding risk for the property as water is unable to leave the raingarden. Blockages are typically caused by sediment, leaf litter and rubbish. Blockages should be removed manually, by hand or with hand tools such as tongs and shovels. Large blockages in pits may require vacuuming or other appropriate machinery.</p>
<p>Elevated surface level / lots of excess sediment on surface</p> <p>If sediment has entered the system and has raised the level of the surface, this reduces the amount of water which can be filtered. Use hand tools to remove/scrape sediment from around the plants. Remove sediment from the raingarden and dispose of appropriately.</p>	<p>Impermeable liner</p> <p>An impermeable liner (e.g. geotextile or flexible membrane) is sometimes used to ensure water does not move into the surrounding soils. This may be required if the surrounding soils are very sensitive to any added moisture (e.g. sodic soils, shallow groundwater or close proximity to significant structures such as building foundations).</p>
<p>Unhealthy or dying plants / bare patches</p> <p>Good plant cover is critical for raingardens so if plants are looking stressed in dry periods, irrigation may be required. Remove (prune) any areas affected by disease or pests. If the plants are dying and have created bare patches, the plants need to be replaced. If the plants keep struggling, replace with a plant type which is growing well in the raingarden.</p>	<p>Raingarden holding water on the surface because of blocked planting media</p> <p>Generally raingardens should be able to filter water at a rate of ~100mm per hour. If the surface of the raingarden is clogged (by clay or moss etc.) or the underlying filter media is not appropriate then water will not be able to drain through the system to be treated. If the surface is clogged use hand tools to scrape off the clay or moss. If this doesn't fix the drainage issue remove an area of planting media to expose the filter media. Check that water can pass through the filter media by pouring water on its exposed surface. If the water can drain then replace the top planting media and check for blockages elsewhere. If the water does not drain the filter media will need to be replaced.</p>

Raingarden Maintenance

This diagram depicts an in-ground raingarden. Raised bed raingardens are also common (refer to photograph).



Note: It is important not to add fertiliser, compost or floatable mulch to a raingarden as the nutrients will pass through the raingarden and pollute the Bay. The plants best suited to raingardens will grow well in the planting media and take nutrients for their growth from the water entering the raingarden.



Maintenance Checklist

The property owner is responsible for checking the maintenance items in this checklist at the recommended frequency at the bottom of the table. The maintenance log at the bottom of the page should be filled in once each maintenance check is complete. Upkeep of this maintenance log should continue throughout the life of the raingarden.

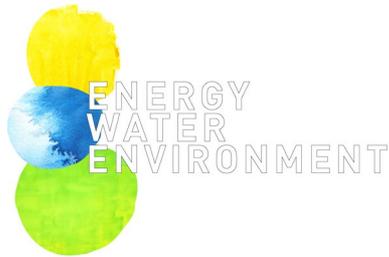


Item	Raingarden element	Inspection item	Y/N	Likely maintenance task
1	Raingarden inlet	Is there scour or erosion where water enters the raingarden?		Re-profile with hand tools, place gravel or stones at the inlet.
		Is there rubbish, leaf litter or sediment blocking the inlet?		Remove by hand and dispose responsibly.
2	Raingarden surface level	Is the level of the raingarden surface sitting less than 5 cm below the raingarden edges/borders?		Remove sediment from the surface so it is sitting about 10-20 cm below surrounding areas.
3	Raingarden temporary detention	Is there moss or clay on the surface of the raingarden which seem to be slowing the filtration of flows?		Remove the crust from the top of the raingarden and check water will filter through exposed media.
4	Raingarden surface	Are there areas which appear to be higher and are not getting wet during rain events?		Smooth out surface so it is flat with hand tools.
		Are there areas which have been eroded away or scoured?		
5	Plants	Are the plants looking unhealthy or dying?		Prune diseased sections, irrigate and/or replace dead plants. If plants keep dying, replace with a different type which is doing well. Do not use fertilizer to improve plant health as this will pollute the raingarden.
		Are there bare patches forming between plants?		
		Are there weeds present?		Remove weeds by hand and dispose responsibly.
6	Planting media	Is the raingarden holding water for more than a couple of hours after the rain has stopped?		Remove and replace the top 100 mm of planting material (loamy sand).
7	Overflow pit / pipe	Is there anything blocking the top of the overflow pit / pipe preventing water from entering?		Remove blockages and dispose responsibly.
8	Underdrainage	Is there rain draining to the bottom of the raingarden following heavy rain?		Flush the underdrain or uncover it to check for blockages.
9	Stormwater network connection	Is there water ponding in the overflow pit or pipe and not entering the stormwater network?		Remove blockages and dispose responsibly.

Maintenance frequency

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			x						x		

+ after heavy rainfall



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Appendix B Construction Stormwater Management Plan

Stormwater management during the construction phase shall be undertaken by mitigation of the following pollutants generated by construction site during a rainfall event.

- Dust
- Silt
- Mud
- Gravel
- Stockpiled materials
- Spills/oils
- Debris/litter

The treatment mechanisms suggested are as follows but not limited to:

- Construction rubbish strategy where site is kept clean from debris and litter
- Temporary grids to stop mud from the site being deposited on the roadway
- Silt filters under grates to prevent silt from entering the stormwater system
- Gravel filters

More information is available from “Keeping Our Stormwater Clean – A Builder’s Guide” by Melbourne Water which is attached. A comprehensive and site specific construction stormwater management plan shall be undertaken by the lead contractor prior to commencement of site works based on this document.

Attachment: Keeping Our Stormwater Clean – A Builder’s Guide

KEEPING OUR STORMWATER CLEAN



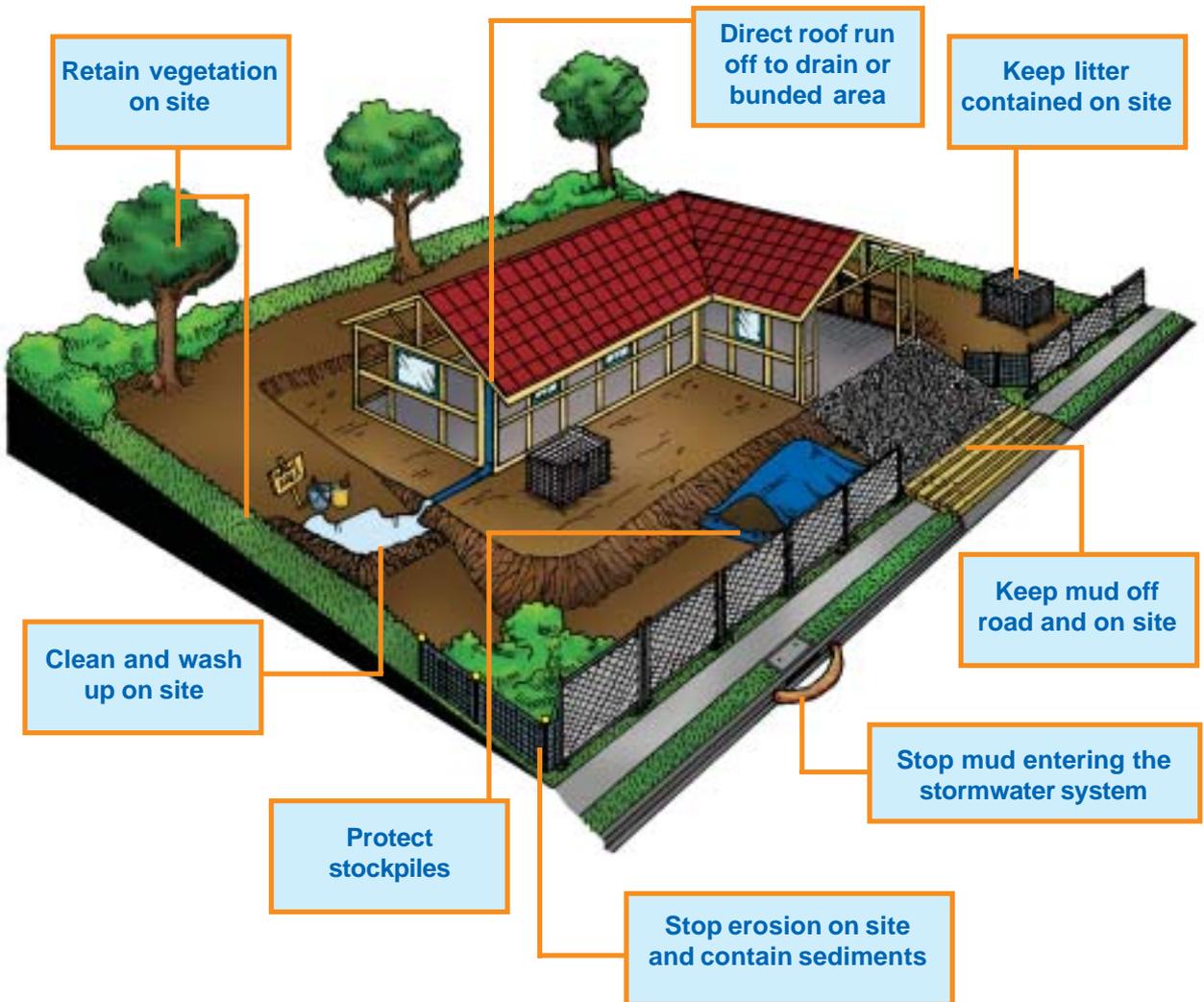
A BUILDER'S GUIDE

Information to help you control sediment and litter from your building site and comply with Council and State regulations

ACKNOWLEDGEMENTS

This revised booklet was originally produced with the support of the Victorian EPA, Melbourne Water, Cities of Kingston, Casey, Hume, Melbourne, Moreland and Moonee Valley.

Check Council requirements and plan before you start work on site



Supplier information for sediment & erosion control on page 3

CONTENTS

6 SITE RULES TO KEEP STORMWATER CLEAN



SITE RULE 1

Check Council requirements and plan before you start work on site.

..... Page 4



SITE RULE 2

Stop erosion onsite and contain sediments.

..... Page 6



SITE RULE 3

Protect stockpiles.

..... Page 12



SITE RULE 4

Keep mud off road and on site.

..... Page 16



SITE RULE 5

Keep litter contained on site.

..... Page 18

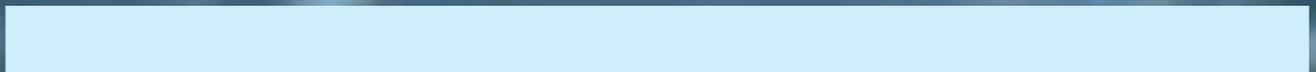


SITE RULE 6

Clean and wash up on site.

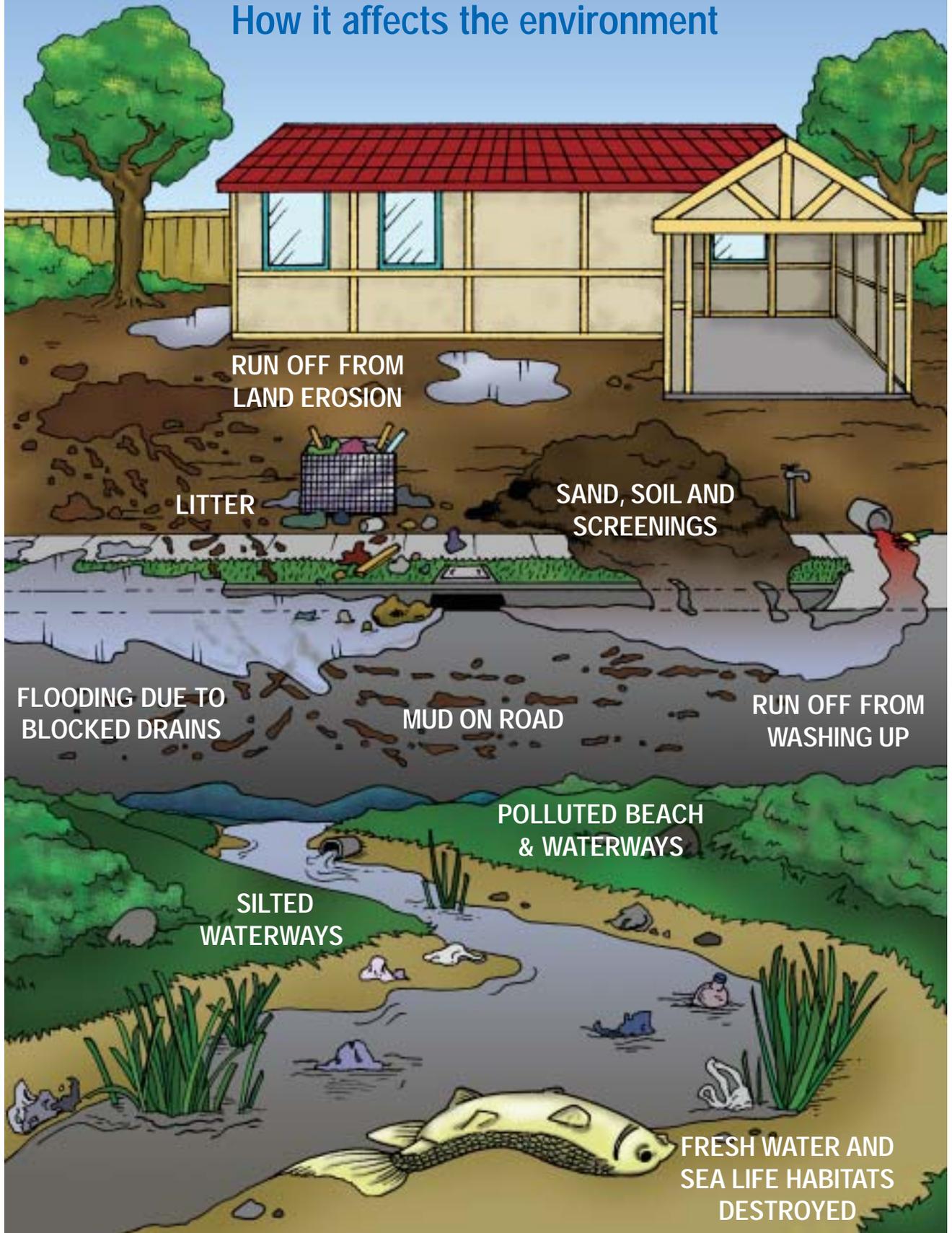
..... Page 21

Use the Site Management Plan..... Page 23



PROBLEMS ON OUR BUILDING SITES

How it affects the environment



WHY DO I NEED TO PROTECT OUR ENVIRONMENT?

It's the law!

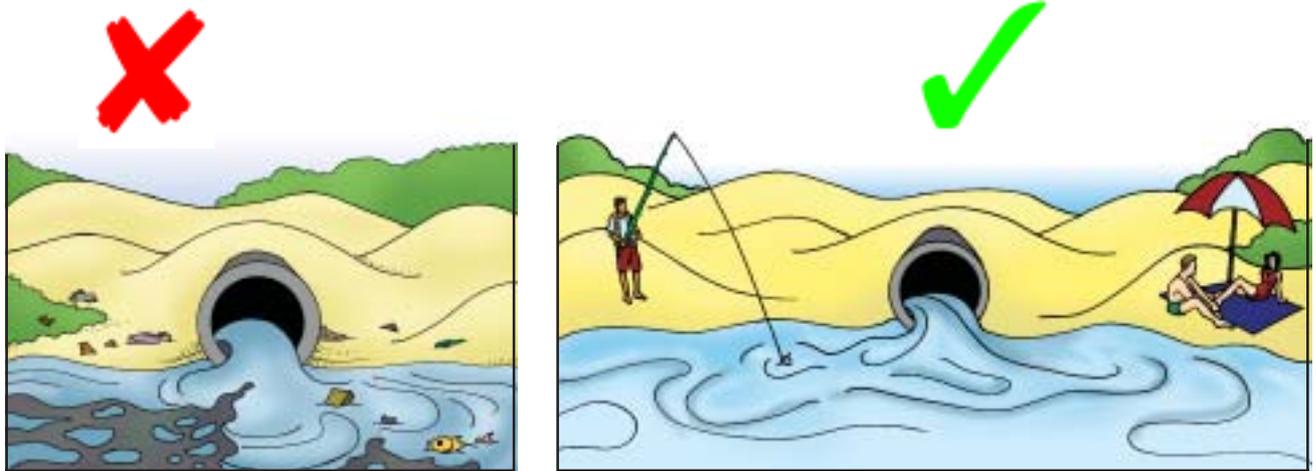
Sediment from building sites can pollute stormwater. There are State and local council laws which make this an offence.

The developer or person managing the building site has the responsibility of making sure that the stormwater is not polluted.

Penalties apply for polluting stormwater.



To enjoy using our environment - now and in the future



Stormwater is not treated and carries pollution to local waterways and bays. Pollution in our stormwater can lead to short and long term damage to our environment.

To benefit builders

The site looks good (which is good for attracting new customers) **and you'll be helping to protect our environment.**

The site has fewer hazards. A well organised site has less loose material lying around causing a hazard. This reduces health and safety issues on a building site.

Downtime is reduced. A well managed and organised site is more efficient. This saves time and money.



USEFUL SUPPLIER INFORMATION



This information is provided for helpful contact details only. The companies are not listed in any particular order and are not necessarily recommended over others that may provide similar services.

SEDIMENT CONTROL

Approximate Price:
Geofabric fencing
100 m roll from \$55 to \$130
stakes \$12 for 10
Filter socks unfilled: 2 m \$4.50 filled \$8 - \$25

Geofabrics Australasia
03 8586 9111 www.geofabrics.com.au
Products: silt fencing

Southern Geosynthetics Supplies
0419 478 238 www.geosynthetics.com.au
Products: Silt fences, Silt Sausages

Statewide River & Stream Management
03 9702 9757 www.stateplanthire.com
Products: silt fence, stakes, silt logs
Installation service and site kits
Approx cost: \$220 for 20 m frontage installed, \$88 self installation

Treemax
03 98787 4111 www.treemax.com.au
Products: filter fence, silt worm, silt sock

Zerosion
0408 351 566 www.zerosion.com.au
Products: silt fence installation
Approx cost: \$215 for up to 20 m frontage

STABILISED DRIVEWAYS

For aggregate look under sand, soil and gravel in the Yellow Pages
Recycled aggregate available from major suppliers.

TEMPORARY DOWNPIPE

Available from major plumbing suppliers
Art Plastic 25 m rolls of temporary plastic downpipe
approx: \$25

Temporary Flexible Downpipe
03 9786 3711 www.tfd.com.au
\$135 per kit - does 2-3 16 sq houses

OTHER EQUIPMENT

Coates Shorco Sykes 131994
Supply : silt fence \$125 100 m
Hire: Rumble Grids \$180 p/week for 2 panels
Hire: Environmental settlement tanks 4 m tank \$542 p/week

PORTABLE TOILETS

See Toilets – Portable in the Yellow Pages

TEMPORARY FENCING

See Fencing Contractors in the Yellow Pages
Australian Temporary Fencing 131716
Victorian Temporary Fencing 03 9484 4000

BRICK AND TILE CUTTING

Slop Mop Recycling Products
www.slopmop.com.au 0418 825 301 **Brikasaurus:**
capture and recycle waste water for brick and tile cutting operations.
Slopmop: water delivery & waste clean up system for use behind concrete saws and grinders.

Useful information is available from:

Master Builders Green Living Builders
www.mbav.com.au
HIA GreenSmart Program
www.greensmart.com.au
Keep Australia Beautiful Victoria – CleanSites Program
<http://www.kabv.org.au/>
Victorian Litter Action Alliance
<http://www.litter.vic.gov.au>
Environment Protection Agency Victoria
www.epa.vic.gov.au
See Publication 981 – Reducing stormwater pollution from construction sites
Melbourne Water
www.melbournewater.com.au



SITE RULE 1

Check Council requirements and plan before you start work on site.



Questions to ask BEFORE you start

Planning, BEFORE you start a job, will make a big difference to how well you manage your site. Check Council requirements for site management. Complete a site management plan (one can be found at the back of this booklet).

Where is the lowest point on the site?

Water always runs to the lowest point. It is important to know where this point is when planning your site. It will affect where you put your crossover, stockpile materials and sediment fence. Leave a buffer of vegetation along the lowest boundary.

Where will I put the crossover?

Try to put the crossover as far away from the lowest point as possible. As water runs to the lowest point it is more likely to be wet and muddy. [See Page 16.]

Where will I keep my stockpile?

Stockpiles are best kept on site, as far away from the lowest point as practical. [See Page 12.]

Where will I build my sediment control fence?

Sediment control fences should be built on the lowest side/s of a site prior to erecting a temporary fence. A flat site may not need sediment control fences. [See Page 9.] These are a primary management measure to keep sediment on site.

Which trees and vegetation will be kept on site?

Rope or fence off the areas you are going to keep. Keeping vegetation such as grassed areas will help to prevent damage to the surface of the site later on and may trap sediment. [See Page 7.]

Why fence my site?

Many councils require sites to be fenced. Site fencing helps to keep building activities to the site, helps stop movement of litter, and helps to keep a site safe by stopping members of the public wandering on site. [See Page 20.]

SITE READY TO START JOB

SITE MANAGEMENT PLAN

Building Company: _____ Date: ____/____/____
 Site Address: _____
 Client Name: _____ Contact Number: () _____

Site Management Plan 23

CLEAN SITE CHECKLIST

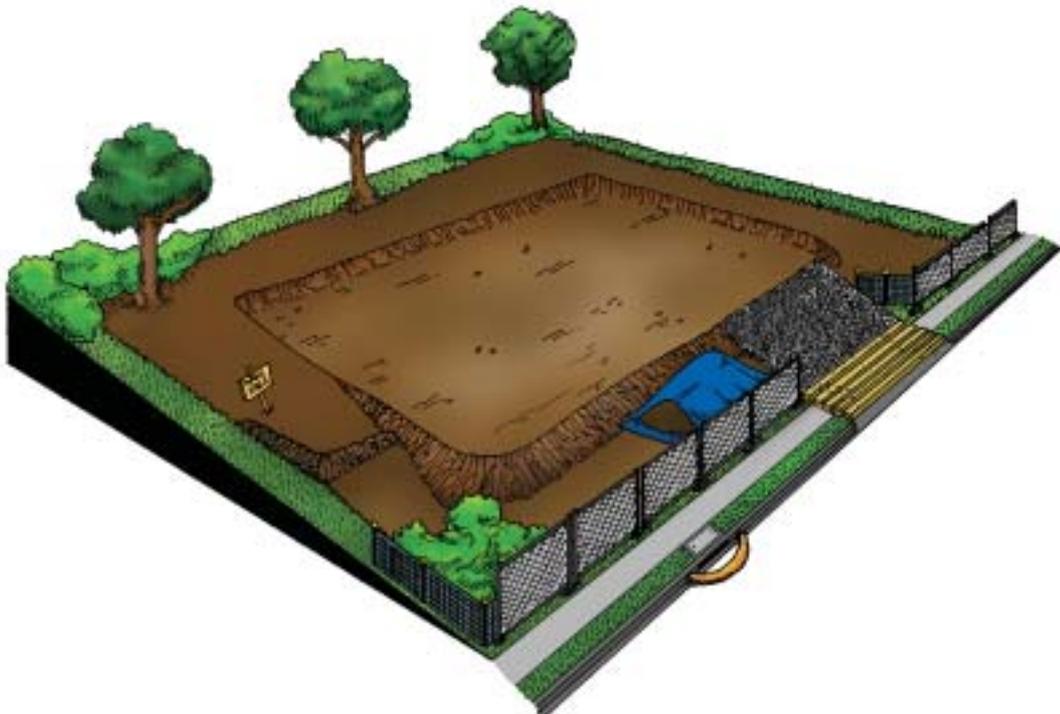
Please photocopy to use on site

SITE DETAILS:
 Building Company: _____
 Site Supervisor: _____
 Date: ____/____/____
 Site Address: _____
 Client Name: _____
 Contact Number: () _____

SITE RULE	TASK	CHECK
SITE RULE 1 - Check Council requirements and plan before you start work on site.	Crossover away from lowest point	<input type="checkbox"/>
	Sediment control fence on lowest site	<input type="checkbox"/>
	Stockpiles away from lowest point	<input type="checkbox"/>
SITE RULE 2 - Stop erosion on site and contain sediments.	Marked trees and vegetation to keep on site	<input type="checkbox"/>
	Sediment control fence in place	<input type="checkbox"/>
	Catch drains on high side of site	<input type="checkbox"/>
SITE RULE 3 - Protect stockpiles.	Vegetation areas kept at boundary	<input type="checkbox"/>
	Downpipes set up as early as possible	<input type="checkbox"/>
SITE RULE 4 - Keep mud off road and on site.	Base and cover for stockpiles	<input type="checkbox"/>
	Gravel savings at stormwater pit	<input type="checkbox"/>
SITE RULE 5 - Litter bins in place with lid closed	Crushed rock access point	<input type="checkbox"/>
	Vehicles kept to crushed rock areas	<input type="checkbox"/>
	Mud removed from tyres before leaving site	<input type="checkbox"/>
SITE RULE 6 - Clean and wash up on site.	Clean road if muddy	<input type="checkbox"/>
	Keep litter contained on site.	<input type="checkbox"/>
	Site fencing in place	<input type="checkbox"/>
	Cutting and staking up area on site	<input type="checkbox"/>
	Clean equipment off before washing	<input type="checkbox"/>
	Sediment filters downlope	<input type="checkbox"/>
	Contain all washings on site	<input type="checkbox"/>

Site Management Plan 24

For copy of plan & checklist photocopy pages 23 & 24.





SITE RULE 2

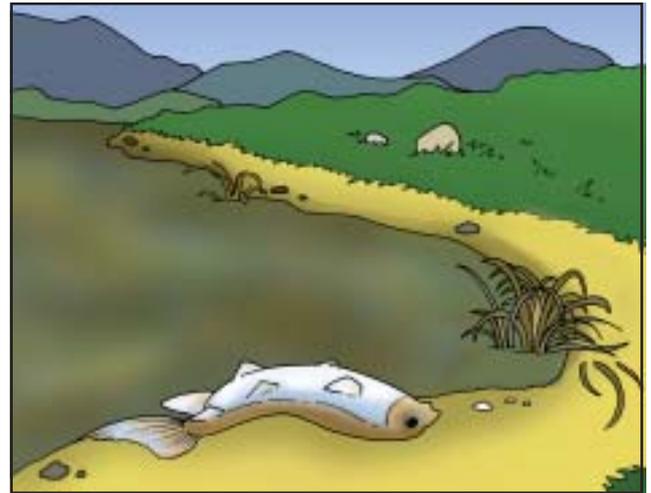
Stop erosion and keep sediment on site

Why is erosion a problem?

Sediment escaping from building sites can:



1. Make roads and footpaths slippery for vehicles and pedestrians, increasing public liability risk.



2. Enter the stormwater system and make stream and river water cloudy which can kill plants and animals in creeks and the bay.



3. Cause blockages to the stormwater system including the side entry pit and pipes, increasing the chance of flooding and requiring regular cleaning.

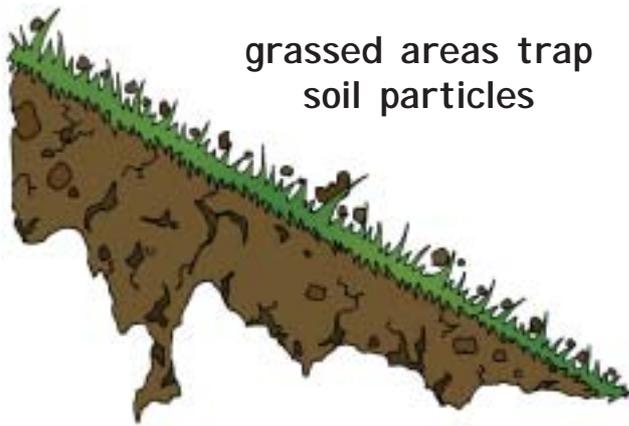


4. Overload and clog local stormwater filtration systems such as rain gardens and swales.

METHODS TO CONTROL EROSION

Control Method 1 - Keep areas of vegetation as a buffer strip at the site boundary.

To prevent sediment leaving site use existing grassed areas and a sediment control fence.



grassed areas trap soil particles

Vegetation helps protect the soil from the effects of rain and surface water by:

- Slowing the flow of water across the ground. Fast water is able to carry more soil particles off site
- Holding the soil together and minimising erosion
- Acting as a filter to trap soil particles.

Decide what areas of vegetation you are going to keep on site. Mark and protect trees, shrubs and grassed areas that you are keeping. Then apply for the relevant permits to remove vegetation.



Protect areas close to the boundary, drains and gutters, and where surface water flows may carry sediment off site.

Control Method 2 - Early downpipe connection



Connecting downpipes to the stormwater or onsite detention system has a number of benefits:

- Less drainage problems on site
- Less mud on site after rain
- A safer site
- Reduce damage to building foundations
- Less downtime after storms
- Projects get finished sooner.

Aim to have the downpipes connected as soon as the roof is installed (temporary or permanent).

Control Method 3 - Pipe roof water onto a grassed or banded area.

If you cannot connect to the stormwater system, pipe the water away from the building onto a vegetated area where there is good ground cover or to a banded area.

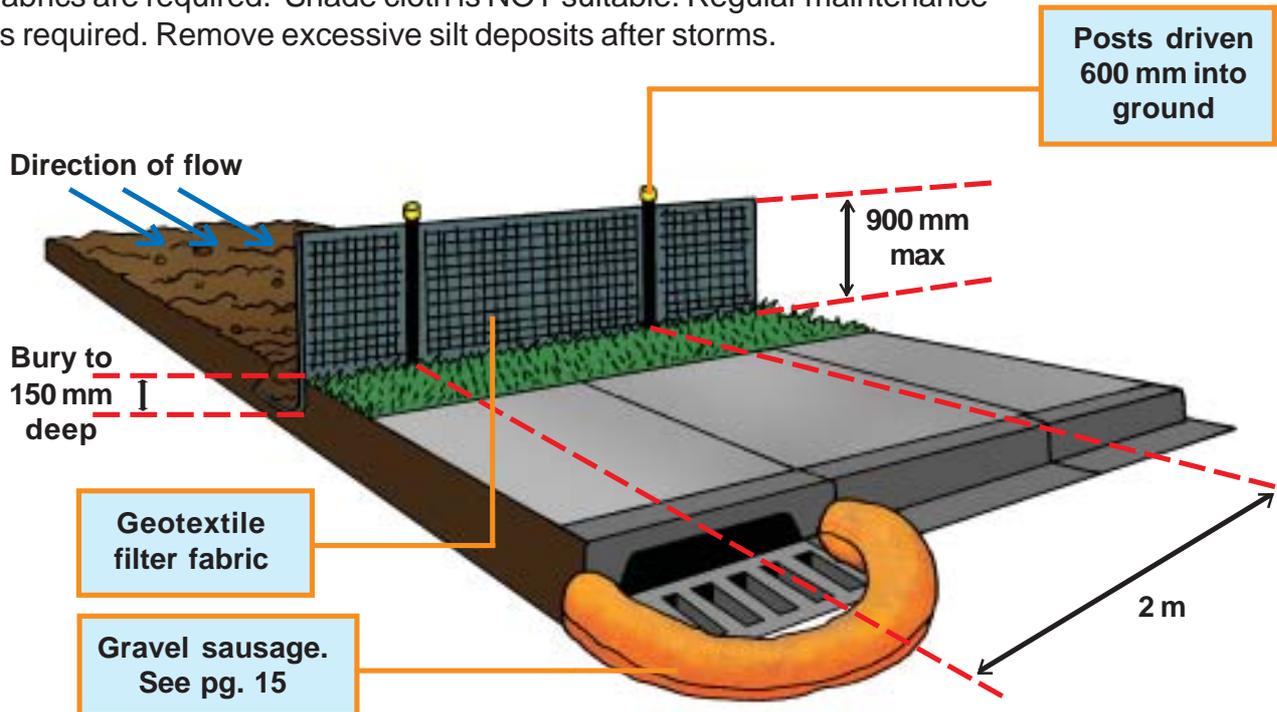


This lets water seep into the ground with less damage to the surface of the soil.

METHODS TO CONTAIN SEDIMENT ON SITE

Method 1 - Sediment Control Fences

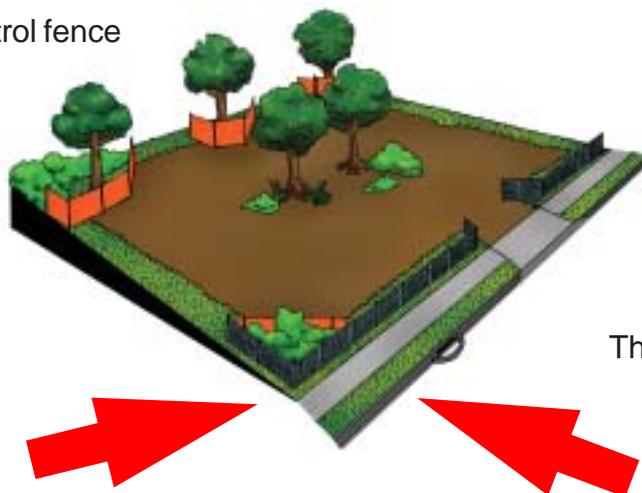
Sediment control fences stop sediment from being washed off site. The fence allows muddy water to pond behind it and for sediment to settle as the water slowly filters through. Geotextile fabrics are required. Shade cloth is NOT suitable. Regular maintenance is required. Remove excessive silt deposits after storms.



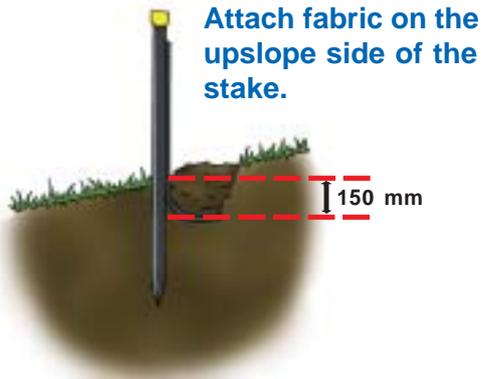
TO BUILD A SEDIMENT CONTROL FENCE:

a) Identify the low point of site.

Place sediment control fence along boundaries where the low point is.



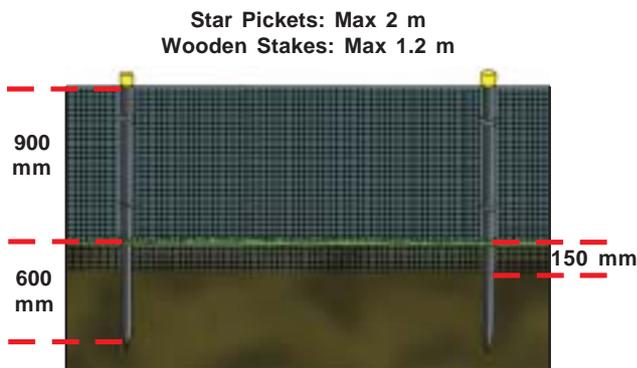
This is the point where the land will allow water to carry sediment off the building site.



b) Dig a trench along the fence line before temporary site fencing is installed.

The trench will be used to bury the base of the sediment control fabric.

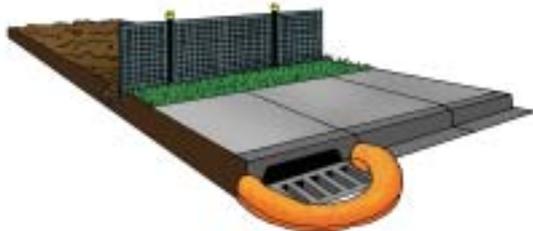
The trench should be 150 mm deep.



c) Put in 1500 mm wooden posts (38 mm) or star pickets.

Put 1.5 m star pickets at a maximum of 2 m apart and 600 mm deep.

Put 1.5 m wooden posts (38 mm) at 1.2 m intervals (max 2 m) and 600 mm deep.



d) Fix geotextile to posts

Geotextile material allows water to pass through but traps sediments.

Use cable ties or staples to attach the geotextile to the upslope side of the fence posts.

Only join fabric at the pickets with a 150 mm overlap (wrap around post).



e) Spread volume of water.

Put a star picket 1.5 m upslope of the others every 20 m (if the fence is longer than 20 m). This spreads the volume of water that flows through each section of fence.

Turn ends up slope to allow for ponding.

Method 2 - Control dust and slurry from cutting

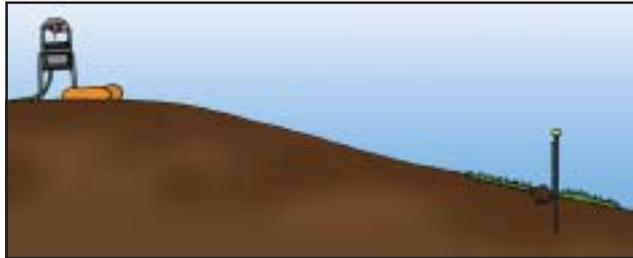
A large amount of dust can be made from cutting materials such as concrete, bricks and tiles. When mixed with water this material can be turned into slurry and washed into waterways. Cement changes the acidity of water which may then kill water plants and animals. The following methods will help keep this waste on site and out of the waterways:



a) Cut materials on site

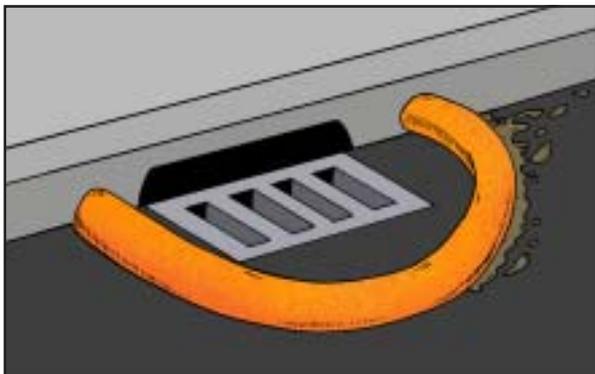
Choose a set area to do all your cutting. This area should be on the building site and away from all stormwater drains.

Equipment is available that captures water used in the cutting process (see page 3).



b) Put sediment control filters downslope

Sediment logs should be placed downslope to catch cutting slurry. A back-up sediment fence may also be used.



c) Use a gravel sausage or sediment log

When cutting must take place near stormwater drains, use gravel sausages or sediment logs.

Alternatively, you can buy sleeves from geotextile companies and fill these with sand.

Always clean up and correctly dispose of captured sediment.



d) Clean up when finished

When you have finished cutting, clean up your equipment in the cutting area.

Use a broom to clean up and get rid of the slurry where it can't get into the stormwater system. Dispose of in waste container

DO NOT HOSE THE SLURRY AWAY



SITE RULE 3

Contain stockpiles on site

Why are sand, soil and screenings a problem?

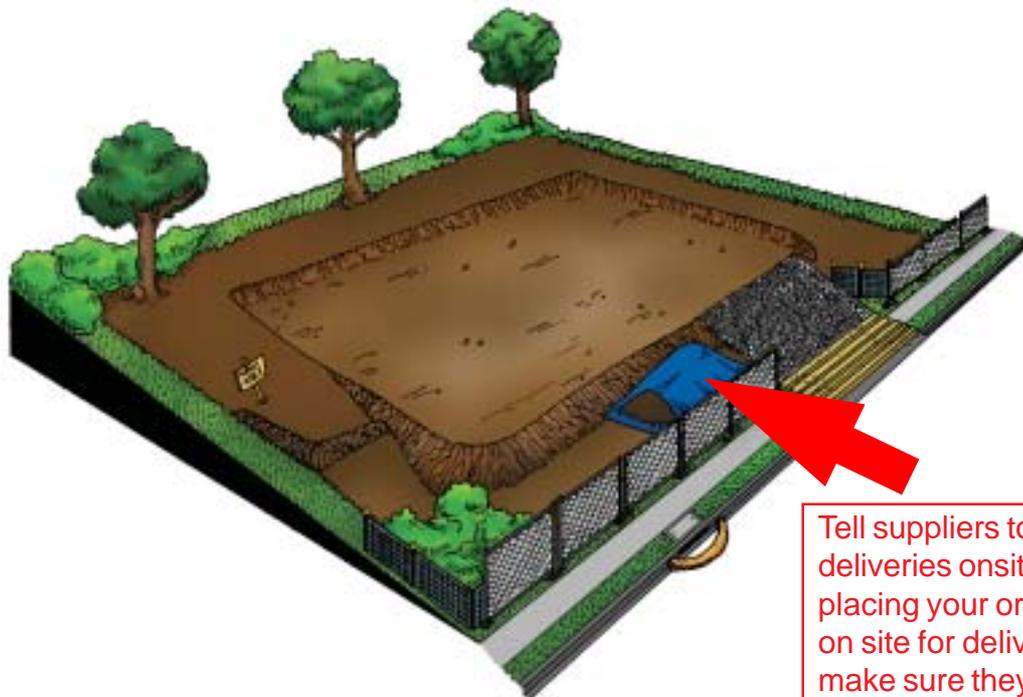


Sand, soil, screenings, dust or sludge from concrete and brick cutting, and other materials escaping from building sites can cause many problems.

Putting stockpiles such as sand, gravel, topsoil and mulch across footpaths and roads will cause a hazard to both vehicles and pedestrians.

Sediment can smother stormwater filtering systems including swales and raingardens.

Stockpiles should be stored on site, not on footpaths or roads.

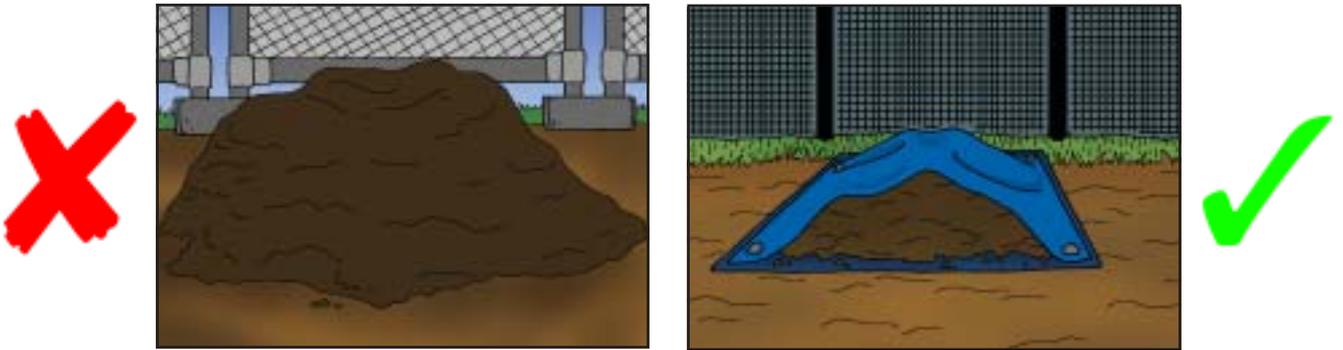


Tell suppliers to place deliveries onsite when placing your order or be on site for deliveries to make sure they are put in the right place.

Stockpiles not stored properly can get washed or blown away and pollute the stormwater.

This is particularly true of stockpiles that:

- Are high
- Have steep sides
- Are put on hard surfaces where they can be blown or washed away.



KEEPING STOCKPILES ON SITE

Place the stockpile in a designated area on site, and upslope of the sediment control fence.

If exposed for some time, stockpiles should be covered with a tarp.



In some cases it may be impossible to store stockpiles on site. In this case, a different set of control methods will be used.

WHEN UNABLE TO STORE STOCKPILES ON SITE

You may have to store a stockpile off site (although never on the footpath, gutter or road). Contact the council to make sure that you have the appropriate council permits.

The council will tell you how stockpiles stored off site are to be managed. Materials may be stored on tarps or on pallets. Containers such as rubbish skips with opening sides that you can get into easily are a good idea.



Material must not get into drains, gutters or the stormwater system

The following control methods can be used when storing materials or working off site.

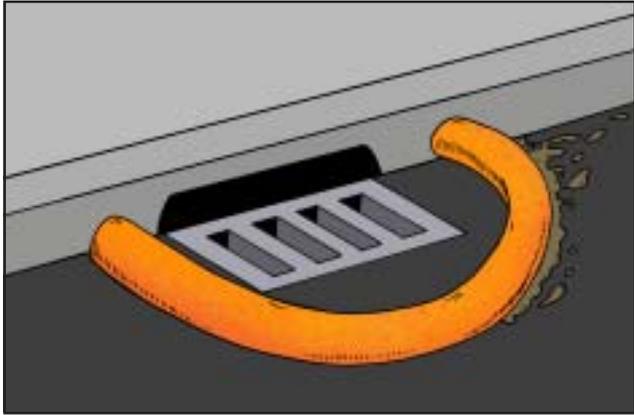
Method 1 - Cover Stockpile

- a) Place a tarp, plastic or banded pallet under the area where the stockpile will be placed.
- b) Place a secured covering over the stockpile.
- c) Then place sediment control logs around the downslope base of the stockpile.



Method 2 - Protect Downstream Stormwater Pit with a Gravel Sausage or Sediment Log

A gravel sausage or sediment log is a temporary collection device that can be used when stockpiles are stored or cutting is done off site. It is also a useful precautionary measure at all sites.

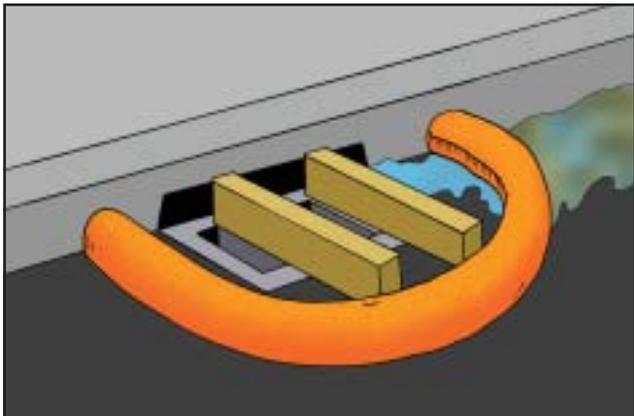


TO BUILD A GRAVEL SAUSAGE:

a) Make the sausage sleeve

A gravel sausage is made from a geotextile sleeve filled with 25 - 50 mm gravel.

The gravel sausage should be 150 mm high.



b) Put the gravel sausage across the opening of the inlet pit

Make sure that the sausage is tight with the kerbing on the upslope side of the inlet pit and extends beyond the grate.

There should be a 100 mm gap between the front of the pit and sausage. Use wooden blocks to keep the 100 mm gap.



c) Clean out gravel sausage regularly

When soil and sand builds up around the gravel sausage, this should be collected and disposed of on site.

Regular maintenance is required.

DO NOT HOSE SEDIMENT DOWN THE GUTTER



SITE RULE 4

Keep mud off road and on site

Why is mud a problem?

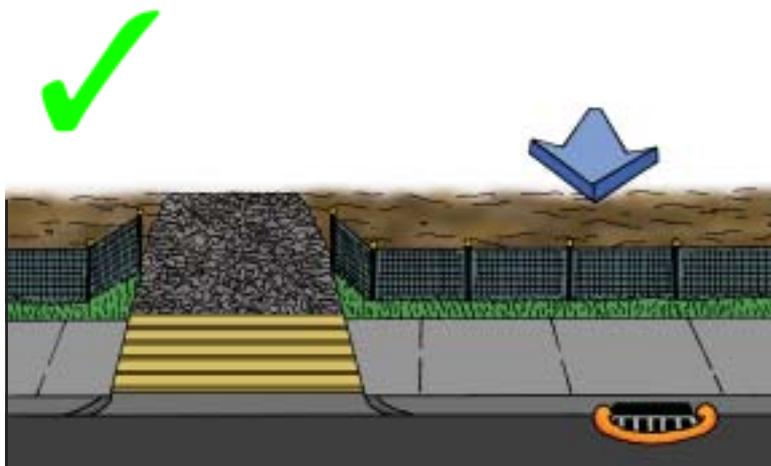
Two things happen when vehicles go on and off the site:

1. The surface area of the site is damaged making it dangerous.
2. Mud is carried back onto the roads and footpaths, and washes into the stormwater system.



METHODS TO CONTROL MUD

The following simple methods will help you to protect the surface of your site and help stop vehicles from dropping mud on the road from their wheels. The best way to do this is to put crushed rock on the crossover or access point of your building site.



Putting crushed rock on the access point of your site is a good way to prevent damage and provide a dry access point for vehicles. Where possible park vehicles off site.

Make sure gravel does not collect in the gutter or on the footpath.

Control Method 1: Build a crushed rock crossover



Remove a 3m or greater strip of soil from road (or where concrete crossover ends) to nearest building point or a minimum of 5 m.

Use road base or 40 mm aggregate or crushed rock to a depth of 200 mm.

Restrict vehicle access to this point.

Control Method 2: Keep to crushed rock path



Only drive where you need to. Keep to a set path (preferably on crushed rock).

Control Method 3: Remove mud from tyres



Use a shovel to remove mud from truck tyres before leaving site.

Control Method 4: Clean road



If mud goes on road, remove as much as possible and put it back on site.

Use a broom or a shovel.
DO NOT USE A HOSE.



SITE RULE 5

Keep litter contained on site

Why is litter a problem?



Many building sites have both building rubble and other rubbish spread across them.

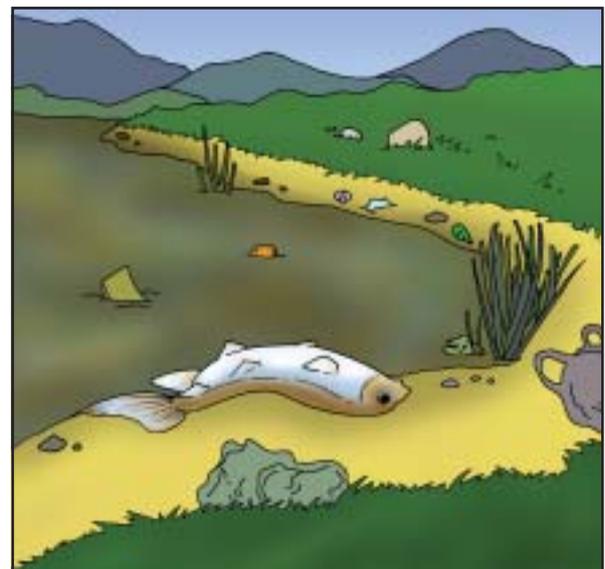


This causes many problems:

You may now have an **UNSAFE WORK ENVIRONMENT!**
This could increase the chance of legal and public liability problems



Litter blowing off site can block stormwater drains.



Litter may spoil local creeks and eventually find its way to the coast.

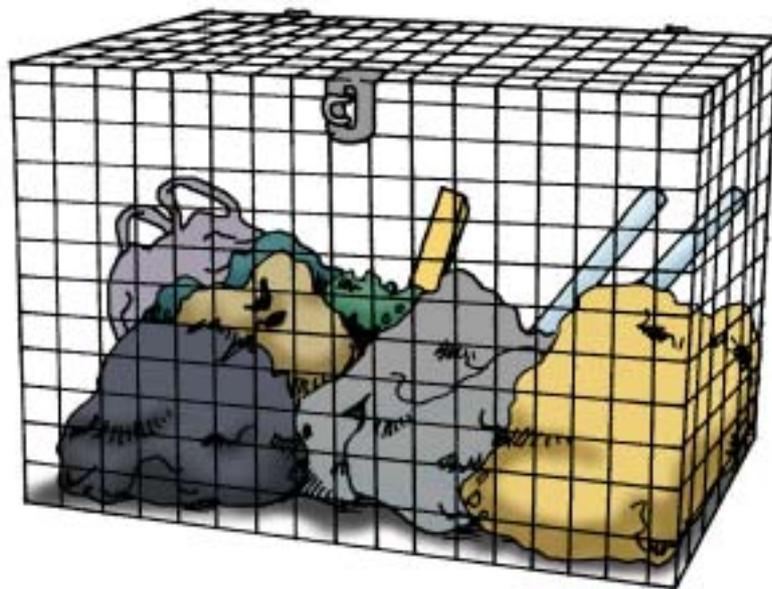
METHODS TO CONTROL LITTER

The following simple methods will help you to stop litter leaving your site or being a hazard on site.

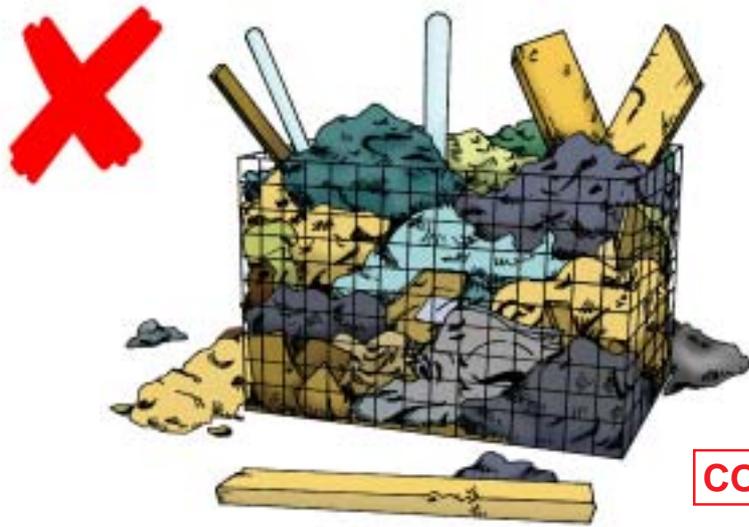
Control Method 1: Litter bins or covered skips

A mesh bin with a closeable lid is suitable for larger items like cardboard boxes, plastic wrapping and polystyrene.

Mesh to be 50 mm
or smaller



A smaller bin is okay for smaller rubbish like paper, food wrapping and drink containers that may be blown off site. Council bins may be restricted from building sites.



Empty the litter bin regularly. Don't allow overflow. Where possible, collect the materials from the litter bin for recycling and /or keep different materials in separate bins.

CONSIDER A RECYCLING BIN

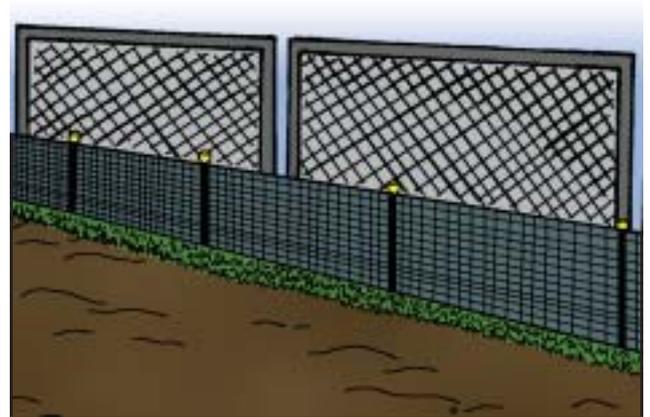
Control Method 2: Site fencing

Site fencing will help to keep litter from being carried off site by wind or water and provide security.

A FENCE DOES NOT NEGATE THE NEED FOR A BIN.



Check council requirements for temporary fencing and avoid trip hazards on footpath.



Remember to install a sediment control fence prior to installation of the temporary fence.



SITE RULE 6

Clean and wash up on site

Why is washing up a problem?



When cleaning up after painting, plastering or concreting it's most important to keep the wash water out of the stormwater system.

Problems to the environment include:

1. Oil based paints form a thin film over the surface of the water. This starves water plants and animals of oxygen
2. Paints and petrol chemicals can contain toxic compounds
3. Concrete changes the acidity of waterways which can kill water plants and animals. Concrete washings can harden and block drains
4. Roads around a building site can become dirty, slippery and dangerous.



METHODS TO CONTROL WASHING UP

The following simple methods will help you to stop the contamination of stormwater from paint, plaster or concrete washings.



Control Method 1: Have a set washing up area

Choose a set area to do all your washing up. This area should be on the building site and away from all stormwater drains. It should be bunded and contain wash out barrels.

You could use the same area you have chosen for tile and brick cutting.

Contain chemicals and slurry onsite.

Put sediment control fences downslope.

NOTE: SEDIMENT CONTROL FENCES WILL NOT STOP CHEMICALS

Control Method 2: Get rid of concrete slurry on site

Collect wash water from concrete mixers and pumps in a wheel barrow and get rid of it in your wash area. You can also safely get rid of

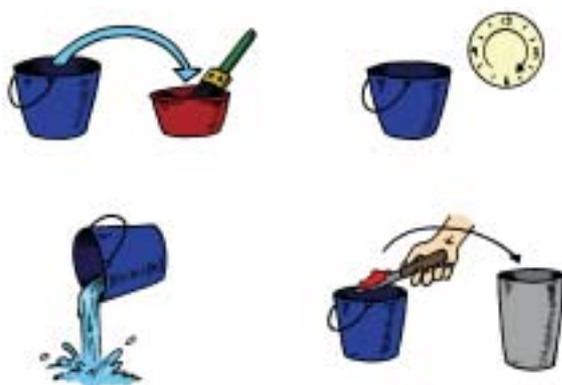
concrete slurry by tipping small amounts in a ditch lined with plastic or geotextile liners. When the water evaporates or soaks into the surface the solids can then be put into a skip bin or recycled in construction or as road base.



Control Method 3: Clean equipment off before washing

Brush dirt and mud off equipment before you wash it. Spin rollers and brushes to remove paint before you wash them in a wash out bin.

You will then need less water to clean this equipment.



Control Method 4: Clean painting tools carefully

Use one container to wash the brush and another to rinse it. Let the first container stand overnight to let solids settle. Then pour out the water on to the ground if it is not too dirty and put settled solids in a bin.

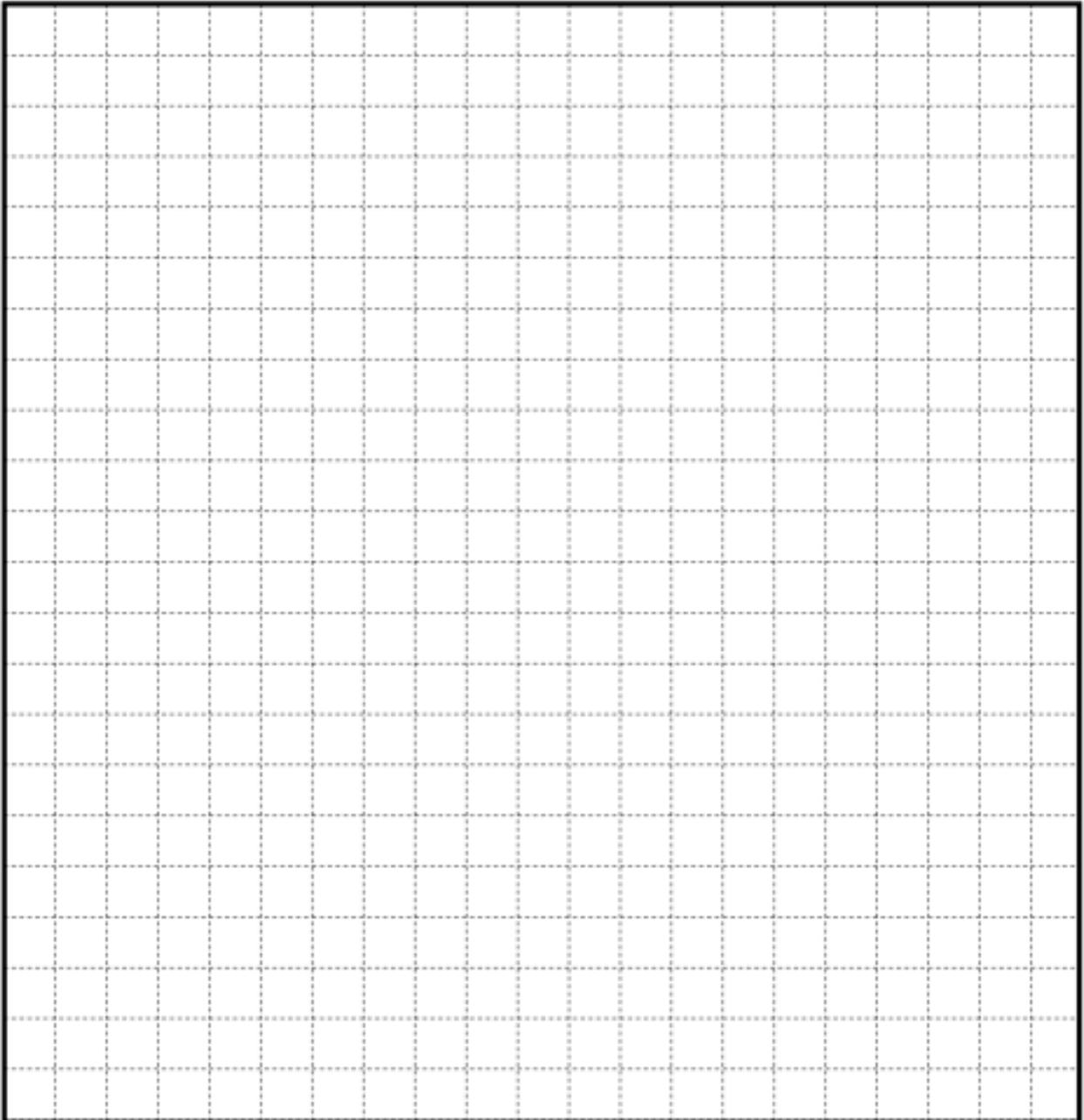
Wash oil based paints in solvent baths until clean. **DO NOT PUT THE SOLVENT ON THE GROUND.** Contact a waste disposal company for removal.

SITE MANAGEMENT PLAN

Building Company: _____ Date: ____ / ____ / ____

Site Address: _____

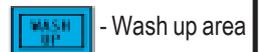
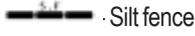
Client Name: _____ Contact Number: () _____



LEGEND:

Scale:

— = 1 m



CLEAN SITE CHECKLIST

Please photocopy to use on site

SITE DETAILS:

Building Company: _____ Date: ____ / ____ / ____

Site Supervisor: _____

Site Address: _____

Client Name: _____ Contact Number: () _____

SITE RULE	TASK	CHECK
SITE RULE 1 - Check Council requirements and plan before you start work on site.	Crossover away from lowest point	<input type="checkbox"/>
	Sediment control fence on lowest side	<input type="checkbox"/>
	Stockpiles away from lowest point	<input type="checkbox"/>
	Marked trees and vegetation to keep on site	<input type="checkbox"/>
SITE RULE 2 - Stop erosion on site and contain sediments.	Sediment control fence in place	<input type="checkbox"/>
	Catch drains on high side of site	<input type="checkbox"/>
	Vegetation areas kept at boundary	<input type="checkbox"/>
	Gravel sausage at storm water pit	<input type="checkbox"/>
	Downpipes set up as early as possible	<input type="checkbox"/>
SITE RULE 3 - Protect stockpiles.	Base and cover for stockpiles	<input type="checkbox"/>
	Gravel sausage at stormwater pit	<input type="checkbox"/>
SITE RULE 4 - Keep mud off road and on site.	Crushed rock access point	<input type="checkbox"/>
	Vehicles keep to crushed rock areas	<input type="checkbox"/>
	Mud removed from tyres before leaving site	<input type="checkbox"/>
	Clean road if muddy	<input type="checkbox"/>
	Clean stormwater pit and maintain gravel sausage	<input type="checkbox"/>
SITE RULE 5 - Keep litter contained on site.	Litter bins in place with lid closed	<input type="checkbox"/>
	Site fencing in place	<input type="checkbox"/>
SITE RULE 6 - Clean and wash up on site.	Cutting and clean up area on site	<input type="checkbox"/>
	Clean equipment off before washing	<input type="checkbox"/>
	Sediment filters downslope	<input type="checkbox"/>
	Contain all washings on site	<input type="checkbox"/>

6 RULES FOR A CLEAN WORKSITE

SITE RULE 1 -

Check Council requirements and plan before you start work on site.

SITE RULE 2 -

Stop erosion on site and contain sediments.

SITE RULE 3 -

Protect stockpiles.

SITE RULE 4 -

Keep mud off road and on site.

SITE RULE 5 -

Keep litter contained on site.

SITE RULE 6 -

Clean and wash up on site.

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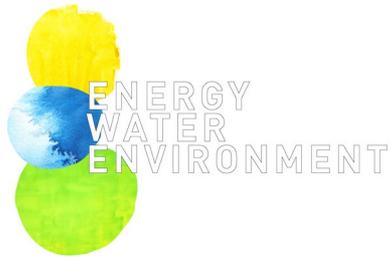


For copies of this guide please contact:
Melbourne Water on 131 722
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Desktop publishing and editing was done by:

First published in 2002
Second edition, revised, published 2002
Third edition, revised, published September 2003
Forth edition, revised, published October 2006





Date: 21/6/2021
Project Number: PJ526
Project Title: Our Lady of the Immaculate Conception
Document Title: WSUD Version 1 - Draft

Appendix C Flow and Detention Calculations

Civil Engineers have completed stormwater flows and detention calculations. These are attached on the overleaf.