

# Soil & Water Management on Building & Construction Sites



## Where can I get further information on soil & water management?

Contact your local council, as they have the power and responsibility to regulate the building and construction industry. Usually they will issue a planning or building permit on condition that accepted guidelines for soil and water management are employed on site.

A Local Government Directory can be found on the Tasmanian Government's Department of Premier and Cabinet website [www.dpac.tas.gov.au](http://www.dpac.tas.gov.au) or on the Local Government Association of Tasmania website [www.lgat.tas.gov.au](http://www.lgat.tas.gov.au). Otherwise, check your phone book.

For additional copies contact the Derwent Estuary Program (03) 6233 3383 or NRM North (03) 6333 7777.

For updates on soil and water management on building & construction sites please visit [www.derwentestuary.org.au](http://www.derwentestuary.org.au).

**Acknowledgement:** some of the images used in this document have been kindly provided by SEEC Morse McVey, Tim Duckett, LMRS Pty Healthy Waterways South East Queensland and Brisbane City Council. They are the owners of the images and hold copyright to them.

## Introduction

The building and construction industry is responsible for soil and water management throughout all phases of a development. To comply with their responsibilities all sectors of the building and construction industry should have a practical understanding of the accepted guidelines for soil and water management. These guidelines will help mitigate the impacts of building and construction site activities on soils, landforms and receiving waters by focusing on erosion and sediment control measures.



## What is soil erosion?

Erosion is the removal of soil by the flow of wind and water. It occurs naturally, but can be intensified by building and construction activities. When erosion occurs soil particles become suspended in water or air and are transported downstream or downwind, eventually settling out as sediment, sometimes far away from the building or construction site.

## Why is soil & water management important?

Soil erosion on building and construction sites can be a major source of sediment pollution in our waterways. The amount of soil erosion during the building and construction phase is considerably higher than what may occur in the overall life of the completed property. In fact, a single building block can lose four truckloads of soil in one storm. Any sediment that moves off-site typically enters stormwater drains, clogging the stormwater system and transporting attached pollutants including oils, heavy metals and hydrocarbons into local waterways. Excessive sediment that enters our waterways can kill fish and aquatic plants, silt up streams, and block stormwater pipes, which can lead to increased flooding.

## What are the benefits of soil & water management?

- Greater compliance with the appropriate regulations including state environmental laws, thereby reducing the risk of fines and other penalties.
- Improved wet weather working conditions, reduced downtime and earlier building completion.
- Fewer public complaints and a better public image for your business.
- Reduced stockpile losses and clean up costs.
- Healthier waterways and a cleaner environment for everyone.





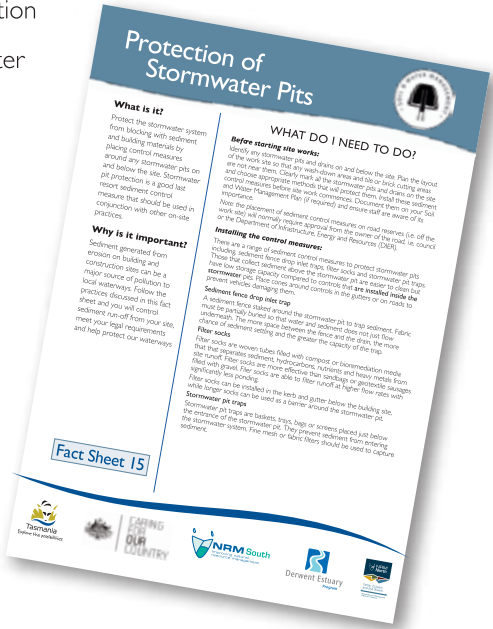
## What are my legal responsibilities?

- Developers and builders have a legal obligation to take ***all reasonable care*** to reduce soil erosion and prevent sediment loss from building and construction sites.This also applies to other tradespeople such as excavator operators, earthmovers, landscapers, concreters, painters and delivery drivers.
- Supervisors need to ensure that workers under their control (e.g. sub-contractors) do not breach regulations.
- Workers also have a responsibility under the law to notify their supervisors if they see a pollution incident occurring. If the supervisor cannot be contacted, workers should notify the local council.
- A \$600 fine can be served on-the-spot for discharging pollutants including sediment with a maximum penalty of \$36,000 if taken to court.
- Contact your local council to find out the legal requirements for your site.

## What are accepted guidelines for soil & water management?

The fact sheets represent accepted guidelines for soil and water management and are divided into sediment control measures and erosion control measures. Erosion control measures hold the soil in place and reduce soil removal by rainfall or runoff. Sediment control measures capture the eroded soil from the runoff preventing it from leaving the building or construction site.

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation



## How do I know which control measures to use for my site?

There are 19 fact sheets, each covering different sediment and erosion control measures.To determine which fact sheet(s) is/are applicable to your site check the title of the fact sheet and the top left box titled **What is it?** for a brief summary.

Remember, each site is different and sediment and erosion control measures need to be assessed on a site-by-site basis. Plan to integrate sediment and erosion control measures with different building and construction activities. It is also much easier and more cost effective to specify sediment and erosion control measures at the planning stage, rather than trying to organise them just before commencing on-ground works.

## How should the fact sheets be used?

Use the fact sheets as needed, but especially if there are soil and water management requirements on your planning or building permit. Implement the appropriate sediment and erosion control measures on site in accordance with your permit.

Subdivisions or activities creating greater than 250m<sup>2</sup> of ground disturbance may need to submit a Soil and Water Management Plan (SWMP) as a requirement of their planning or building permit. SWMPs are a standard method for planning and implementing sediment and erosion control measures on larger building and construction sites. See ***Fact Sheet 3. Soil & Water Management Plans*** for details.

## When do the control measures need to be in place?

Sediment and erosion control measures should be installed early, before the start of any ground disturbance and maintained in good working order throughout the building and construction period.They should remain in place until all disturbed areas have been stabilised, restored or sealed to the satisfaction of the council.

## Checklist for soil & water management

In summary, effective soil and water management on building and construction sites depends upon meeting the following practices:

- Select erosion and sediment control measures at the planning stage and integrate them with other design aspects including engineering design.
- If required, prepare a SWMP and make sure everyone working on the site understands it and how important it is not to pollute.
- Install sediment and erosion control measures before the start of any ground disturbance.
- Minimise the area of soil disturbed and exposed to erosion.
- Preserve existing vegetation.
- Divert ‘clean’ water flows away from the work site.
- Capture sediment from runoff before it leaves the site.
- Rehabilitate disturbed areas quickly.
- Inspect and maintain your erosion and sediment control measures throughout the project.

# Soil & Water Management on Large Building & Construction Sites



## What is this?

Sediment and erosion control measures are typically required for subdivisions and larger sites. The construction of subdivisions involves breaking land into smaller lots and installation of related services (roads, water, sewerage, power etc.). Due to the scale of land clearance and excavation, subdivision construction activities can cause excessive erosion and sediment loads in runoff, compared with the disturbance of building single house lots.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion and control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 1

## WHAT DO I NEED TO DO?

All works undertaken during subdivision construction are normally 'controlled' through the principle contractor and site manager. This means the risks of erosion can be readily managed through appropriate guidance and supervision. Compared with the allotment building phase where there are different building contractors and subcontractors present on any given allotment it is easier to manage erosion and prevent sediment runoff at the subdivision construction phase.

### **Submit a Soil and Water Management Plan:**

Subdivisions or activities that create greater than 250 m<sup>2</sup> of ground disturbance may need to submit a drawn Soil and Water Management Plan (SWMP) to council as a requirement of their planning permit (see Fact Sheet 3).

On the SWMP clearly define and document who is responsible for maintaining the sediment and erosion control measures (installed during the subdivision phase) that will be used in the allotment building phase.

### **When designing subdivision works:**

- 1) Ensure that the subdivision conforms to the natural limitations presented by the topography and the soil so as to reduce the potential for soil erosion.
- 2) Make sure that land clearing is only being undertaken in conjunction with the development of each stage.
- 3) Develop the site in increments of workable size such that adequate sediment and erosion control measures can be provided as the subdivision progresses. The smallest practical area of land should be exposed at any one period of time.
- 4) Coordinate the sediment and erosion control measures with the different subdivision construction phases.
- 5) Limit soil exposure to the shortest feasible period of time.
- 6) Keep removed topsoil for respreading over the developed area.
- 7) Retain and protect natural vegetation wherever practical.
- 8) Install larger sediment controls i.e. sediment basins if site conditions are suitable.
- 9) Manage wind-borne erosion.



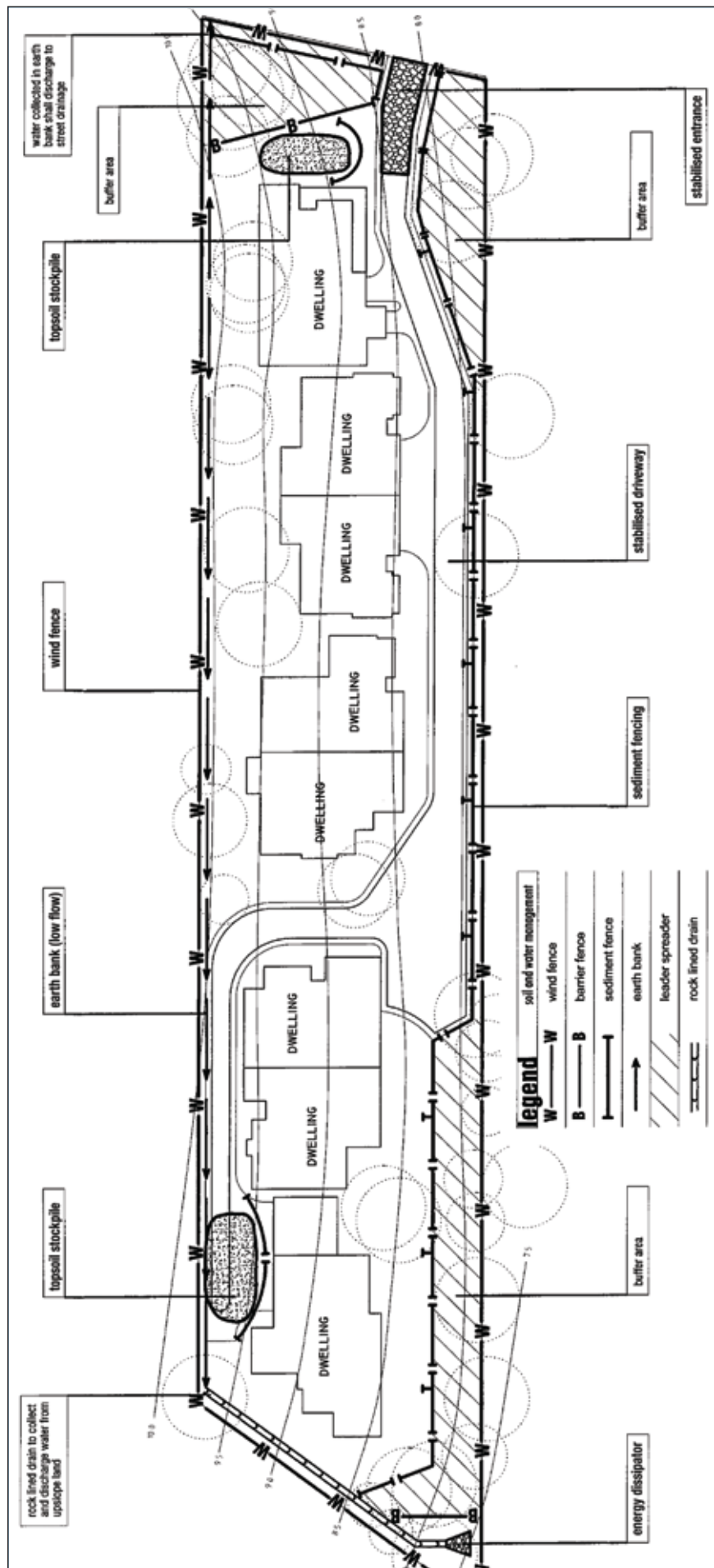


Figure 1A: SWMP for a subdivision.

## List of fact sheets

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18. Dust Control
19. Site Revegetation

### Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

### Acknowledgement:

Figure 1A after Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)". Some of the text in this brochure has been obtained and modified from the Brisbane City Council 2008 "Subdivision and Development Guidelines".

Date of Issue: December 2008



# Soil & Water Management on Standard Building & Construction Sites



## What is this?

A general overview of sediment and erosion control measures that are typically required for single residential building lots including when certain control measures should be installed. Useful for planning and for determining what practices might be suitable for your site. For further details about each of the control measures mentioned go to the relevant fact sheet in the series.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion and control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 2

## WHAT DO I NEED TO DO?

The timing of works and installation of control measures has a major influence on how effective soil and water management is in reducing on-site erosion and the amount of sediment that is carried off-site.

### **Before starting site works plan to:**

- 1) Schedule earthworks in phases throughout the project so that the ground is disturbed for the shortest time possible (**see Fact Sheet 5**).
- 2) Avoid stripping and excavating until all necessary permits, licences and approvals have been obtained and you are ready to start work.
- 3) Install erosion and sediment control measures in accordance with an approved Soil and Water Management Plan (if required) (**see Fact Sheet 3**).

### **Install erosion and sediment control measures in sequence:**

- 1) Choose a single, stabilised site access point (**see Fact Sheet 12**).
- 2) Install sediment fences or fibre rolls at the low end of the site to trap sediment (**see Fact Sheet 14**).
- 3) Divert up-slope catchment runoff around the site by installing a diversion drain and level spreader (**see Fact Sheet 7**).
- 4) Keep as much vegetation as possible to minimise soil erosion and reduce rainwater running across the site (**see Fact Sheet 6**).
- 5) Designate a location where topsoil and other excavation material will be stockpiled during building and construction. Provide suitable controls to prevent erosion (**see Fact Sheet 9**).
- 6) Stabilise areas of exposed soil with vegetation or erosion control blankets and mats (**see Fact Sheet 8**).
- 7) Protect the nearby stormwater system including any stormwater pits on and below the site from blocking up with sediment (**see Fact Sheet 15**).
- 8) Designate an appropriate location within the site where sediment-generating activities can be managed (e.g. wheel wash, brick cutting) (**see Fact Sheet 16**).

### **Once site works have commenced:**

- 1) Monitor sediment and erosion control measures at least once a week and after each rainfall event.
- 2) Construct service trenches away from where water is likely to concentrate. Try not to have service trenches open any longer than necessary (**see Fact Sheet 9**).
- 3) Prevent clean rainwater running across the site by connecting downpipes to the stormwater system as soon as the roof is on the building frame (**see Fact Sheet 10**).

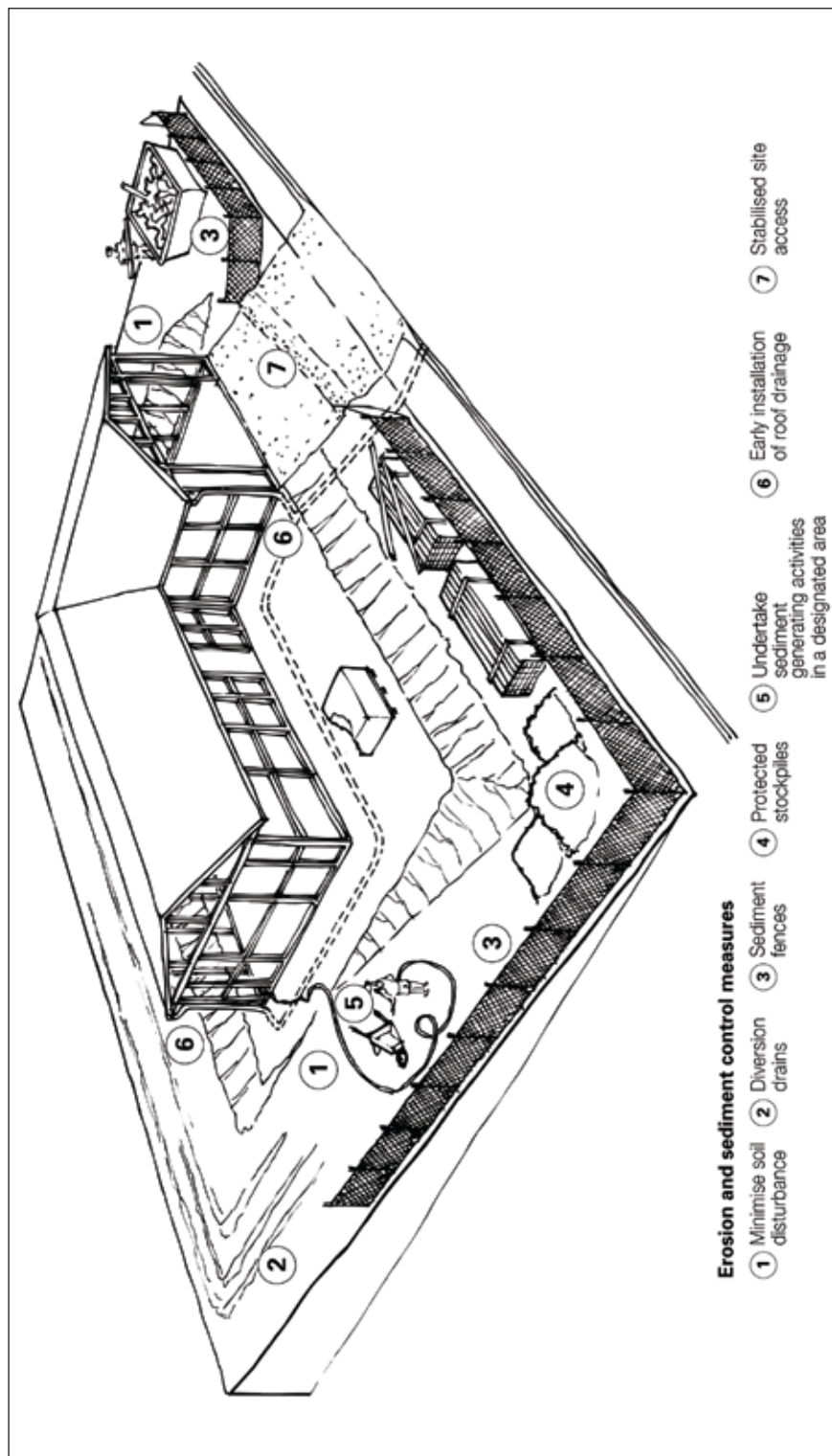


Figure 2A: Appropriate sediment and erosion control measures for single residential building lots.

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### Acknowledgement:

Figure 2A was kindly provided by South East Queensland Healthy Waterways Partnership and Brisbane City Council. Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008



# Soil & Water Management Plans



## What are these?

Soil and water management plans are specific site plans or drawings that detail sediment and erosion control measures on building and construction sites. The Soil and Water Management Plan (SWMP) shows the type, location, design, installation and maintenance schedule for all these measures and should be considered as the blueprint for controlling all anticipated erosion and for preventing sediment from leaving a site.

Subdivisions or activities that create greater than 250 m<sup>2</sup> of ground disturbance typically need to submit a SWMP to council with their building or development proposals prior to any site disturbance. Once approved by council, all building and construction works need to be conducted in accordance with the SWMP.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion and control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 3

## WHAT DO I NEED TO DO?

### **Prepare a SWMP (see Figure 3A):**

A SWMP can easily be developed by overlaying information on a copy of the engineering site drawings. The plan must detail the site development and all the systems intended to minimise erosion and trap sediment. On the SWMP show the following:

- 1) Date and author.
- 2) North point and scale.
- 3) Property boundaries.
- 4) General soil description.
- 5) Location and amount of ground disturbance.
- 6) Initial and final contours, location of watercourses, surface drainage and existing stormwater infrastructure.
- 7) Stormwater discharge point, if proposed.
- 8) Location of all proposed temporary drainage control measures.
- 9) Construction details (e.g. building or subdivision layout).
- 10) Location of vegetation to be retained and removed.
- 11) Location of stabilised site access.
- 12) Location of soil, sand or other material stockpiles.
- 13) Location and details of all proposed erosion control measures.
- 14) Location and details of all proposed sediment control measures.
- 15) A statement of who is responsible for establishing and maintaining all erosion and sediment control measures.
- 16) The installation sequence of the different sediment and erosion controls.
- 17) The maintenance program of the sediment and erosion controls.
- 18) The revegetation and rehabilitation program.

**Note:** Other details may be required depending on the specific requirements of the site, scale of the development and level of ground disturbance. Contact your local council for what information you are required to submit on your SWMP.

### Submit the SWMP to council for approval:

A SWMP may be a requirement of your planning or building permit. Ensure that the council has approved your SWMP; otherwise you may be in breach of your permit.

### Implement the SWMP and update as needed:

- 1) Keep a copy of the council-approved SWMP at the site at all times.
- 2) Ensure that all on-ground workers understand the SWMP.
- 3) Implement, update and maintain the control measures shown in the SWMP.

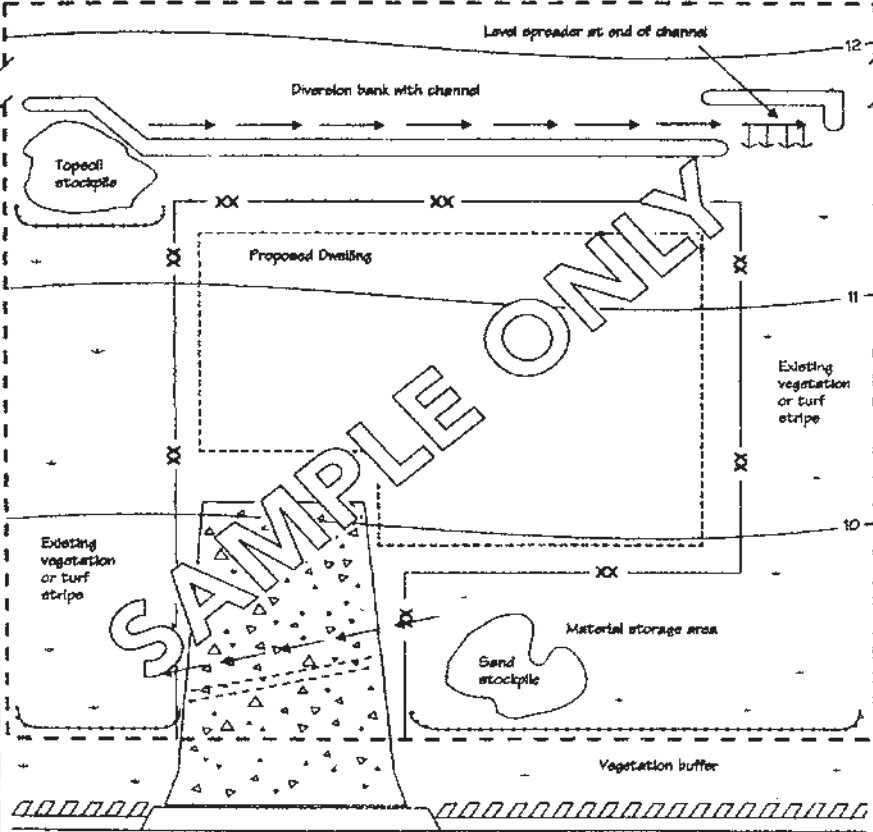
SOIL AND WATER MANAGEMENT PLAN															
<b>Legend</b>															
--- Property boundary	▤▤▤▤ Kerb/turf	--- XX --- Extent of clearing or disturbance													
- - - Dwelling site	→ → → Diversion channel	- - - Entry / exit pad bund													
--- Sediment fence	▢ Stabilised entry / exit point	--- 12 --- Contour line													
<b>Notes</b>															
1. All runoff and sediment control structures will be inspected each working day and maintained in a functional condition.		(Additional notes may be included on soil type, erosion control measures installation sequence and maintenance of control measures)													
2. All vegetation outside the building envelope will be retained.															
															
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Figure 3A: Example of a SWMP

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### Acknowledgement:

Figure 3A from Gold Coast City Council "Best Practice Guidelines for the Control of Stormwater Pollution from Building Sites". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008



# Dispersive Soils – High Risk of Tunnel Erosion



## What is it?

**Dispersive soils**, or **sodic soils**, collapse or disperse to form dissolved slurry when in contact with fresh water (rain). These soils are highly prone to erosion often leading to **tunnel** and **gully erosion**. Unlike other forms of erosion, dispersion and tunnel erosion result from an imbalance in soil chemistry.

- 1) Tunnel erosion occurs in all municipalities in Southern Tasmania.
- 2) Tunnel erosion results from a combination of both chemical dispersion and physical transport of dispersed clay particles.
- 3) Soils with greater than 6% exchangeable sodium are prone to dispersion.

Dispersion and tunnel erosion usually occurs in subsoils making early detection difficult. Building activities such as excavation, topsoil removal and ponding of rainwater all increase the risk of initiating tunnel erosion. Whilst wind, rain and water runoff are the typical causes of soil erosion on construction sites, the soil chemistry can also determine how prone it is to erosion. Chemistry of the soil determines how well it stays bound together when fresh water is added. Dispersive soils can be caused by high sodium content (i.e. >6% exchangeable sodium); hence they are sometimes called sodic soils. Typically dispersive soils are found in the subsoil as the topsoil is usually non-dispersive. All southern municipalities have dispersive soil risks and tunnel erosion is not uncommon. Dispersive soil can be very patchy in distribution with soil types changing over a few metres in distance, thus it is **very important** to look and test for signs of dispersive soil!

## Fact Sheet 4

## Why is it important?

Building and construction activities may increase the risk of soil dispersion and can result in the formation of tunnel erosion. Tunnel erosion initially results from the dispersion of clay soils in rainwater, but once the tunnels have formed they can quickly enlarge to form underground drainage paths. When the tunnels collapse they create gullies. Development of tunnel erosion in residential areas has resulted in damage to buildings, roads and septic systems leading to increased public health risks and major impacts on the environment.

During building and construction the runoff from areas of disturbed dispersive soils will contain large amounts of clay and will appear very cloudy. It is very difficult to remove this clay from freshwater without the addition of chemicals (e.g. gypsum). If this runoff enters local waterways it will reduce light levels and decrease water quality. Follow the practices discussed in this fact sheet and you will prevent erosion of dispersive soils from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### *Before starting site works:*

Always ask if there has been soil testing for dispersive or sodic soils, especially in the subsoils where they are more prevalent. An appropriate soil specialist can do this.

### *Installing the control measures:*

- 1) Minimise disturbance to topsoil and vegetation.
- 2) Choose building and construction methods that minimise the need for excavation and subsoil exposure.
- 3) Avoid concentrating water flow over areas that have dispersive topsoil or subsoils. If possible divert water to areas where the soil is not dispersive (**Note:** dispersive soils can be very patchy in distribution).

- 4) When diverting water, create diversion berms/banks by pushing the soil to create banks up hill, this maintains grass in the channel and reduces infiltration directly to the subsoil and the potential for tunnel erosion.
- 5) **Do not** create soakage pits in dispersive soils.
- 6) Immediately infill any trenches or holes to prevent collection and ponding of water on subsoil surfaces.
- 7) **Always** compact dispersive subsoils that have been disturbed or excavated. Dispersive soils require above average compaction. Consider using a 'whacker packer' for small areas or a sheeps foot roller for large areas. Apply gypsum or lime according to soil test recommendations during infilling and cover with topsoil and revegetate.
- 8) **Always** bury any exposed subsoils with topsoil and revegetate.
- 9) Top dress the surface of potentially dispersive soils with gypsum (if soil pH > 6.5) or lime (if soil pH < 5) or a mixture of both (if soil pH is within the range of 5 to 6.5) according to soil test recommendations to reduce dispersion.
- 10) Cover dispersive soils with a minimum 100 mm layer of non-dispersive soil prior to revegetation, or the placement of rock gabions, or concrete.

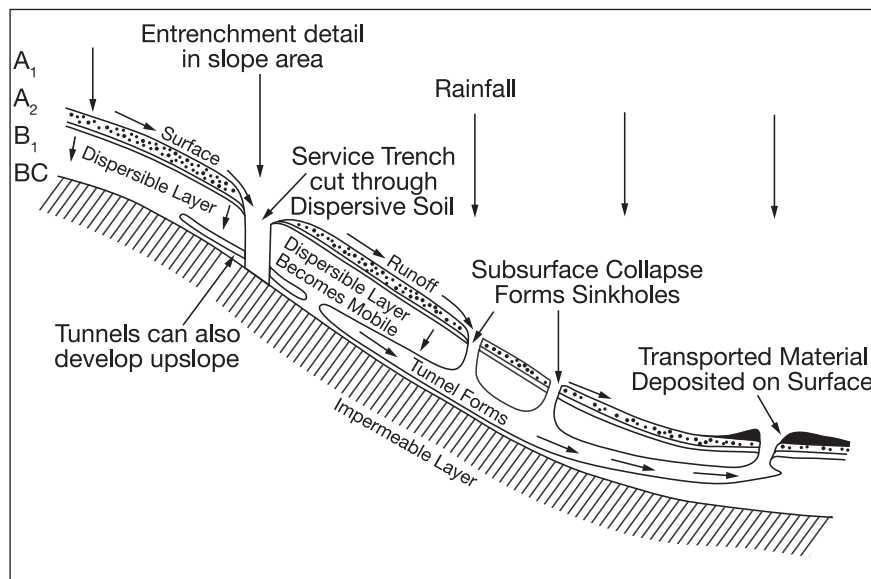


Figure 4A Tunnel erosion development in dispersive soils

**Note:** You can seek further information and advice on the issue of dispersive soils and tunnel erosion from several sources including: your local council, a soil surveyor, civil engineer or soil specialist, NRM South and the Land Conservation Branch of the Department of Primary Industries and Water (DPIW).

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### Acknowledgement:

Figure 4A after Department of Construction and Environment, Land Protection Division, Victoria "Field Erosion its Characteristics and Amelioration".

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# Minimise Soil Disturbance

## What is it?

Minimise soil disturbance to the greatest extent practicable. Earthworks should be kept to a minimum and should be closely linked with the commencement of building and construction work. To minimise risks, preserve native topsoil and natural vegetation and implement suitable sediment and erosion control measures (see other fact sheets in this series). Areas of soil disturbance on slopes should be roughened and terraced to reduce erosion.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 5

## WHAT DO I NEED TO DO?

### **Design considerations:**

- 1) Avoid the need for earthworks by working with the natural contours of the site. Limit building or construction on steep inclines. On slopes choose a subfloor method that will minimise excavation.
- 2) Limit the area of soil disturbance (the excavation envelope) to the minimum required, i.e. the house only.
- 3) Identify suitable sediment and erosion control measures for the excavation envelope.
- 4) Staging works. Consider scheduling earthworks in phases throughout the project to reduce erosion potential and rehabilitate exposed areas quickly to reduce the amount of soil exposed at one time.
- 5) Retain as much stripped topsoil as possible for reuse during landscaping and site rehabilitation.

### **Before starting site works:**

- 1) Ensure approval has been granted by council.
- 2) Identify vegetation, including grass buffers, around the construction site to preserve throughout the development. Mark this as a **No Go Area (see Fact Sheet 6)** on all work plans, including the Soil and Water Management Plan (if required) (**see Fact Sheet 3**).
- 3) Install sediment and erosion control measures.
- 4) Ensure the operators of earthmoving equipment are aware of the excavation envelope and where stockpiles will be located.

### **Once site works have commenced:**

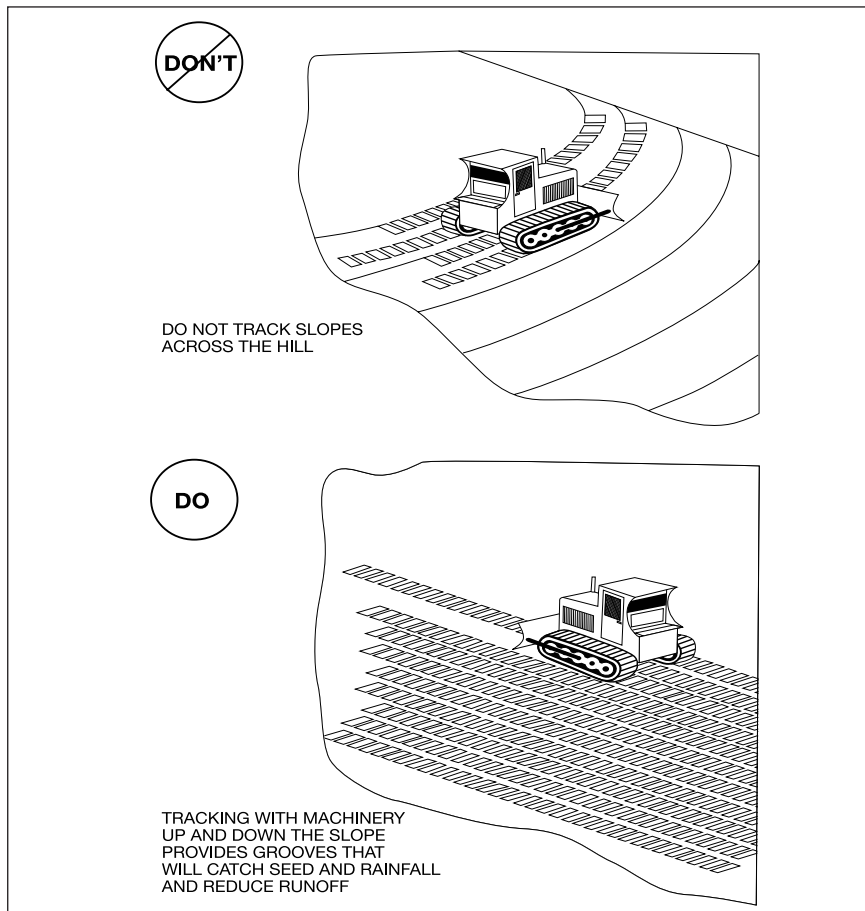
- 1) Ensure vegetation buffers are protected.
- 2) Carry out staged excavation and stabilisation (if applicable).
- 3) Maintain sediment and erosion control measures.
- 4) Stabilise soil stockpiles by placing sediment fences around their lower edges, cover with fabric, plastic or vegetation.
- 5) Restrict vehicles and equipment to designated areas.

**Soil roughening:** when using heavy machinery (i.e. non-wheeled vehicles) on exposed slopes.

**Don't** smoothly grade slopes with compacted soils. This will increase runoff, is hard to revegetate and is highly susceptible to soil erosion.

**Don't** track heavy machinery across the slope. The track marks will create furrows that water will flow down when it rains.

**Do** track machinery (e.g. excavators) up and down the slope to create grooves from the wheels/or tracks that will catch seeds, fertilizer, and rainfall. The grooves will roughen the surface in a way that will slow runoff over the slope (see **Figure 5A**).



**Figure 5A:** Avoid moving tracked vehicles across the slope, unless the final pass involves tracking up and down the slope.

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16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

## Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

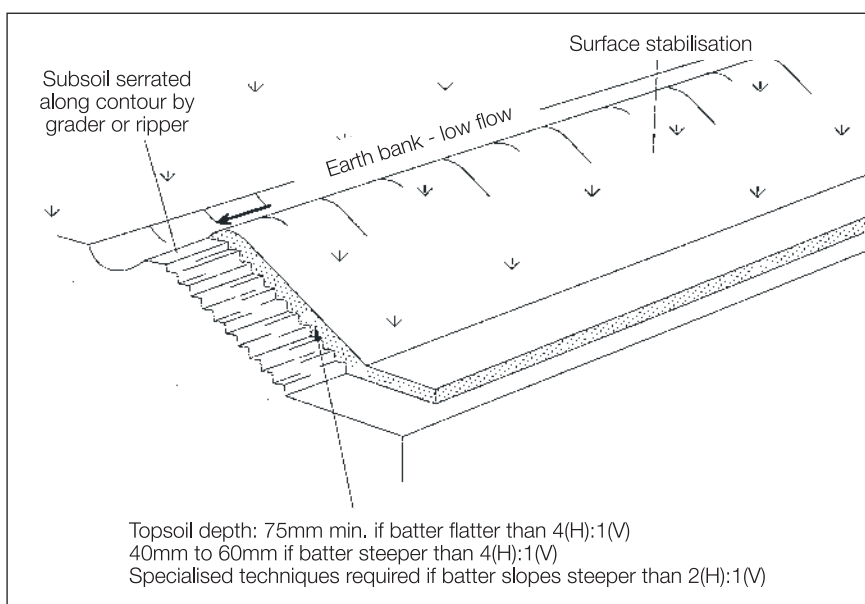
## Acknowledgement:

Figure 5A after California Regional Water Quality Control Board 1999 "Erosion & Sediment Control Field Manual". Figure 5B from Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

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## Maintaining control measures:

If topsoil has been removed it will need to be replaced (see **Figure 5B**).



**Figure 5B:** Replacing Topsoil.



# Preserve Vegetation



## What is it?

Keep as much of the original vegetation (grass, trees, etc.) on the site by establishing **No Go Areas** for the building and construction phase as well as vegetated filter strips down-slope of the work site. Preserving grassed areas, trees and shrubs protects the soil from erosion and provides an effective filter for sediment runoff.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Identify vegetation (trees, shrubs and grassed areas) on site which can be kept throughout the entire building and construction phase and mark this as a **No Go Area**. Include this information on the Soil and Water Management Plan if required (see Fact Sheet 3).

**Vegetation is the most effective soil stabiliser available on building and construction sites.** Keep groundcover along surface drainage areas and on steeper slopes. Retain significant areas of healthy grass down-slope of the worksite, these strips can be highly effective for filtering out coarse sediment. The flatter and wider the strips are, the more effective they become. Native vegetation along streams and waterways should be retained and protected from sediment by installing additional sediment control measures up-slope e.g. fibre rolls and sediment fences (see Fact Sheet 14). On exposed sites a 400 mm wide planted turf strip between the kerb and the footpath is a good last resort sediment control, filtering the runoff before it enters the stormwater system (see Figure 6A).

Where vegetation needs to be removed, leave it in place for as long as possible and stage earthworks to minimise the amount of site cleared at any time.

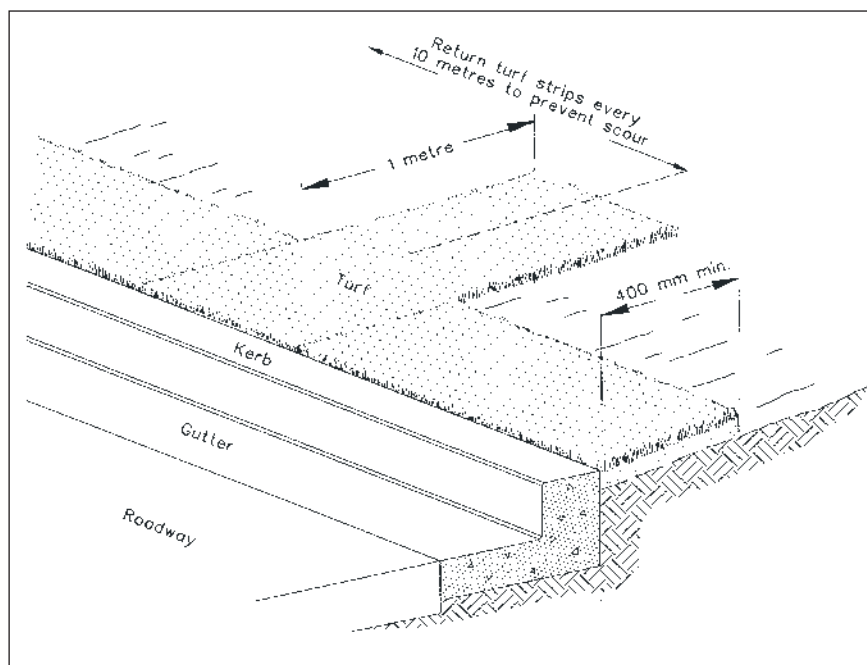


Figure 6A: Planted turf strip.

## Fact Sheet 6

**Installing the control measures:**

Fence off the **No Go Area**. Place red tape or other bright materials around the trees, shrubs and grassed areas to be kept. Ensure staff and subcontractors know not to enter these areas or damage marked trees. Where practicable, maintain the planted turf strip in a healthy state during the building and construction process and ensure it is fenced-off to prevent traffic-induced damage.

**List of fact sheets**

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance

**6. Preserve Vegetation**

7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
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**Remember:**

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**Acknowledgement:**

Text in this brochure has been obtained and modified from the “Do It Right On Site” brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils. Figure 6A from Landcom 2004 “Soils & Construction Volume I Managing Urban Stormwater (4th edition)”.

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# Divert Up-slope Water



## What is it?

Design surface drainage up-slope of building and construction sites to divert runoff away from the site. Where practical and particularly where stormwater runoff from more than 0.5 hectares feeds into the work site, divert up-slope water around the disturbed or active work area.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Look at the site plans to identify site areas where stormwater can be diverted around the disturbed or active work area. Stormwater can be diverted with the use of small diversion drains. Note that the stormwater must not be diverted onto adjacent properties; instead it must discharge the work site at a legal point of discharge. Diversion drains need to be properly designed to ensure that they can convey water without overflowing or accumulating sediment. Document the diversion drains on your Soil and Water Management Plan (if required) (**see Fact Sheet 3**). Ensure workers on-site are aware of the need to maintain the diversion drains. Do not dig diversion drains on dispersive soils (**see Fact Sheet 4**), instead build soil berms.

### **Installing the control measures:**

**Diversion drains:** A diversion drain is a channel constructed on the high side of a site to divert surface runoff from rainwater that would otherwise flow down onto the disturbed or active work area.

- 1) The channel should be about 150 mm deep with a curved shape.
- 2) Place the excavated soil from the channel on the down-slope side to increase the diversion drain's capacity.

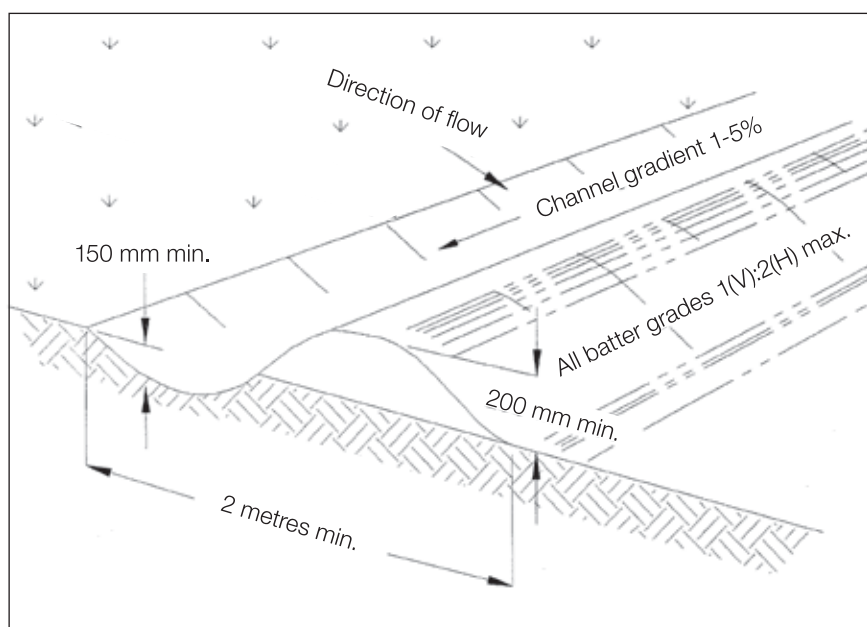


Figure 7A: Example of a diversion drain.

## Fact Sheet 7



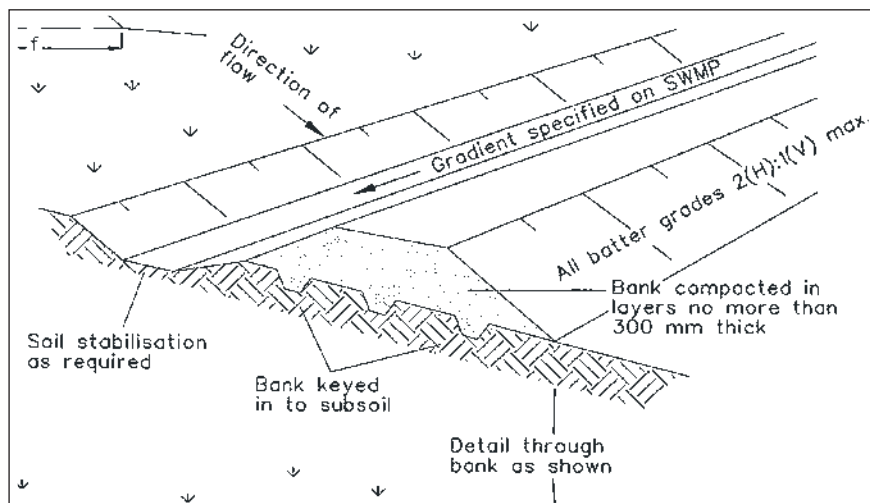


Figure 7B: Example of a diversion drain for high flow.

- 3) The diversion drain should divert flows to a stable drainage line to ensure that the channel does not itself cause erosion where it discharges.
- 4) The diversion drain should be kept clean and free of plantings and mulch as this will lead to the deposition of sediment that obstructs water flow and causes water to breach the channel and create unwanted erosion.

**Level spreader:** Level spreaders are generally used at the outlet of diversion channels. A level spreader is a wide, level overflow sill built across a slope. It allows even spread of water flow so velocities are reduced and soil erosion is avoided. This should only be constructed to release water to areas where the:

- 1) Water flow will not become concentrated.
- 2) Soil is stabilised and the site is not within the path of construction activities.
- 3) Ground remains well-vegetated.
- 4) Discharged water flow will be slow moving.

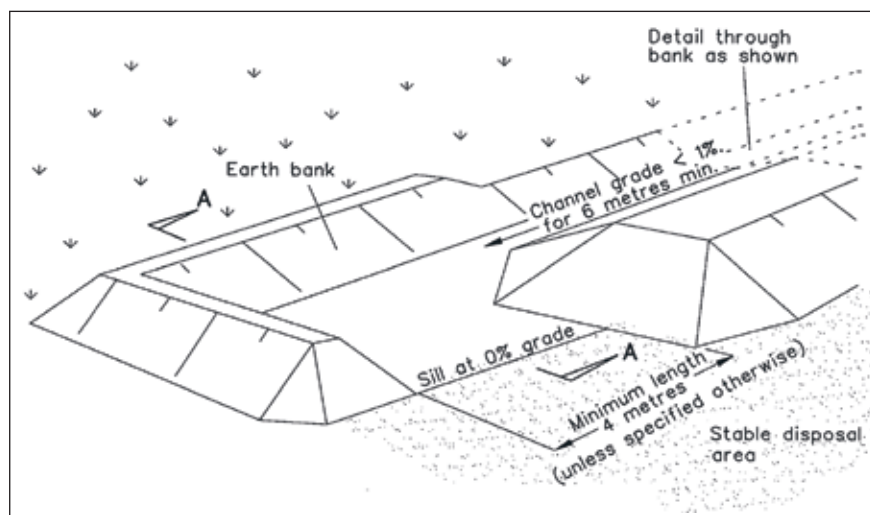


Figure 7C: Example of a level spreader used to release minor concentrated flows as sheet flow.

In some cases such as on steep slopes or where there are high flow velocities, a grass or geotextile fabric lined channel may be required to return the diverted flow to the stormwater system or a stable drainage line.

### Maintaining the control measures:

Check diversion drains, level spreaders and discharge areas for signs of erosion.

### List of fact sheets

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5. Minimise Soil Disturbance
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- 7. Divert Up-slope Water**
8. Erosion Control Mats & Blankets
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### Acknowledgement:

Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils. Figures 7A, 7B & 7C from Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)".

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# Erosion Control Mats & Blankets



## What are these?

Erosion mats and blankets are used as a soil cover and a protective barrier for vegetation establishment. They are applied on soils with a high erosion risk, on steep sites or for site rehabilitation. When applied correctly, they are one of the most effective and practical means of controlling runoff and erosion on disturbed land prior to vegetation establishment.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 8

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Identify where erosion is likely to occur i.e. areas of bare soil, especially on slopes steeper than 3:1 or when there is a delay in building and construction work or site rehabilitation. Select erosion control mats or erosion control blankets.

**Erosion control mats:** are heavier, synthetic and non-degradable, they are designed to add stability to soils and are often filled with topsoil, and vegetated when installed. Erosion control mats are suitable on slopes and in channel-lining applications.

**Erosion control blankets:** are light-weight and open-weave made from mulch, straw and wood fibre and held together by natural or synthetic netting. They are used for establishing and reinforcing vegetation. Their application depends on the blanket materials. Synthetic netting and wood fibre is stronger and can be used on steeper slopes compared to jute and straw blankets, which rapidly degrade and are more suitable for flatter areas. Check with suppliers of erosion control blankets about the applications of their different products.

Erosion control blankets can be used in conjunction with soil seeding, preventing the seed washing away and erosion of the prepared seedbed. Once established, the vegetation provides permanent erosion control.

Document erosion control mats and blankets on your Soil and Water Management Plan (if required) (see **Fact Sheet 3**).

### **Installing the control measures:**

Erosion control mats should be installed immediately on exposed soils, while erosion control blankets should be fitted on newly seeded or landscaped areas. See **Figures 8A and 8B** for their installation guidelines.

### **Maintaining the control measures:**

Close inspection after rainfall events and major runoff occurrences is essential. Check for damage due to water running under the mat or blanket or if it has been displaced by wind. Restabilise with anchor pins or wooden spikes. If significant erosion has occurred repair the fabric. Grading and reseedling may also be necessary. Continue inspections until vegetation is firmly established.

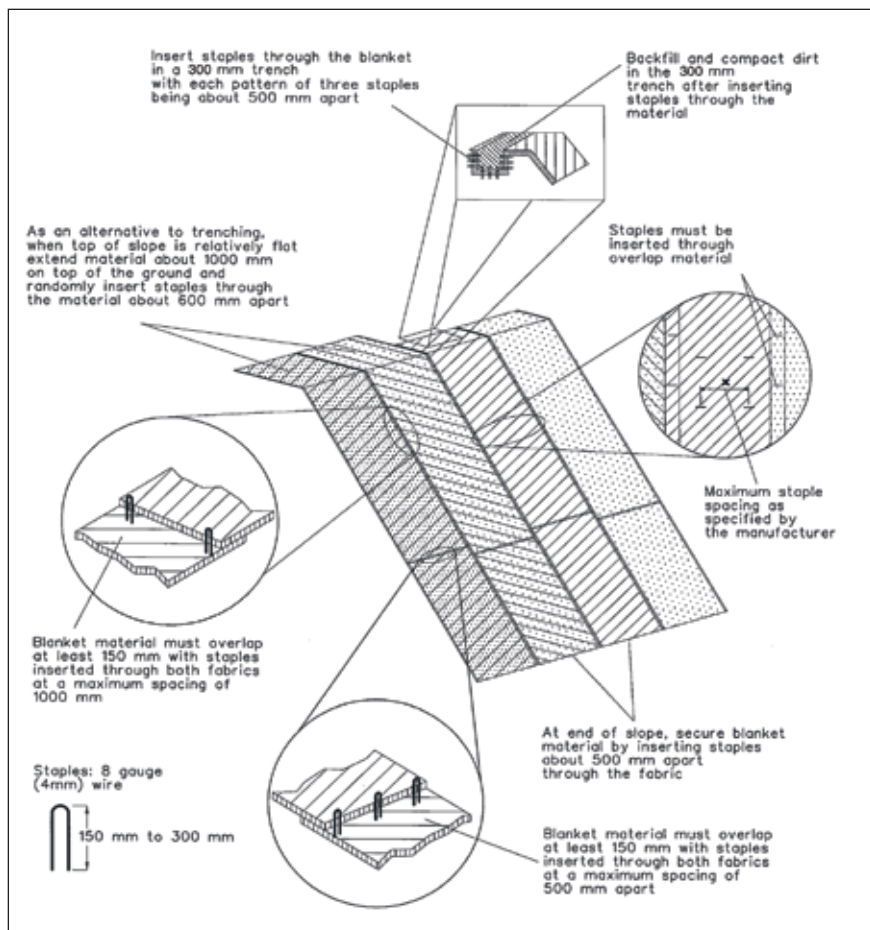


Figure 8A: Installation of an erosion control blanket on a hillside.

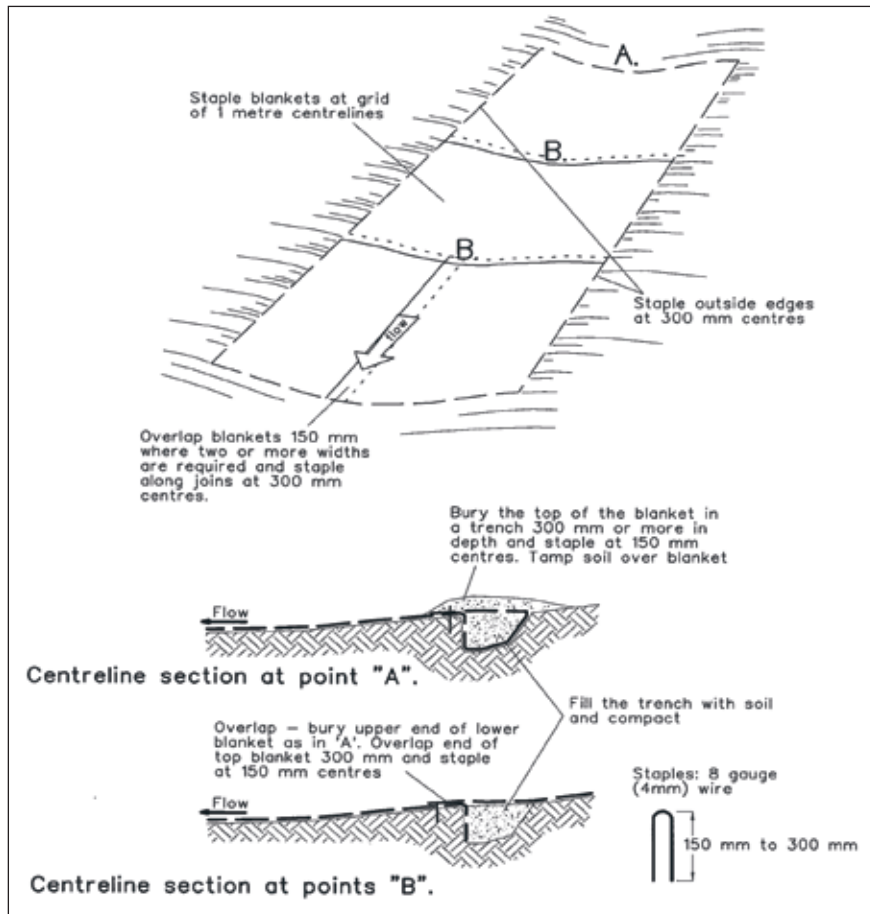


Figure 8B: Erosion control mat used to line a channel.

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### Acknowledgement:

Figures 8A & 8B from Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)".

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# Protect Service Trenches & Stockpiles



## What is it?

When excavated, service trenches can concentrate runoff and cause rapid soil erosion. This fact sheet discusses methods to install service trenches in a manner that does not cause soil erosion.

Temporary stockpiles are at risk of being washed or blown away. This fact sheet discusses proper on-site storage of materials such as sand, gravel, topsoil, mulch and woodchips.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 9

## WHAT DO I NEED TO DO?

### **Before starting site works:**

**Service trenches:** if your site has fine soil, protection measures may be needed. Decide where the service trenches will need to go and document them on your Soil and Water Management Plan (if required) (see **Fact Sheet 3**). Ideally they should be away from areas where water flow is likely to concentrate. Where possible coordinate the various service connections so a single trench can be used and quickly backfilled. Also try scheduling the work when rainfall is low. Be aware if you have dispersive soil (see **Fact Sheet 4**).

**Stockpiles:** avoid stockpile loss and stormwater pollution by limiting the amount of material on-site and remove all materials when work is complete. Identify a protected storage area for building material stockpiles away from on-site drainage or stormwater flow paths. Place control measures such as diversion drains up-slope or sediment fences down-slope. Cover the stockpiles with fabric, plastic or a temporary grass cover. Drivers delivering stockpile material should always use the protected storage area as the drop-off. Document your storage area on the Soil and Water Management Plan (if required) (see **Fact Sheet 3**) and ensure staff are aware of its importance.

**Note:** Don't stockpile sediment or building materials (sand, gravel, mulch) on roadways or within drainage areas.

### **Installing the control measures:**

#### **Service trenches:**

- 1) Remove and store vegetated topsoil so it can be replaced after works to provide immediate erosion protection.
- 2) Place the soil on the uphill side of trenches to divert water flow away from the trench line. Temporary bunds can be used.
- 3) The trench should be open for the shortest time practicable and avoid opening them when the risk of rainfall is high.
- 4) Once completed, backfill trench with subsoil and compact.
- 5) Replace top soil, level and top up to account for soil settling.
- 6) If trenches are on steep slopes, install earthbanks along the backfill surface at 6 metre intervals to divert flows and prevent erosion.
- 7) Excess soil should be used or disposed of in such a way that it does not create a wind or water erosion hazard.

#### **Stockpiles:**

- 1) Locate stockpiles at least 5 metres from stormwater flow paths, roads and hazard areas.
- 2) Place on gently sloping ground (not level areas which tend to be overland low paths) as a low, flat, elongated mound.

- 3) Stockpiles should preferably be less than 1.5 metres high.
- 4) Construct an earth bank on the up-slope side to divert runoff around the stockpile and install a sediment fence 1–2 metres down-slope of the stockpile. The height of the sediment fence should be equal to the stockpile height and the length equal to the stockpile length at the base.
- 5) Stockpiled materials should be covered during windy conditions, rain or unattended periods. Topsoil stockpiles left for extended periods should be revegetated.

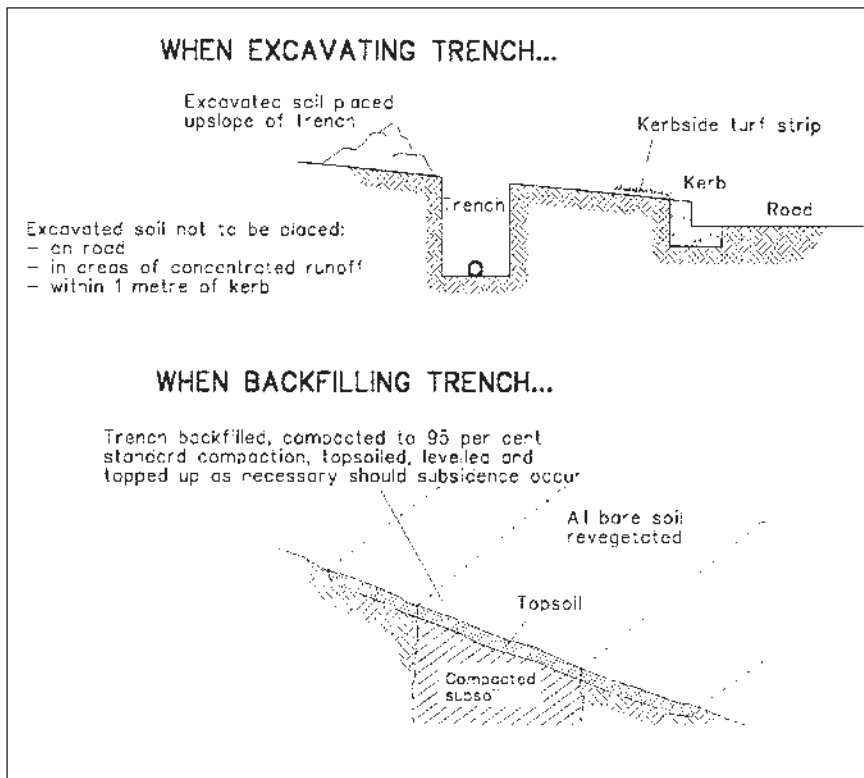


Figure 9A: Example of a service trench.

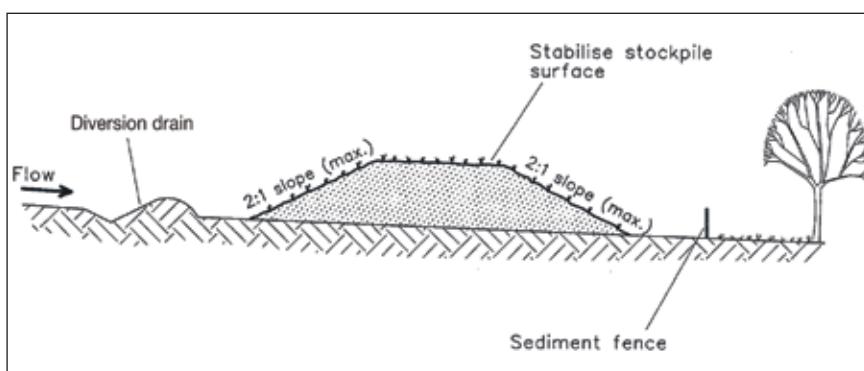


Figure 9B: Keep building materials in protected stockpiles.

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5. Minimise Soil Disturbance
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- 9. Protect Service Trenches & Stockpiles**
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## Acknowledgement:

Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils. Figure 9A from the NSW Department of Housing as in Hobart Regional Councils 'Guidelines for Soil & Water Management 1999'. Figure 9B from Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)".

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## Maintaining the control measures:

**Service trenches:** if they fill with water, pump water evenly over a stabilised vegetated area that will filter out the suspended clays. If this is not possible, add a small amount of gypsum to the water and allow the suspended clays to settle before pumping the water out.

**Stockpiles:** should be covered and checked regularly. Sediment and erosion controls (diversion drains and sediment fences) associated with stockpiles also need to be monitored and maintained.

# Early Roof Drainage Connection



## What is it?

Connect the downpipes to the stormwater system as soon as the roof is on the building frame. This control measure prevents 'clean' rainwater running through the disturbed or active work area.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Aim to have the roof and downpipes in place as soon as possible.

Document this on your Soil and Water Management Plan (if required) (see Fact Sheet 3) and ensure all on-ground staff are aware of its importance.

### **Installing the control measures:**

Connect the permanent downpipe or temporary ones such as flexible tubing. If pipes to the road can not be installed, pipe the water to a turfed area, or infiltration trench, where it can soak into the ground.

### **Maintaining the control measures:**

Check that the pipes are still connected whenever rain is forecast.

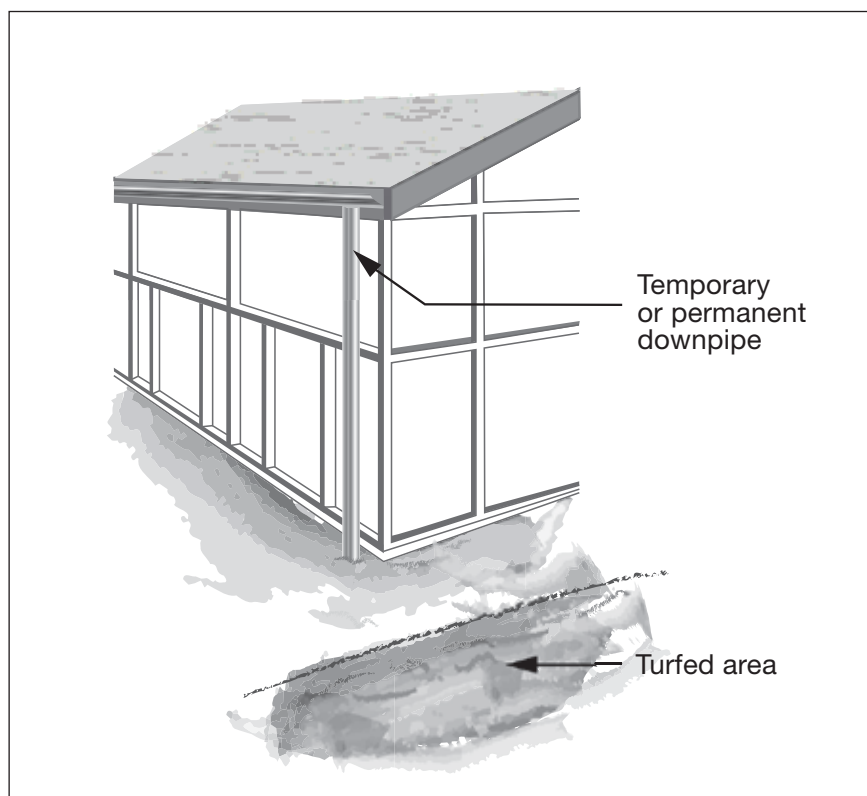


Figure 10A: Early installation of roof drainage.

## Fact Sheet 10



## List of fact sheets

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Figure 10A and text in this brochure has been obtained and modified from the “Do It Right On Site” brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

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# Scour Protection – Stormwater Pipe Outfalls & Check Dams



## What is this?

At stormwater pipe outfalls or along open drainage channels use rocks, vegetation, or other materials to break up concentrated flows, reduce the velocity of flows to non-erosive rates and to stabilise the outflow point.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 11

## WHAT DO I NEED TO DO?

### **Before starting site works:**

**Stormwater pipe outfalls:** should be located in areas where there is a low potential for soil erosion (e.g. areas of naturally occurring rock). If this is not possible, create a hard rock scour protector (**see Figure 11A**). If the pipe is highly visible (e.g. along a creek-side walking trail), natural rock and vegetation placement can conceal the outfall. If the outfall becomes council infrastructure, appropriate design approvals are required.

**Check dams:** are semi-pervious (typically loose rock) dam constructions that are placed in a series along open drainage channels to detain and reduce the velocity of stormwater runoff. They are particularly useful on gently sloping channels up to 10% (10:1) grade, but only effective for draining small areas of land (less than 4 hectares). If high flows are anticipated it may be necessary to line the entire base of the drainage channel with rocks.

Check dams can be temporarily used until a drainage channel has become revegetated. Alternatively, check dams can be a permanent feature if water detention is required. However, the drainage channel must still be able to effectively convey water.

**Don't** place check dams in channels that are already grass-lined, unless erosion is expected.

**Don't** construct check dams using sediment fences or straw bales.

### **Installing the control measures:**

#### **Stormwater pipe outfalls:**

- 1) Fill material needs to be compacted to the density of the surrounding undisturbed material.
- 2) Place geotextile fabric over fill material.
- 3) Ensure that the rock work used for scour protection conforms to the required limits for water flow energy dissipation. (Ensure that the underlying geotextile does not sustain serious damage during the rock work phase.)
- 4) Repair any damage to geotextile areas with patches of geotextile (ensuring a 300 mm overlap with surrounding intact fabric).

**Note:** If low water flow has been determined for the stormwater pipe outfall, leave gaps in the rock work and plant into cuts in the geotextile.

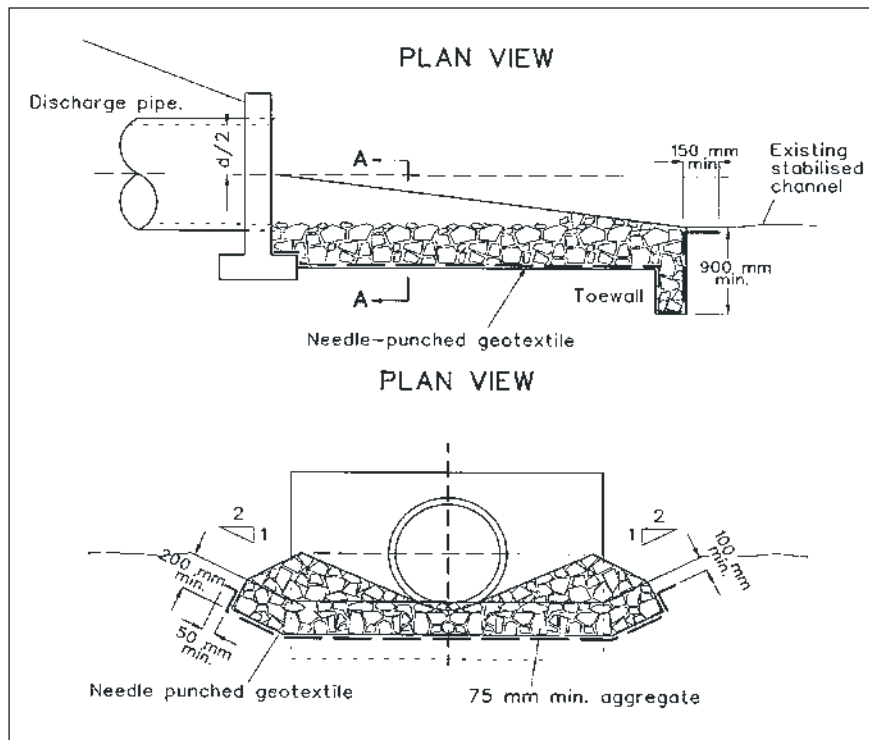


Figure 11A: Hard rock scour protector.

**Check dams:** these are appropriate for small channels with low flows that are susceptible to erosion (for larger channels or higher flows, specialist design may be required). A number of check dams will probably need to be built.

- 1) Excavate a shallow (200 mm) trench perpendicular to the drainage channel.
- 2) Construct the dam from aggregate (washed sand/gravel), placed in sandbags (for easy deconstruction). Place bags within the trench and build up the dam wall.
- 3) Ensure that the height of the dam spillway is less than 1 metre above the base of the drainage channel.
- 4) Ensure the dam height and spillway height does not dramatically impede water conveyance.
- 5) Space individual check dams so the toe of the upstream dam is level with the spillway of the next downstream dam. Otherwise extend downstream toe to provide erosion protection.
- 6) Check dams require regular maintenance as accumulated sediment needs to be removed, to prevent it becoming resuspended during subsequent storms.

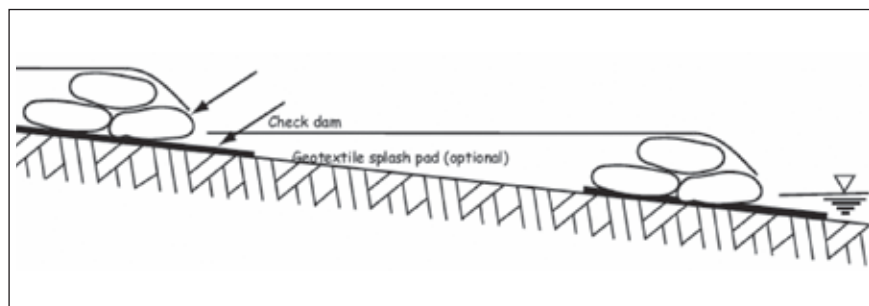


Figure 11B: Example of a check dam.

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#### Acknowledgement:

Figure 11A from Landcom 2004 "Soils and Construction Volume I Managing Urban Stormwater (4th edition)". Figure 11B from South East Queensland Healthy Waterways partnership 2006 "Best Practice Guidelines for the Control of Stormwater Pollution from Building Sites". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

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# Stabilised Site Access



## What is it?

A stabilised site access is a single entry/exit point for building and construction sites that is designed to reduce the tracking of sediment off-site. It provides a clean, dry surface for vehicles to enter and unload during all weather conditions without destroying vegetation or carrying large amounts of sediment onto paved road surfaces.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Identify the best location to place the stabilised site access – ideally it should be in an elevated position with little or no water flowing to it from up-slope and away from any down-slope stormwater pits. All deliveries should be able to be made through this point. Document it on your Soil and Water Management Plan (if required) (see **Fact Sheet 3**) and ensure on-site staff are aware of its importance.

### **Installing the control measures:**

The recommended construction method for the stabilised site access is laying down 200 mm of aggregate or recycled concrete greater than 40 mm in size (crushed sandstone is not suitable). Where the site access slopes toward the road, a diversion hump should be installed across the stabilised area to direct stormwater runoff to the side where it can be filtered by a sediment fence. If the construction process enables it, a permanent driveway can be laid and used as the access point.

### **Stabilised site access:**

- 1) Strip at least 150 mm of topsoil, level area and stockpile in the space available.
- 2) Compact infill.
- 3) Cover the area with geotextile.
- 4) Construct a 200 mm thick pad over geotextile using aggregate at least 40 mm in size, ideally from kerb to building.
- 5) Construct a trafficable diversion hump immediately within the boundary to divert water to a sediment fence or other sediment control measure.

**Note:** On larger sites cattle grids or shaker grids can also be installed at the access point. These allow the wheels to turn a couple of times and shake off excess sediment. If sediment is still being tracked off-site then a wheel wash should be installed (see **Fact Sheet 13**).

## Fact Sheet 12

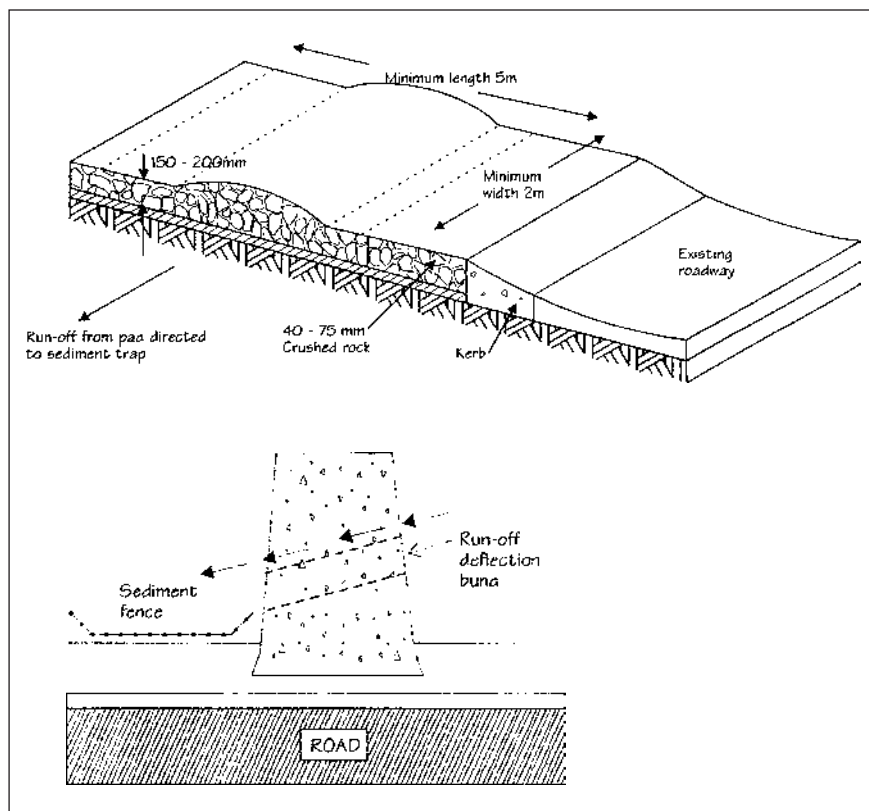


Figure I 2A: Stabilised site access for building sites only.

### **Maintaining the control measures:**

As vehicles use the stabilised site access they will slowly compact the gravel or rock. When it becomes too compacted the voids between the rock and gravel disappear and the stabilised site access will no longer trap mud and dirt.

Monitor the surface of the stabilised site access and ensure that it drains to the sediment fence or other sediment control measures. Add new gravel or rock as needed. Roads should be inspected for any sediment that has escaped the site at the end of each day and swept up if necessary. This should also be done whenever rain looks likely.

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1. Soil & Water Management on Large Building & Construction Sites
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3. Soil & Water Management Plans
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5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams

## **12. Stabilised Site Access**

13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

### **Remember:**

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### **Acknowledgement:**

Figure I 2A and text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

# Wheel Wash



## What is it?

A wheel wash reduces the amount of sediment transported onto paved roads by vehicles.

They should be installed on larger building and construction sites or when the stabilised site access is not preventing sediment from being tracked off the site.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### Installing the control measures:

- 1) Identify the best location to place the wheel wash. It should be incorporated with the stabilised site access (**see Fact Sheet 12**).
- 2) Construct a pad by evenly spreading a 200 mm layer of coarse aggregate or recycled concrete greater than 40 mm in size (crushed sandstone is not suitable) at a minimum depth of 300 mm.
- 3) Install a wash rack that is suitable for the anticipated traffic and weight loads.
- 4) The water used to wash the wheels of the vehicles shall not be discharged into stormwater system at any time. Provide a drainage channel that will convey the runoff from the wash area to a suitable on-site sediment control measure i.e. sediment basin (**see Fact Sheet 17**), sediment settling tank, or a flat vegetated area.
- 5) Ensure that the drainage channel used to transport the sediment to the sediment control measure is of adequate size and proper gradient to carry the wash runoff.
- 6) Make sure that the sediment control measure is also of adequate size.
- 7) Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
- 8) Require all employees, subcontractors and others that leave the site with mud or dirt caked tyres and undercarriages to use the wash facilities.
- 9) If weeds and plant disease are an issue for your site refer to "Tasmanian Washdown Guidelines for Weed and Disease Control 2004" from the Tasmanian Department of Primary Industries and Water, Forestry Tasmania and the Agricultural Contractors Association of Tasmania.

## Fact Sheet 13

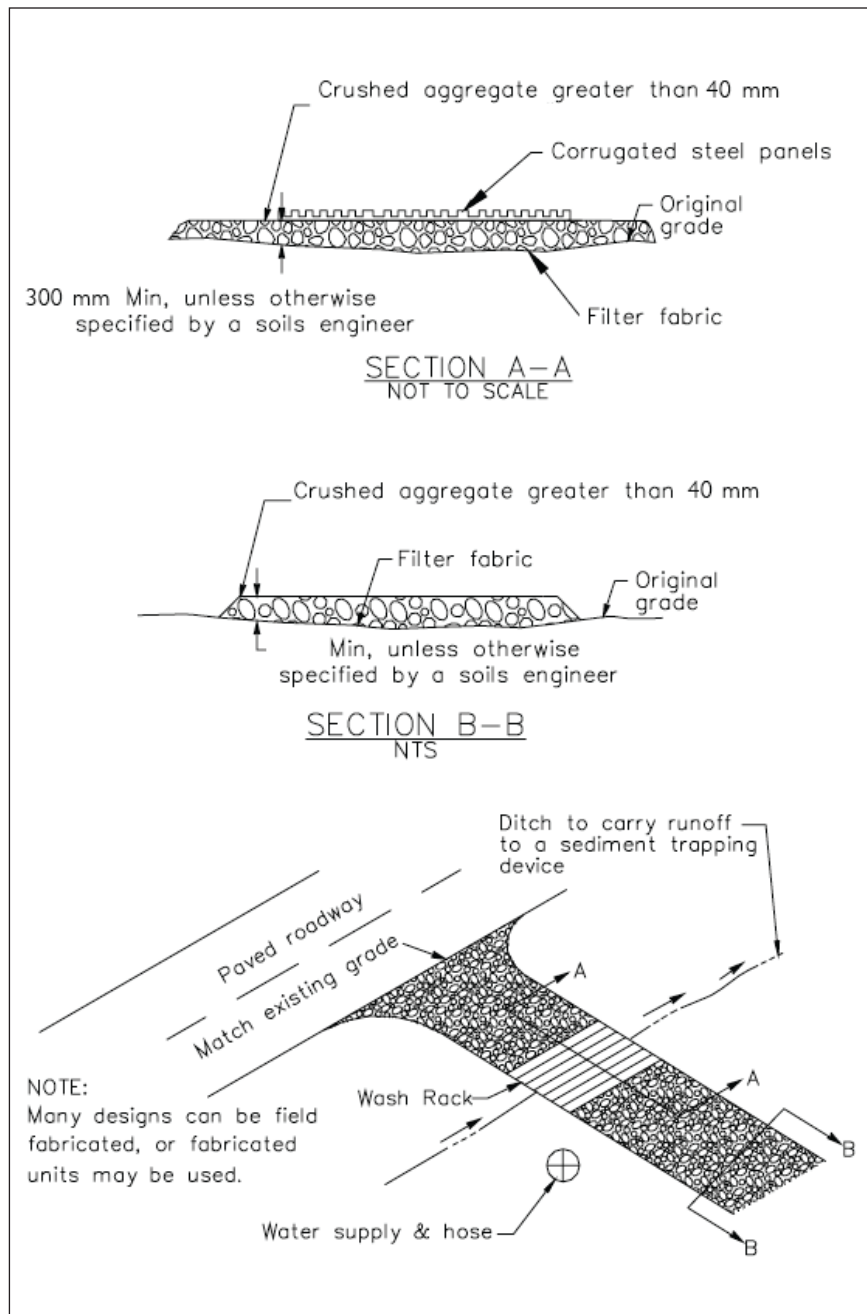


Figure 13 A: Wheel wash design.

### Maintaining the control measures:

The wheel wash should be inspected weekly and after a major rainfall event. Remove accumulated sediment from the wash rack to maintain system performance. This sediment should be collected and may need to be disposed to landfill.

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11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access

### 13. Wheel Wash

14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
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18. Dust Control
19. Site Revegetation

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### Acknowledgement:

Figure 13A after California Stormwater Quality Association 2003 "California Stormwater BMP Handbook Construction".

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# Sediment Fences & Fibre Rolls



## What are these?

Sediment fences and fibre rolls are sediment control measures installed across slopes or along the parameter of building and construction sites. Fibre rolls are a range of organic products (coconut fibre, straw, flax) that are rolled into large diameter logs. Sediment fences are vertical barriers made from woven geotextile that are held in place by star pickets and a backfilled trench.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

**Fibre Rolls:** are log-like products commonly consisting of biodegradable fibres. They vary from biodegradable rolled coir (coconut fibre) and hessian socks filled with straw or mulch, to non-biodegradable geotextile tubes filled with mulch or straw. Biodegradable fibre rolls can be left permanently onsite to assist stabilisation and will support vegetative growth if left in place.

**Sediment fences:** are a commonly used sediment control measure constructed from heavy-duty geotextile. Although a sediment fence looks like shade cloth it is very different (shade cloth is not appropriate because it cannot slow water flow enough to adequately pond water up-slope of the fence and allow sediment to settle under gravity).

### Before starting site works:

Identify drainage flow pathways that will intercept runoff from the site. Decide whether to use fibre rolls or sediment fences. Use fibre rolls at the base of an embankment, on slopes that are exposed, or on vegetated slopes where vegetation is failing to control erosion. Sediment fences should be used on small drainage areas and placed down-slope of potential areas of erosion. Document these measures on your Soil and Water Management Plan (if required) (see Fact Sheet 3).

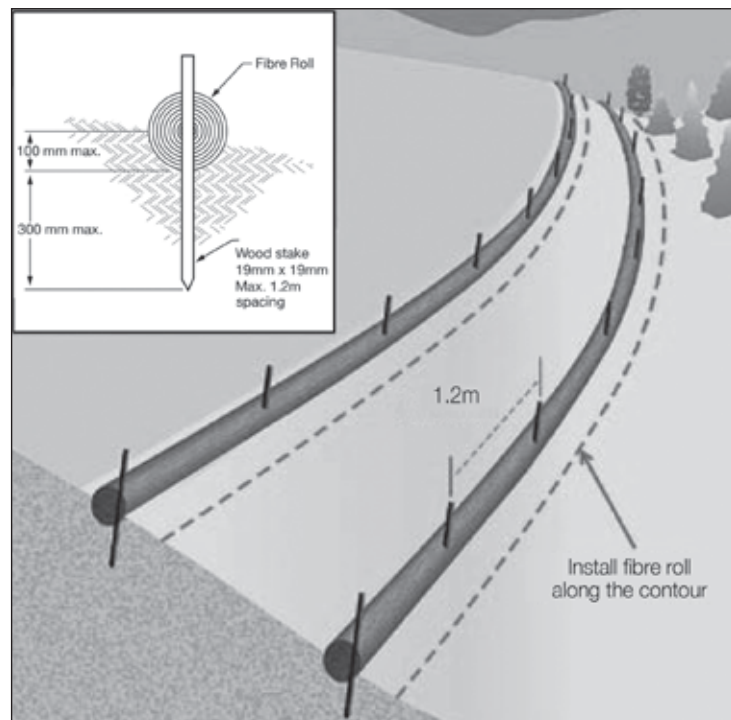


Figure 14A: Installation of fibre rolls

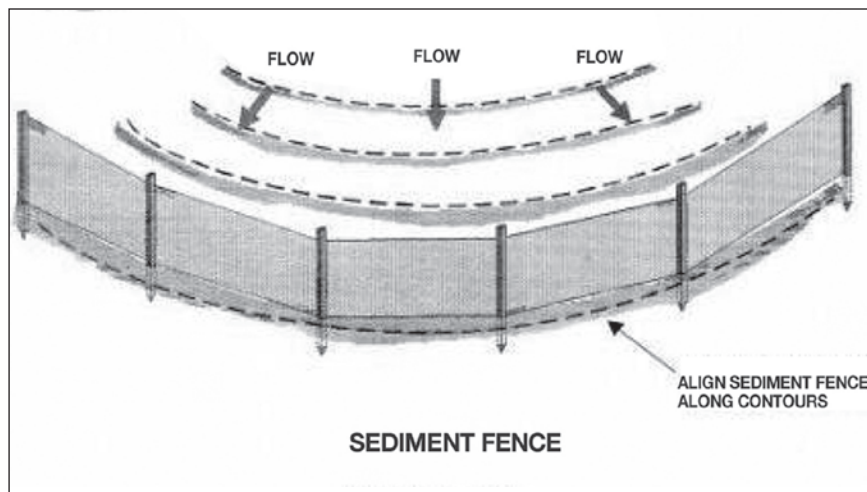
## Fact Sheet 14

### Installing the control measures:

Sediment control measures need to be in place prior to the start of site works. They can be altered after ground disturbance activities and if the site's drainage patterns change.

#### Installing fibre rolls:

- 1) Find a suitable installation site (if on a slope, place parallel to contours).
- 2) Remove large rocks and debris, and prepare a shallow concave trench (50–100 mm deep) to inset the fibre roll. (**Note:** Place excavated material on the upside of the fibre roll to prevent undercutting.)
- 3) Place the fibre roll in a shallow trench and stake through the fibre roll every 30 cm.
- 4) Place further stakes on both sides of the fibre roll to within 2 m from the end of the roll.



#### Installing sediment fences:

- 1) Survey and mark out location of sediment fence, ensure it is parallel to the contours of the site.
- 2) Dig a 150 mm trench immediately above the proposed fence line.
- 3) Place the bottom of the fabric to the base of the trench and run fabric up the down-slope side of the trench.
- 4) Backfill the trench and compact to secure anchorage of the fabric.
- 5) Drive 1.5 m star pickets into ground, 2 m apart to support the sediment fence fabric. Tension and fasten fabric to pickets using UV stabilised zip ties or wire ties.
- 6) Join sections of fabric at a support post with a 2 m overlap.
- 7) Angle the ends of the sediment fence upslope to reduce scouring.

**Don't** place sediment fences across creeks or major drainage lines.

### Maintaining the control measures:

Fibre rolls and sediment fences should be checked regularly, especially after every rain event and cleaned or repaired. For sediment fences check that all the pickets and the bottom of the fence are secure and that there are no tears in the fabric.

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#### Acknowledgement:

Figures 14A and 14B after California Regional Water Quality Control Board 1999 "Erosion & Sediment Control Field Manual".

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# Protection of Stormwater Pits



## What is it?

Protect the stormwater system from blocking with sediment and building materials by placing control measures around or inside any stormwater pits on and below the site. Stormwater pit protection is an important last resort sediment control measure that should be used in conjunction with other on-site practices.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 15

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Identify any stormwater pits and drains on and below the site. Plan the layout of the work site so that any wash-down areas and tile or brick cutting areas are not near them. Clearly mark all the stormwater pits and drains on the site plan and choose appropriate methods that will protect them. Install these sediment control measures before site work commences. Document them on your Soil and Water Management Plan (if required) (see **Fact Sheet 3**) and ensure staff are aware of its importance.

**Note:** the placement of sediment control measures on road reserves (i.e. off the work site) will normally require approval from the owner of the road, i.e. council or the Department of Infrastructure, Energy and Resources (DIER).

### **Installing the control measures:**

There are a range of sediment control measures to protect stormwater pits including, sediment fence traps, filter socks and stormwater pit traps. Those that collect sediment above the stormwater pit are easier to clean but have low storage capacity compared to controls that are installed inside the stormwater pits. Place cones around controls in the gutters or on roads to prevent vehicles damaging them.

**Sediment fence trap:** these are sediment fences staked around the stormwater pit to trap sediment. Fabric must be partially buried so that water and sediment does not just flow underneath. The more space between the fence and the pit, the more chance of sediment settling and the greater the capacity of the trap (see **Figure 15A**).

**Filter socks:** are woven tubes filled with compost or bioremediation media that separate sediment, hydrocarbons, nutrients and heavy metals from site runoff. Filter socks are more effective than sandbags or geotextile sausages filled with gravel. Filter socks are able to treat runoff at higher flow rates with significantly less ponding.

Filter socks can be installed in the kerb and gutter below the work site, while longer socks can be used as a barrier around the stormwater pit (see **Figure 15B**).

**Stormwater pit traps:** are baskets, trays, bags or screens placed just below the entrance of the stormwater pit. They prevent sediment from entering the stormwater system. Fine mesh or fabric filters should be used to capture sediment (see **Figure 15C**).

### **Maintaining the control measures:**

All sediment control measures should be inspected, especially after rainfall events and cleaned regularly to maintain effectiveness and prevent bypass. The built up material can be re-stockpiled and used on-site (if it is not contaminated), or otherwise disposed to landfill.

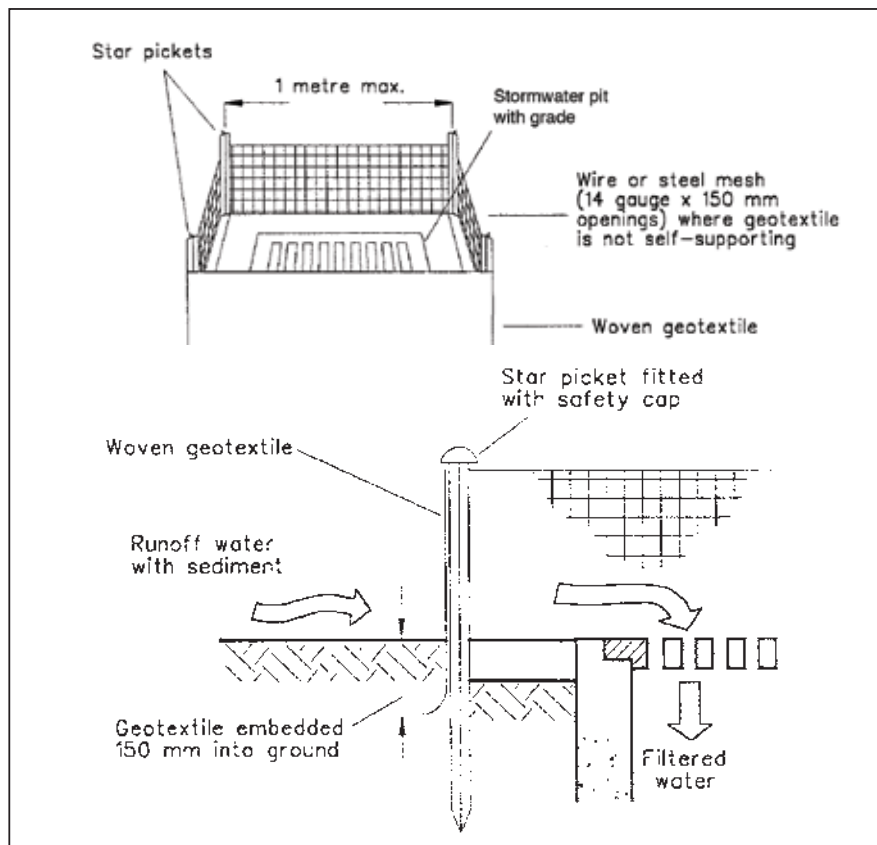


Figure 15A: A sediment fence trap.

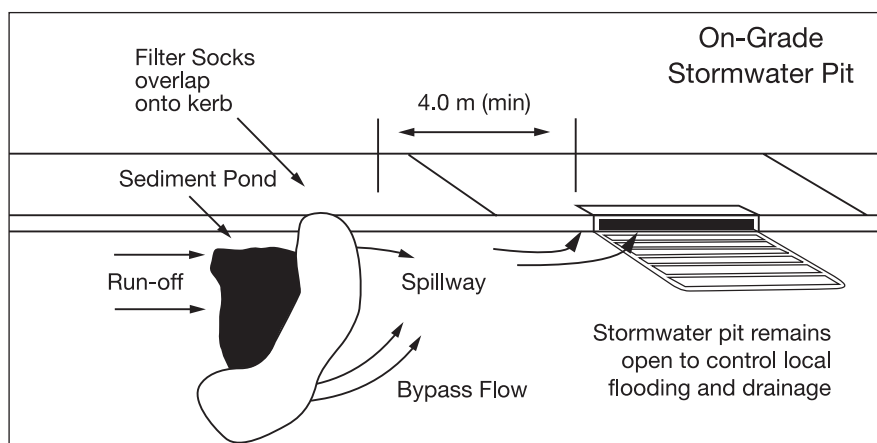


Figure 15B: A filter sock.

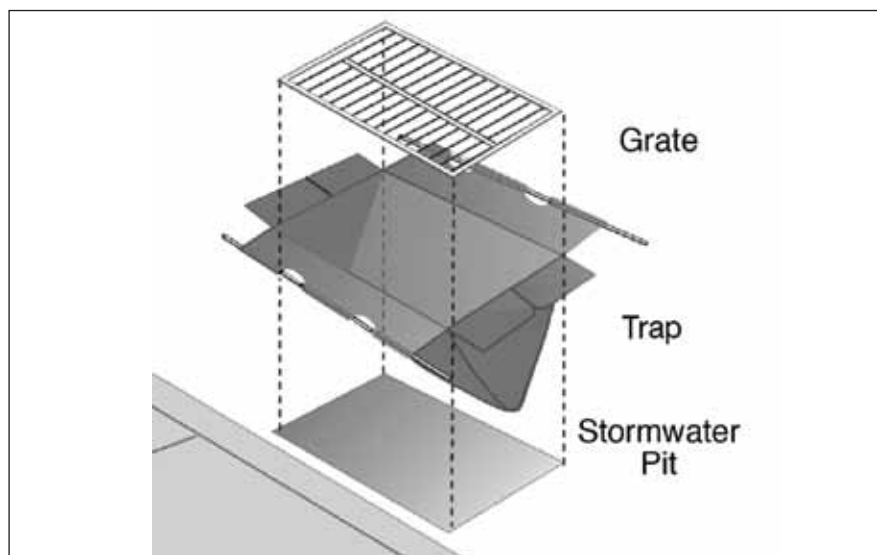


Figure 15C: Stormwater pit trap.

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### Acknowledgement:

Figure 15A from Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)". Figure 15B after South East Queensland Healthy Waterways Partnership 2006 "Best Practice Guidelines for the Control of Stormwater Pollution from Building Sites". Figure 15C after California Regional Water Quality Board 1999 "Erosion & Sediment Control Field Manual". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

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# Protected Concrete, Brick & Tile Cutting



## What is this?

Concreting, bricklaying, brick and tile cutting must be conducted in such a way that ensures no waste products enter the stormwater system. If washed into the stormwater system, brick and tile cutting, concrete and mortar slurries will harden and block stormwater pipes and potentially cause flooding. Cement also raises the pH of waterways making it alkaline which is deadly to aquatic animals.

## Why is it important?

Sediment generated from building and construction activities can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 16

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Find a location on the site away from stormwater pits and drains to undertake these activities, including mixing cement and mortar. This area should be large enough to contain all excess water, residues and waste.

Designate where associated building materials should be stockpiled, as this typically determines where this activity will occur. If the nature of the job requires cutting in a location close to stormwater pits or drains such as cutting a footpath then controls need to be put in place to ensure that no material enters the stormwater system. Identify site requirements and list them on the Soil and Water Management Plan (if required) (**see Fact Sheet 3**) before starting site works.

### **Installing the control measures:**

The designated brick or tile cutting area should have a diversion channel up-slope and sediment collection devices such as a sediment fence below it. If cutting in an area near a stormwater pit, use temporary collection devices such as filter socks, bunding or skirts suitably installed to direct the slurry onto a land area where it can soak into the earth. If this is not possible and the slurry is likely to flow to the stormwater system, filtering will be required. There are filtration systems available that work in the brick cutting machine with built in slurry containment systems, while for the kerb and gutter there are filter socks and for stormwater pits insert traps can be used (**see Fact Sheet 15**). The filtered water must not be cloudy when discharged to the stormwater system. Install a series of filtration systems for best results.

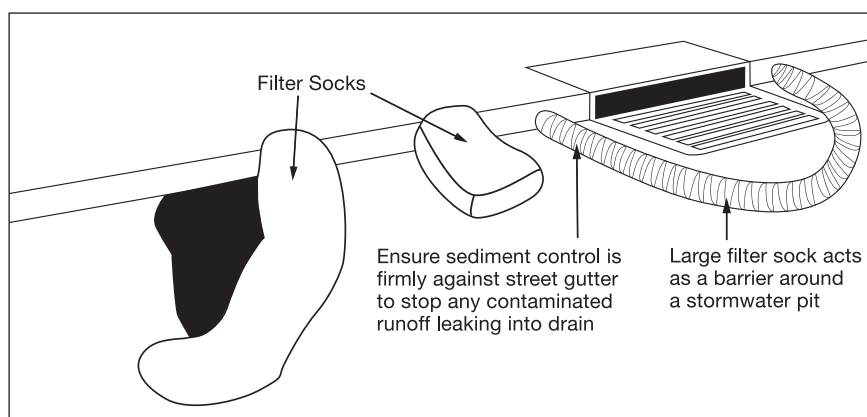


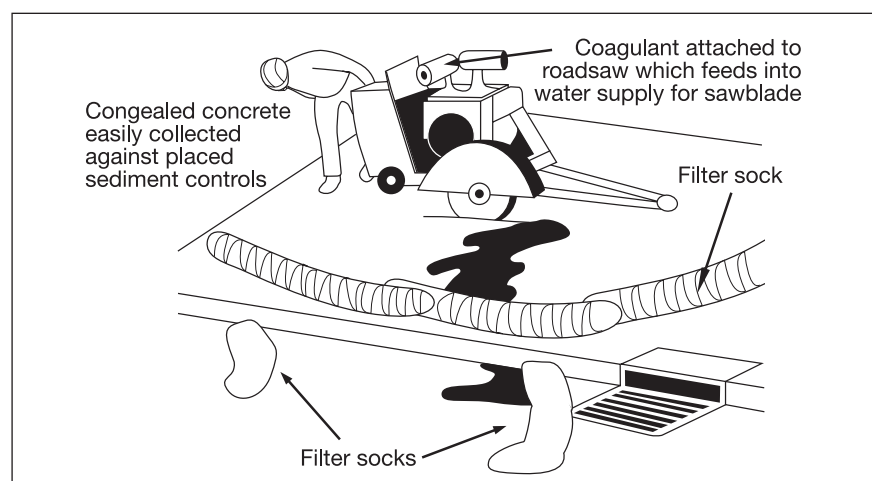
Figure 16A: Installing a series of filtration systems.

When equipment is washed down, use a designated wash-down area on-site e.g. wheel wash (**see Fact Sheet 13**). Waste concrete slurry can be safely disposed of by tipping small amounts into plastic or geotextile-lined ditches (**see Figure 16C**). This will enable the water to evaporate or soak in to the earth and the solids can then be disposed to landfill or reused as clean fill in construction or as road base.

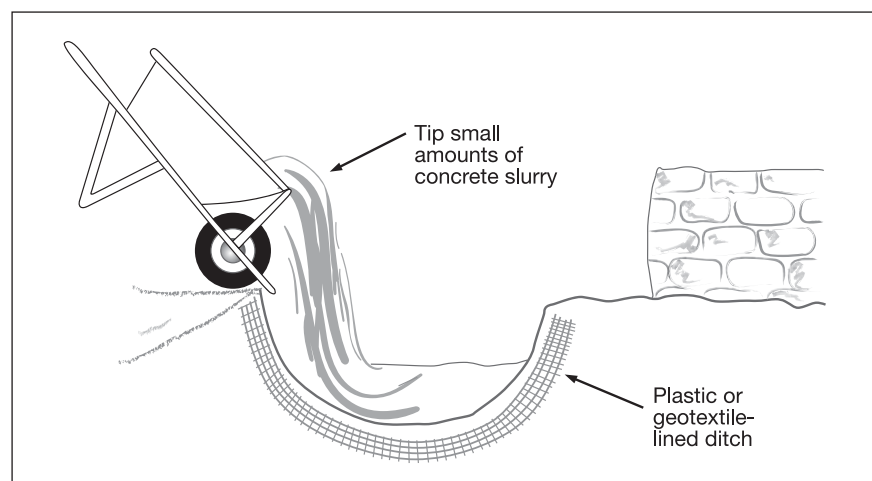
### **Maintaining the control measures:**

All sediment control measures will require regular cleaning to maintain effectiveness and over time may need to be replaced. Remove the built up sediment and check for holes, other breaks, clogging and blockages in the control measures.

Shovel or vacuum concrete, brick or tile cutting slurry to an area well away from the stormwater system. **Do not** hose down. If there is no designated disposal area, place slurry into a 40 gallon drum that is half full of water. Solid materials will settle to the bottom of the drum for later disposal and the water can be reused when concreting.



**Figure 16B:** Acceptable concrete slurry disposal method.



**Figure 16C:** Disposing concrete slurry into a lined ditch.

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### **Acknowledgement:**

Figures 16A, 16B and 16C after NSW Department of Conservation 2004 "Environmental Best Management Practice Guideline for Concrete Contractors". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

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# Sediment Basins



## What is it?

Sediment basins are dams or ponds that capture sediment runoff from building and construction sites. They allow sediment to settle out and sink rather than be transported away with the runoff.

Sediment basins are formed by constructing an embankment of compacted soil at the lowest downstream point on the site and installing an outlet structure and overflow spillway. They are one of the most useful and cost-effective measures for treating sediment-laden runoff.

## Why is it important?

Sediment generated from building and construction activities can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will control sediment run-off from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 17

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Sediment basins are typically required on large construction sites and subdivisions, or in areas of high seasonal rainfall. Sediment basins by no means trap all the sediment from a site. Therefore, sediment basins should be used in conjunction with other sediment and erosion control measures. Sediment basins should be constructed as a first step in any land disturbing activity and remain functional for as long as possible, ideally until the area contributing sediment is stabilised. Document the sediment basin on the Soil and Water Management Plan (if required) (**see Fact Sheet 3**). Detail on the plan how the basin will be maintained and decommissioned (if it is not a permanent on-site feature). Ensure that on-ground staff are aware of the need to maintain the sediment basin.

### **Design considerations:**

Sediment basins require a considerable area to be effective. The two major factors determining the size of the basin are the settling velocity of the sediment and design flows in regards to rainfall. Sediment basins should be designed to cater for peak flow runoff from a design storm having an average reoccurrence interval of 10 years.

Sediment basins need to be positioned so if failure occurs they will not cause damage or nuisance to property, people or the environment. **Do not** install sediment basins on major drainage pathways. Locate sediment basins off-line and up-stream of the stormwater system, natural and constructed water bodies.

Preferably construct basins at the lowest downstream point to intercept most of the runoff from the site. Access for machinery to remove sediment is crucial, as is an area designated for stockpiling the removed sediment so it can dry out (preferably with this water seeping back into the basin). The dried sediment can eventually be reused or disposed to landfill.

### **Installing the control measures:**

For suitable sediment basin design refer to the procedures in Chapter 4 of the *Water Sensitive Urban Design – Engineering Procedures for Stormwater Management in Southern Tasmania*, available from the Derwent Estuary Program web page:

<http://www.derwentestuary.org.au/file.php?id=145>

**Note:** For larger sediment basins a civil engineer can be used. They can provide detailed drawings to follow construction. It is essential that the engineer review/check the specifications of the proposed sediment basin to ensure it is correctly sized and down-stream risks are addressed in the event of basin failure. Sediment basins over one megalitre may require a dams permit.

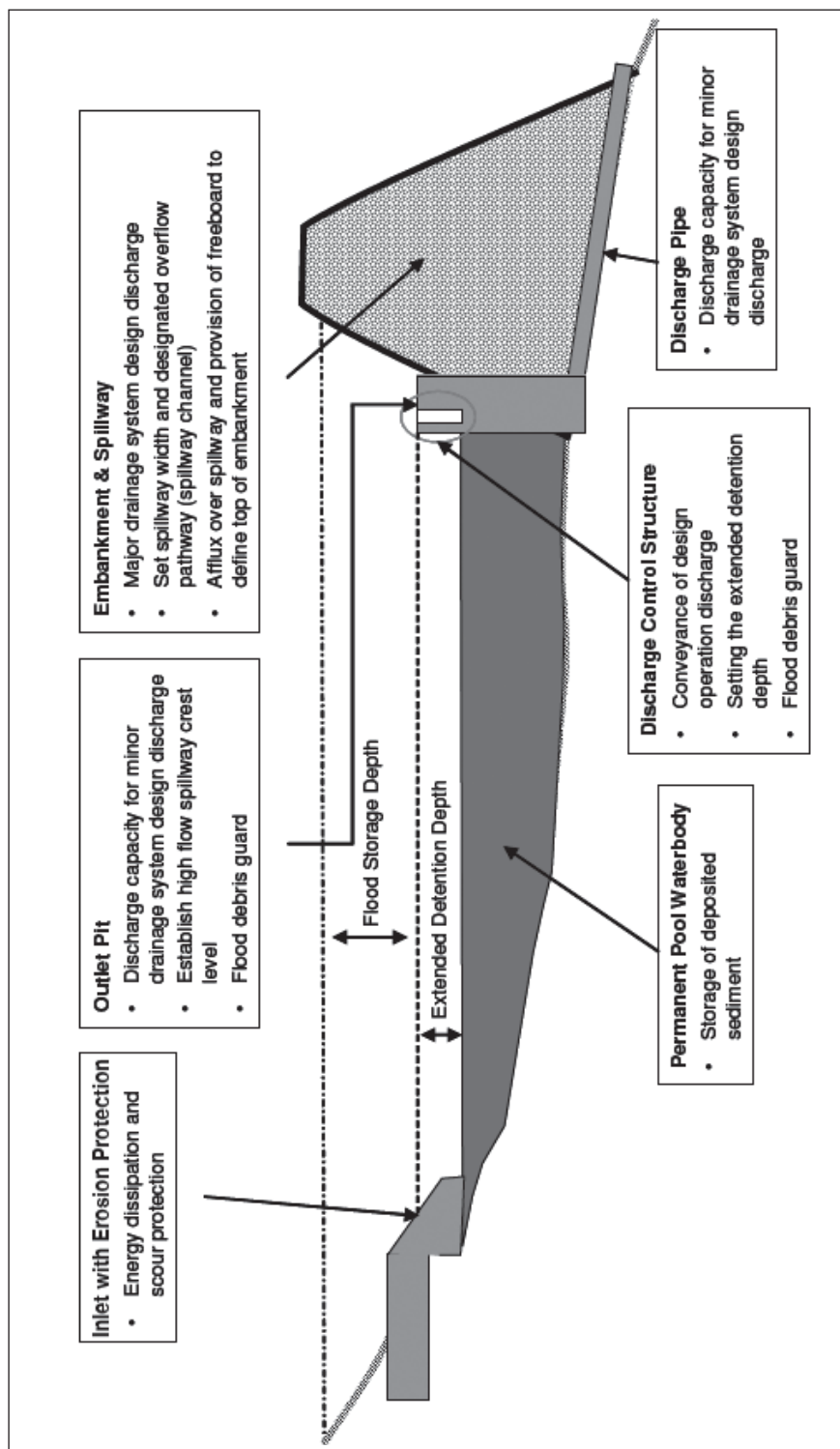


Figure 17A: Sediment basin.

### Maintaining the control measures:

Sediment basins require regular inspection, especially after rain events and should be cleaned when more than half full of sediment. Litter and debris should be removed whenever observed in the sediment basin. If the water within the basin is cloudy and never clears, apply gypsum to allow the sediment to settle out.

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### Acknowledgement:

Figure 17A from Derwent Estuary Program 2006 "Water Sensitive Urban Design – Engineering Procedures for Stormwater Management in Southern Tasmania".

Date of Issue: December 2008



# Dust Control



## What is it?

Minimise the amount of dust (soil, building materials and residues) generated by wind erosion on building and construction sites. Research shows that average dust emission rates of over 2.5 tonnes per hectare per month occur on sites which have no dust control measures in place. The control measures discussed can be used on any building or construction site where dust may be generated and where dust may cause on or off-site damage.

## Why is it important?

Sediment generated from wind erosion on building and construction sites can be a major source of pollution to local waterways. Follow the practices discussed in this fact sheet and you will minimise wind erosion from your site, meet your legal requirements and help protect our waterways.

## Fact Sheet 18

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Good site planning can eliminate dust being a problem.

- 1) Assess the dust potential of your site. Dust generating activities include major soil disturbances or heavy construction activity, such as clearing, excavation, demolition, cutting concrete or excessive vehicle traffic.
- 2) Decide upon dust control measures. A number of methods can be used to control dust from a site. The developer or builder will have to determine which practices are suitable based on specific site and weather conditions.
- 3) Document dust control measures on your Soil and Water Management Plan (if required) (**see Fact Sheet 3**) and ensure everyone working on the site understands them.

### **Installing the control measures:**

These control measures will help to reduce the amount of soil and building materials loose on the site and therefore the dust that can be generated.

- 1) Stage works and disturb only small areas of the site at a time.
- 2) Maintain as much vegetation as possible. Existing trees and shrubs act as wind breaks, slowing wind velocities and provide coverage to surface soils.
- 3) Install constructed wind barriers if there is high risk of dust generation. Wind fences divert the wind up and over the site. Ensure that it is semi-permeable otherwise down-wind turbulence can make erosion worse.
- 4) Dampen the site slightly with a light application of water during excavation or when dust is being raised (be careful to only moisten ground surface, do not wet it to the point of creating mud).
- 5) Apply mulch to recently disturbed areas. Mulch can reduce wind erosion by 80%.
- 6) Where vegetative cover and mulching cannot be used (i.e. on site roads and entrances) apply rocks and stones.
- 7) For large open areas deep ploughing (tillage) brings soil clods to the surface where they rest on top of the dust, preventing it from becoming airborne.
- 8) Install a wheel wash where vehicles and/or equipment exit the site. Alternatively, a stabilised site access can be used (**see Fact Sheet 12**).

- 9) Cover sand and soil stockpiles with fabric, plastic or vegetation.
- 10) Ensure that relevant equipment and machinery have dust suppressors fitted.

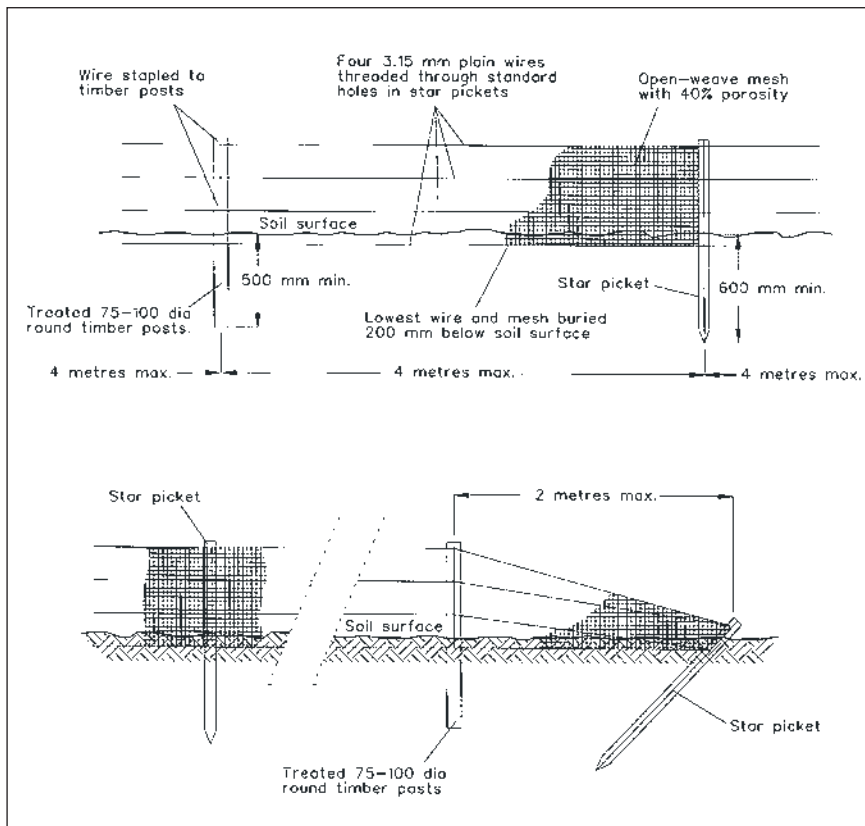


Figure 18A: Installation of a wind fence.

### Maintaining the control measures:

Dust control measures involving the application of water require more monitoring than structural or vegetative controls to remain effective. If structural controls are used, they should be inspected for deterioration on a regular basis to ensure that they are still achieving their intended purpose.

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19. Site Revegetation

### Remember:

*Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.*

### Acknowledgement:

Figure 18A from Landcom 2004 "Soils & Construction Volume I Managing Urban Stormwater (4th edition)". Text in this brochure has been obtained and modified from the "Do It Right On Site" brochure series, kindly provided by the Southern Sydney Regional Organisation of Councils.

Date of Issue: December 2008

# Site Revegetation



## What is it?

All areas disturbed by building and construction activities should be promptly and progressively stabilised through revegetation and landscaping to reduce the potential for erosion.

## Why is it important?

Sediment generated from erosion on building and construction sites can be a major source of pollution to local waterways. Follow the management practices discussed in this fact sheet and you will minimise erosion from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### **Installing the control measures:**

As you finish works in one part of the site, revegetate it. Vegetation is an ideal and usually inexpensive method of stabilisation because it reduces soil erosion by:

- 1) Absorbing the impact of raindrops.
- 2) Reducing the volume and velocity of runoff.
- 3) Binding the soil with the roots.
- 4) Protecting the soil from the erosive effects of the wind.

**Note:** Revegetation should not be expected to provide all the soil erosion protection required on your site. Other erosion control measures will be required if the soil is not stable due to its composition or slope. Erosion control mats and blankets should be used on steep slopes to provide temporary protection until the vegetation is fully established (**see Fact Sheet 8**).

**Temporary revegetation:** annual grass species (e.g. rye) are effective temporary ground cover because they are fast growing and can quickly establish a root system. They can be planted to prevent erosion where:

- 1) Exposed soil needs to be stabilised until permanent revegetation grows.
- 2) Temporary protection (between 6-8 months) is required until landscaping occurs.
- 3) A disturbed area will be left and then be re-disturbed as part of the site works (e.g. topsoil stockpiles).

**Note:** These annual grasses do not provide effective erosion control during their early growth phase (first few weeks) unless the soil is prepared with a mulch layer. Annual grasses die within one season providing limited soil coverage after about 6-8 months. They require watering until established, and may need mowing (without the collection of the cut grass) at least once before they can provide adequate soil coverage.

**Permanent revegetation:** options include seeding with perennial grasses (that will over time succeed the annual species), installing turf strips, and planting of native plants from seed, tube stock or invasion from surrounding bushland. If local seed stock is to be used for propagation it needs to be collected in advance. Advice on native plants and/or sources of seed stock can be obtained from your local council.

Seed the exposed topsoil, not the subsoil as the biological, physical and chemical characteristics of many subsoil materials inhibit the establishment of plants. Where practical to do so, a seedbed should be cultivated and

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moistened before sowing seed (see Figure 19A). This may require deep ripping to 300 mm where there is a compacted layer.

Include native species endemic to the region to enhance the ecological values and create an aesthetically pleasing environment. Native species have evolved to local environment and can establish themselves more quickly and vigorously than exotic species.

Some revegetation options may require mulching. Planting trees and shrubs tends to be more successful if combined with weed suppressing mulching and installation of tree guards and stakes. Apply mulch at a depth between 75-100 mm.

**Note:** Seeding, turf strips and native plants require sufficient irrigation for germination and to sustain plant growth if rainfall is poor. If the plants are slow growing other erosion control measures may be required until the vegetation is established and is able to prevent erosion.

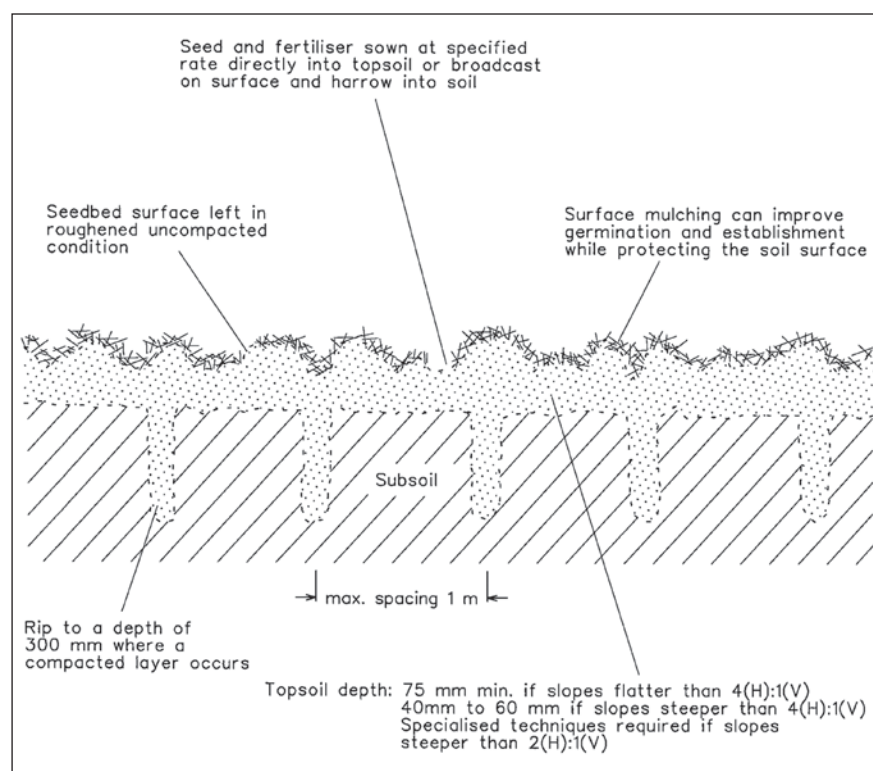


Figure 19A: Seedbed preparation.

### Maintaining the control measures:

A monitoring and maintenance program for site revegetation should be developed and implemented. It needs to include irrigation, mowing, weeding and appropriate remedial action such as replacing any lost topsoil and re-sowing the site. Once the site has been revegetated and is established to the satisfaction of the council it can be handed over to the new homeowner.

### List of fact sheets

1. Soil & Water Management on Large Building & Construction Sites
2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
4. Dispersive Soils – High Risk of Tunnel Erosion
5. Minimise Soil Disturbance
6. Preserve Vegetation
7. Divert Up-slope Water
8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control

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