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.

Fact Sheet 7

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.

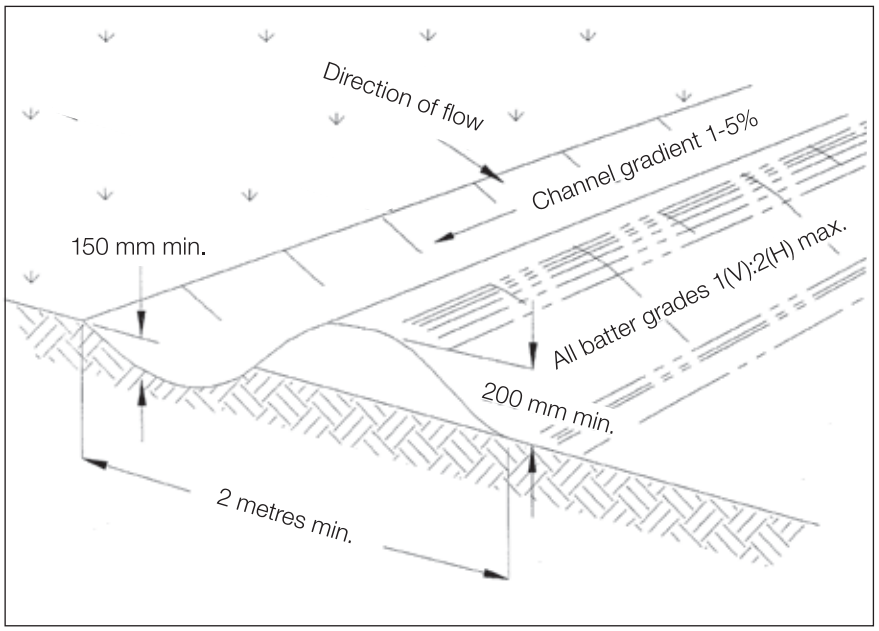

Figure 7A: Example of a diversion drain.

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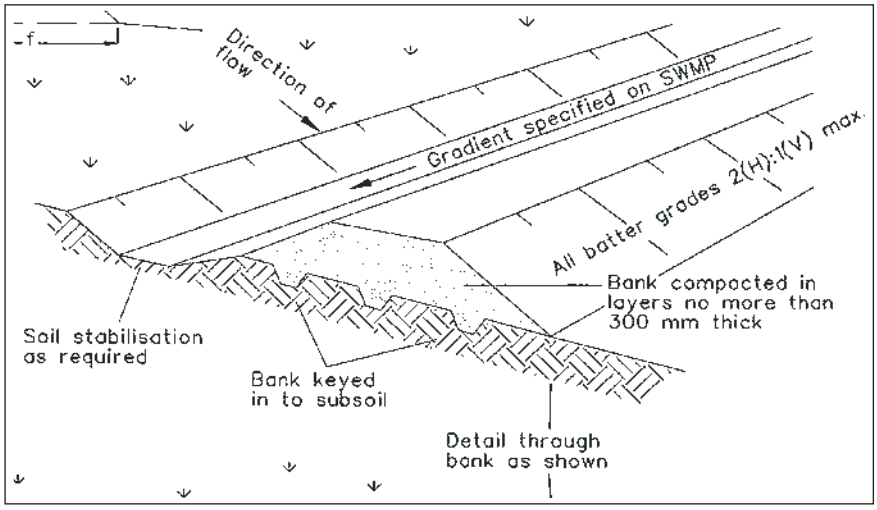

Figure 7B: Example of a diversion drain for high flow.

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.

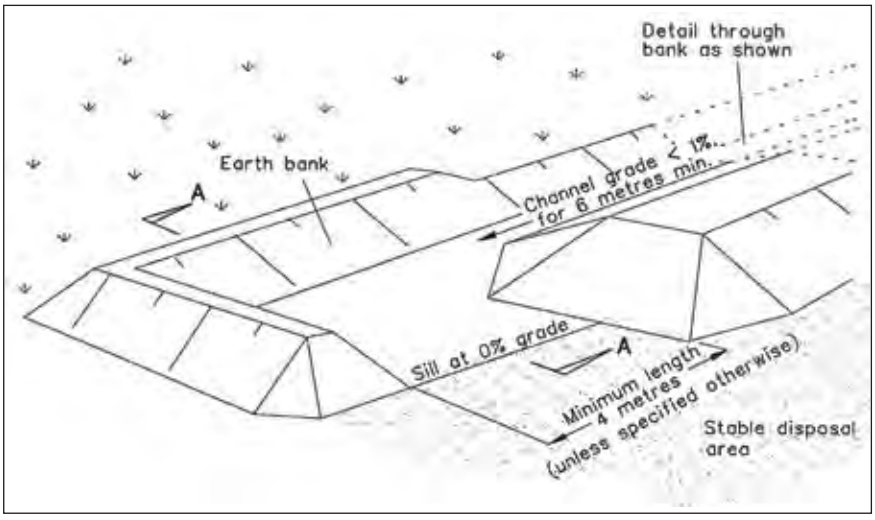

Figure 7C: Example of a level spreader used to release minor concentrated flows as sheet flow.

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.

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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. 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 reseeding may also be necessary. Continue inspections until vegetation is firmly established.

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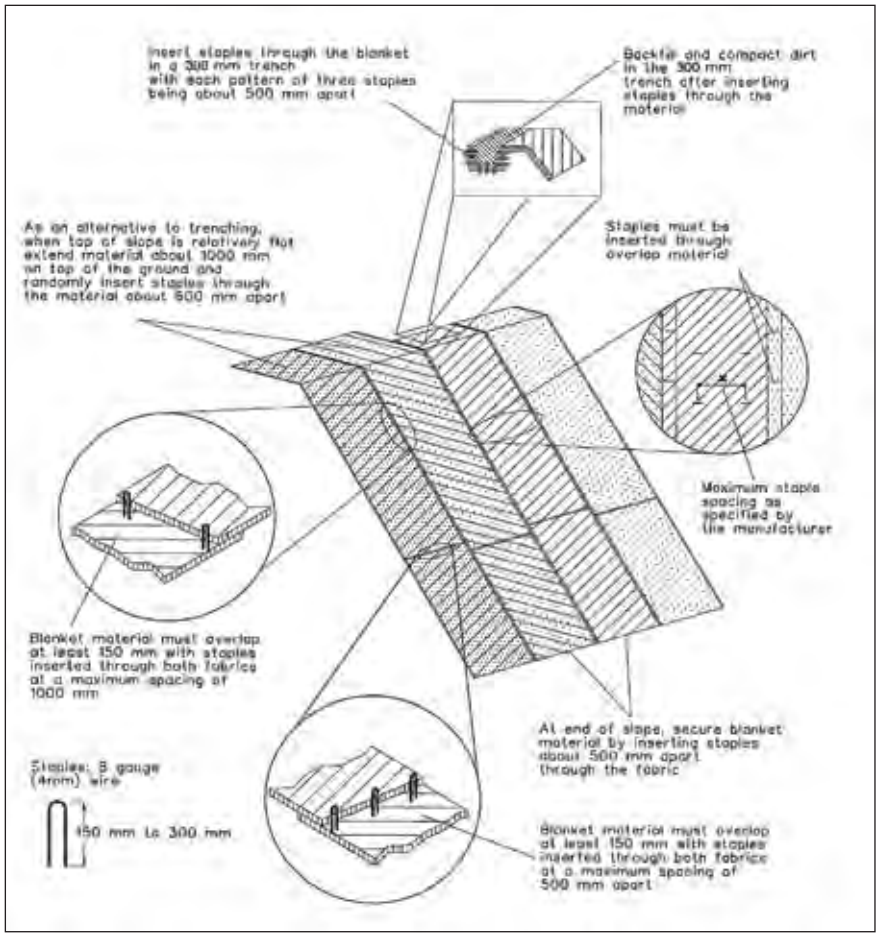

Figure 8A: Installation of an erosion control blanket on a hillside.

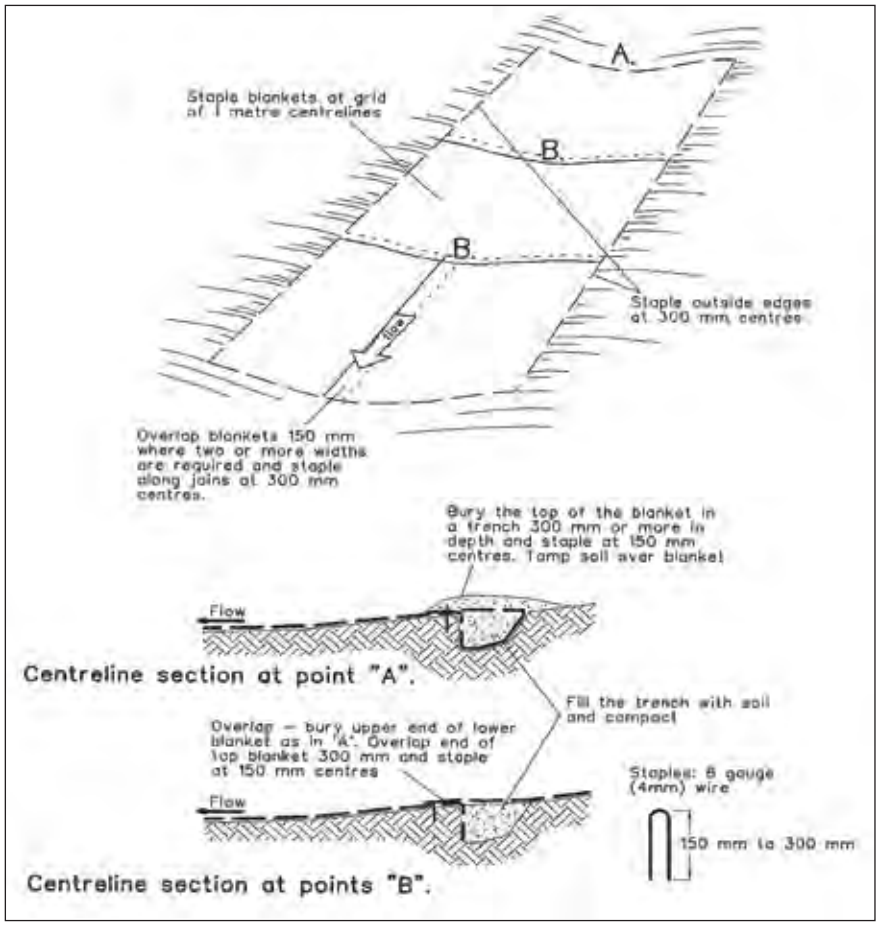

Figure 8B: Erosion control mat used to line a channel.

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Acknowledgement:

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

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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.

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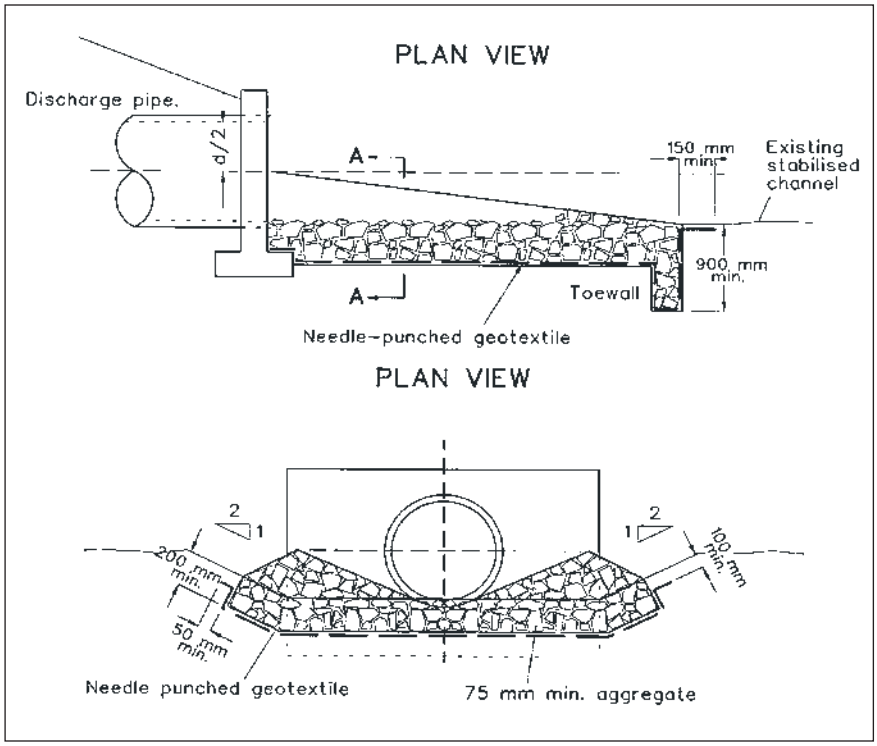

Figure 11A: Hard rock scour protector.

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.

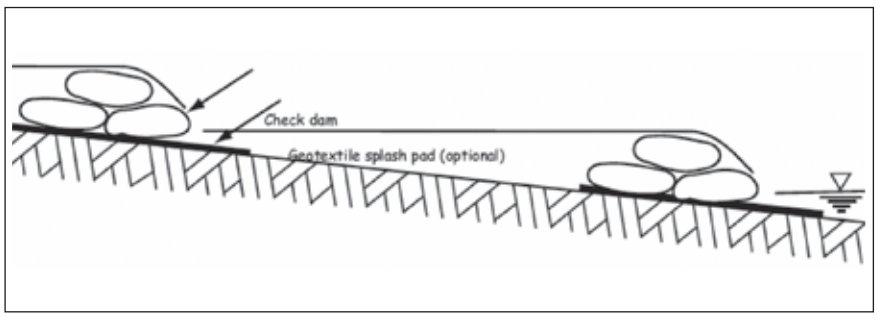

Figure 11B: Example of a check dam.

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Acknowledgement:

Figure 11A from Landcom 2004 *"Soils and Construction Volume 1 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.

Fact Sheet 12

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)**.

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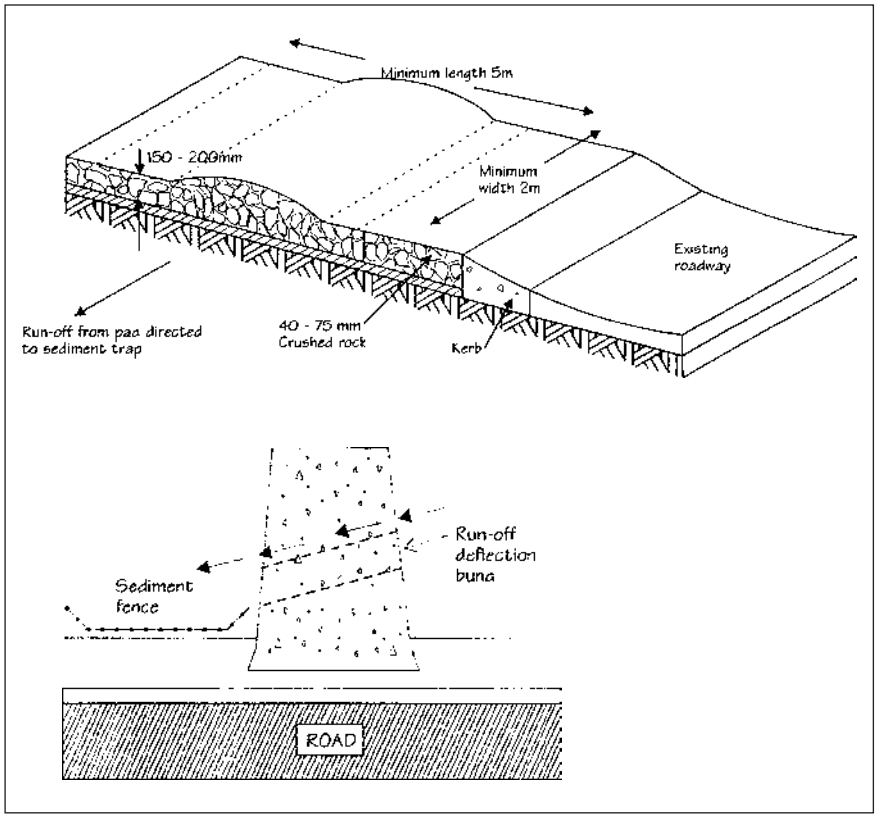

Figure 12A: Stabilised site access for building sites only.

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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Acknowledgement:

Figure 12A 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

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.

Fact Sheet 14

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)**.

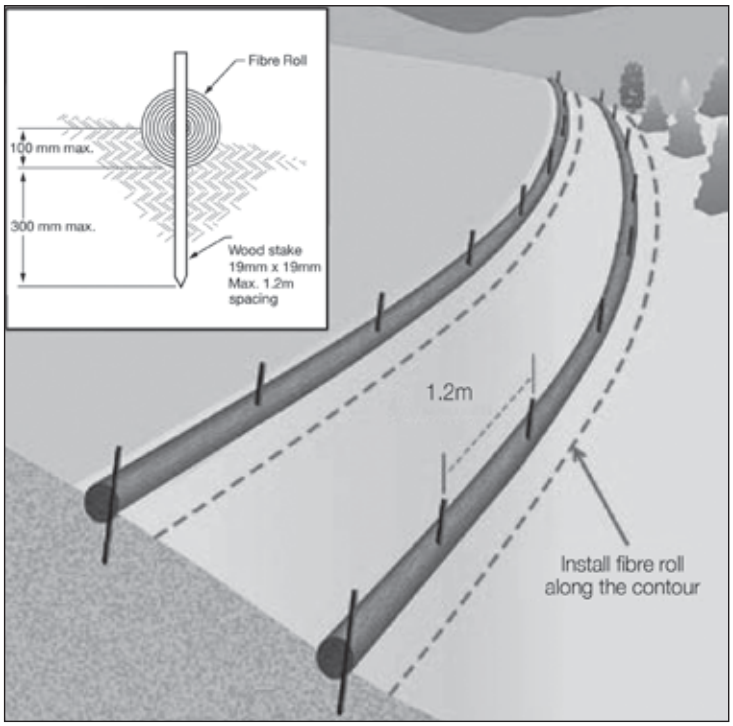


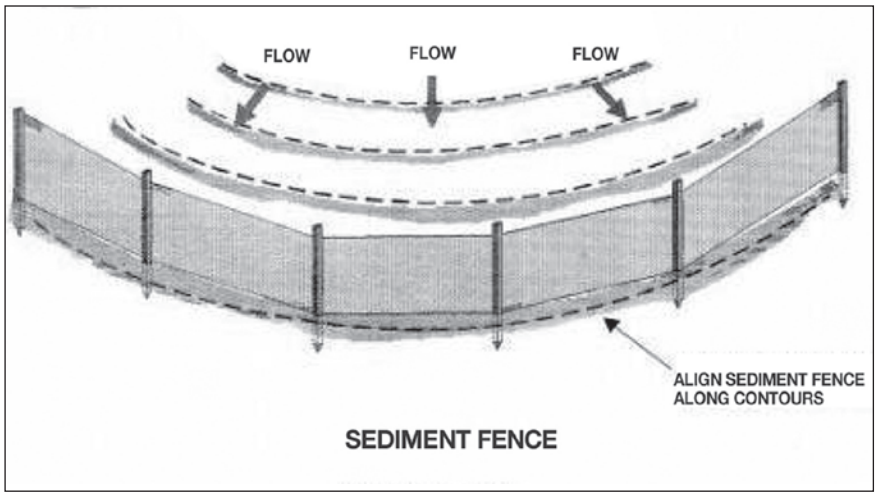
Figure 14A: Installation of fibre rolls

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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