

# A RESOURCE GUIDE FOR LOCAL COUNCILS



## Erosion and Sediment Control



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## Erosion and Sediment Control

Department of **Environment and Conservation** NSW



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## Other resources

The above appendices and other resources are available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)). The list of resources available at the time of printing or in preparation is shown over the page. Councils are encouraged to adapt the standard texts, checklists and brochures for their own use.

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### **Suggested standard texts**

Model code of practice – erosion and sediment control

Suggested standard conditions

Sample enforcement protocol

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### **Checklists**

Erosion and sediment control – gap analysis

ESCP assessment checklist

Building and development site audit tool

Checklist for council operations work sites

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### **Pamphlets, brochures and booklets**

Keep the soil on the site – erosion and sediment control guide

Erosion and sediment control – bricklayers

Erosion and sediment control – excavators

Erosion and sediment control – homeowners

Erosion and sediment control – landscapers

Erosion and sediment control – management of deliveries

Erosion and sediment control – plumbers

Erosion and sediment control – plasterers

Planning for erosion and sediment control on single residential allotments  
(see Landcom 2004)

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### **Managing urban stormwater report series**

All reports are published by DEC in 2006, except where shown:

*Managing urban stormwater: harvesting and reuse*

*Managing urban stormwater: soils and construction* vol. 1, 4th edition (2004) Landcom

*Managing urban stormwater: soils and construction* vol. 2

A Installation of services

B Waste landfills

C Unsealed roads

D Main roads

E Mines and quarries

*A resource guide for local councils: environmental management of council operations*

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### **Other reports in preparation**

*Managing urban stormwater: treatment techniques*

*Managing urban stormwater: stormwater planning*

*Managing urban stormwater: urban design*

*Managing urban stormwater: stream remediation*



## Overview

### Why control erosion and sediment?

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The need to control soil erosion and resulting sediment pollution has been recognised as a key aspect of improving the management of urban environments for over two decades. Land disturbance associated with the construction, installation or maintenance of buildings, roads, sewerage or other infrastructure creates the potential for increased levels of soil erosion and consequent sediment pollution of waterways.

The ecological effects of sediment pollution in waterways include:

- smothering or burying the habitats of aquatic plants and animals
- clogging the gills of fish and other aquatic animals (macroinvertebrates)
- reducing the growth of aquatic plants, such as macrophytes (reeds) in streams and seagrass in estuaries, due to reduced light penetration.

Sediment typically causes other impacts too such as:

- increasing the risk of flooding due to blocked drains and accumulated sediment in streams
- transporting chemicals, such as nutrients and contaminants, to sensitive ecosystems
- muddying water bodies, reducing their aesthetic appeal and restricting the suitability of the water for different uses.

### Role of local councils

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Reducing these impacts requires awareness and a coordinated effort on the part of many players, and in this sense local councils are critically placed to help control erosion and sedimentation. In achieving this, there is a great deal of high quality information available, such as *Managing urban stormwater (MUS): soils and construction* vol. 1 (commonly known as the Blue Book), published by Landcom, which is the definitive resource for the design and construction of erosion and sediment control measures.

There is, however, much more to effective erosion and sediment control than just designing and building on-ground works. Many areas of council have responsibilities that can affect the control of erosion and sediment – planning, engineering, compliance

and operations – and on a typical day in any council many officers are involved in some aspect of erosion and sediment control: planners, policy makers, engineers, drafting officers, building surveyors, rangers, environmental health officers, gangers, leading hands, development assessment officers, operational staff, education officers and environmental specialists.

Despite this broad involvement, there is often little integration between individual sections of local councils when considering erosion and sediment control.

## **Purpose of this guide**

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The purpose of this guide is to look at how local councils can develop, adopt and maintain a consistent and rigorous approach to erosion and sediment control across their areas of operations. It is not a 'how to' guide, but rather a collection of recommendations and resources that can be used by council officers who are striving to develop an integrated and effective approach to erosion and sediment control.

It is based on:

- detailed discussions with a broad range of council officers, builders, developers and specialists in the erosion and sediment control industry
- a review of existing training materials, professional association newsletters and information leaflets.

These discussions and the review have also resulted in the development of a number of training course frameworks designed to enhance the knowledge and understanding of erosion and sediment control in key areas.

The guide contains five broad sections. They are:

Section 1 – Before you start your program

Section 2 – Planning and development assessment

Section 3 – Building and development

Section 4 – Engineering, design and operations

Section 5 – References and resources.

Anyone planning a program to control erosion and sediment should read section 1 before deciding what other resources they will utilise.





# 1. Before you start your program

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## **1.1 Read this first**

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This guide is a collection of resources for use in the planning or review of erosion and sediment control programs. The intended users in local councils may be found in the planning, engineering, operations management or building and development enforcement areas.

Participating councils and other contributors have granted approval for users of this guide to print and distribute copies of the resources it contains with the provision that appropriate acknowledgement is given.

## **1.2 What the research found**

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Research during the preparation of this guide identified a number of challenges faced by councils striving to implement effective erosion and sediment control programs:

- responsibilities for erosion and sediment control are divided, with little coordination across planning, engineering, enforcement and operational sections
- a belief held by some staff that issues about erosion and sediment must have been resolved, simply because they have existed for some time
- a perceived or real lack of understanding or commitment from senior management towards effective erosion and sediment control programs
- the difficulty in measuring outcomes from erosion and sediment control programs
- different levels of knowledge and skill among builders and developers about effective erosion and sediment control
- different levels of knowledge and skill among those council officers responsible for assessing erosion and sediment control plans (ESCPs) and soil and water management plans (SWMPs)
- inconsistent attitudes between councils in some regions about the need to require and enforce effective ESCPs and SWMPs
- different levels of knowledge among council officers responsible for managing and enforcing erosion and sediment controls on building and development sites
- different levels of knowledge among council operations staff and management for ensuring effective erosion and sediment control on council job sites
- lack of knowledge about how to find and access suitable resources.

This guide aims to address these challenges by providing a directory to the available resources on erosion and sediment control for local councils, builders and developers. The guide also provides a framework for face-to-face training, although it does not aim to replace the need for professional support networks and other capacity-building activities.

### 1.3 Who's responsible for erosion and sediment control in local councils?

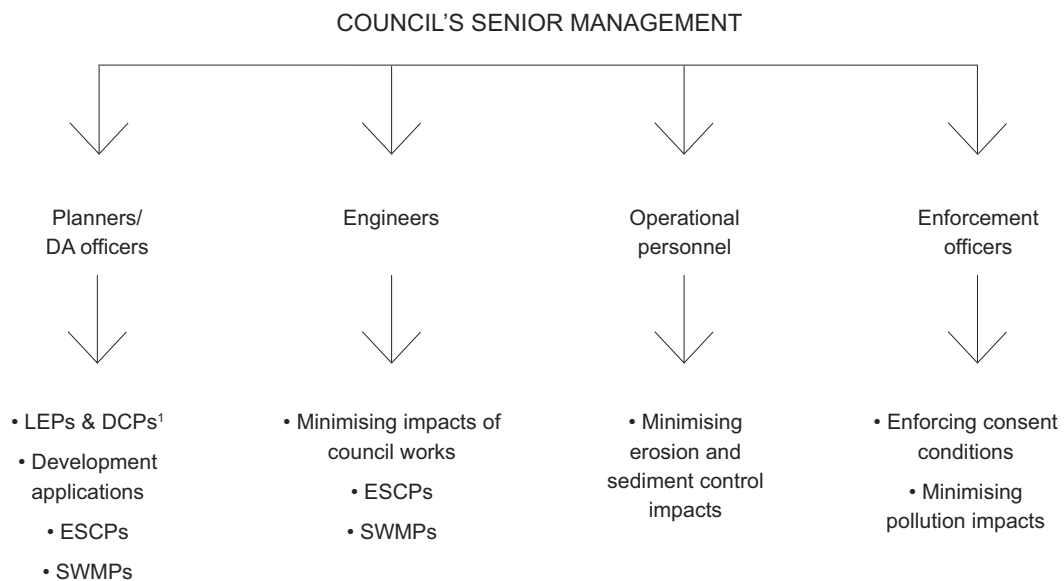
In general, four broad areas of council have some responsibilities for erosion and sediment control (figure 1.1). They are:

- planners and development assessment personnel
- engineers and other technical specialists
- operations personnel
- enforcement personnel.

To develop a consistent, integrated approach to erosion and sediment control, a council officer from one of these areas should take a leadership role and convene a discussion group/working party involving representatives of each of these groups. This group should identify areas where a consistent and effective approach to erosion and sediment control is needed, and develop and implement programs towards this outcome.

The group should also develop a strategy to ensure that erosion and sediment control continues to be considered as a significant environmental issue by council management and councillors.

**Figure 1.1 Areas of responsibility for erosion and sediment control within a typical council**



1 LEP Local environment plan  
DCP Development control plan

## 1.4 Seven reasons for putting an erosion and sediment control program in place

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Sometimes it is not clear to everyone in council why resources should be allocated to an erosion and sediment control program, yet there are at least seven important reasons for doing so. This section will be useful for anyone developing a rationale for a council erosion and sediment control program. The reasons are:

- 1 it's the law
- 2 council's responsibility as a leader
- 3 council's policy commitments
- 4 it's in the management plans
- 5 the community demands it
- 6 it's expensive not to deal with it
- 7 the local environment deserves it.

### 1 It's the law

There are a number of Acts that require councils to ensure all of their operational activities are carried out in an environmentally responsible manner. Other legislation requires councils to ensure all building and development activity in their areas is carried out responsibly. A brief summary of the main legislation is provided below.

#### Local Government Act 1993

The *Local Government Act 1993* sets a broad agenda for councils. It outlines overarching responsibilities to ensure that councils manage the local environment effectively.

The first stated purpose of the Act (section 7a) is 'to provide the legal framework for an effective, efficient and environmentally responsible open system of local government in NSW'. Another purpose (section 7e) requires councils, councillors and council employees to 'have regard to the principles of ecologically sustainable development in carrying out their responsibilities'.

Section 8 of the Act sets out the charter of local councils in NSW and includes the requirements for a council to 'properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible'.

A recent amendment (section 496A) allows councils to levy an annual charge for providing stormwater management services for rateable land.

In developing a plan to control erosion and sediment for your council, you could draw specific links from this Act to identify council's responsibilities across all areas of activity.

While councils have the power to issue enforcement notices for environmental purposes under section 124 of the Act, council staff generally find that the *Protection of the Environment Operations Act 1997* (POEO Act) is a more useful and flexible enforcement tool.

#### Protection of the Environment Operations Act 1997

The POEO Act is the main Act for environmental protection in NSW. It is used by the Department of Environment and Conservation (DEC) to deal with inappropriate practices

on council sites. It is also used by authorised council officers to deal with inappropriate practices on building and development sites in their area.

The Act provides DEC and councils with some specific enforcement measures as outlined below.

### ***Clean-up notices (section 91)***

Under this section of the POEO Act, authorised officers can issue clean-up notices at sites where they consider that an incident has occurred or is occurring.

The clean-up notice is a direction notice and not a penalty notice; its purpose is to direct the person or organisation receiving it to take action in order to minimise environmental harm. The notice must broadly outline the actions required and specify a deadline for those actions to be taken. It can require immediate action and can also be served verbally, but must then be followed up in writing within 72 hours.

A clean-up notice is not appealable – any person receiving one must do what it says or face fines of \$120,000 for an individual and \$250,000 for a corporation per day. Councils and DEC can decide whether to charge an administrative fee (currently \$320) for issuing a clean-up notice. Failure to pay this fee can also attract a fine of up to \$22,000.

Clean-up notices are a widely used enforcement tool for minimising the environmental impacts of sediment loss from building and development sites. Councils have also used the notices to require developers to sweep the streets around their development sites at the end of each day.

### ***Prevention notices (section 96)***

Prevention notices are used for more systemic environmental challenges and in response to activities carried out in an 'environmentally unsatisfactory manner'. Prevention notices are appealable and so cannot require action within the appeal period (21 days).

Like clean-up notices, a prevention notice outlines the actions a person or an organisation is required to take and provides a deadline for those actions to be completed. If a prevention notice is not appealed or is upheld on appeal, and the required actions are not taken, it is a breach of the POEO Act, attracting a fine of up to \$120,000 for an individual and \$250,000 for a corporation per day. As with clean-up notices, councils and DEC can decide whether to charge an administrative fee (currently \$320) for issuing a prevention notice. Failure to pay this fee can attract an additional fine of up to \$22,000.

### ***Compliance cost notice (section 104)***

Compliance cost notices enable councils to recover the costs of ensuring compliance with clean-up and prevention notices. These include the cost of monitoring action taken under a clean-up or prevention notice and the cost of the council cleaning up voluntarily or under direction from DEC.

### ***Penalty notices (various sections)***

Most erosion and sediment control breaches will be dealt with through the issue of a penalty notice. A notice under the POEO Act operates like an on-the-spot fine and the fines attached to notices are set out in the Regulations under the Act. Table 1.1 provides examples of fines under the Act.

Table 1.1 Fines for penalty notices issued under the POEO Act			
Examples of offences from POEO regulations (June 2005)	Penalty (individual)	Penalty (corporation)	Section of Act
Failure to comply with a clean-up notice	\$750	\$1500	91
Failure to pay a clean-up notice fee	\$500	\$1000	94
Failure to comply with a prevention notice	\$750	\$1500	97
Failure to pay a prevention notice fee	\$500	\$1000	100
Polluting waters	\$750	\$1500	120
Causing air pollution	\$750	\$1500	124–8

## Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) gives councils responsibility for land management on a number of levels including:

- Land-use planning (part 3) – councils are required to prepare local environmental plans that also impose development controls
- Development assessment (part 4) – councils are required to assess the suitability or otherwise of all developments in their area. Councils can exclude certain types of activities from the formal assessment process, but these are usually only very minor.

Councils can require specific ESCPs or SWMPs at the development assessment phase. If the applications do not meet council's requirements they can be rejected.

Councils usually impose erosion and sediment control conditions on development consent. These conditions can vary from basic requirements using standard conditions to more-detailed job-specific conditions.

A number of sections of the EP&A Act give councils the authority to act against builders or developers who breach their conditions of consent. In particular, section 127a allows councils to issue penalty notices for non-compliance with development consent conditions.

Through this Act, councils have the means and the authority at the planning and application phases, as well as during the construction phase, to minimise the potential for erosion and sediment pollution.

## Other legislation

While the Acts outlined previously are the main ones relating to erosion and sediment control at urban development sites, council may also need to consider the following legislation:

- *Coastal Protection Act 1979*
- *Fisheries Management Act 1994*
- *Heritage Act 1977*
- *National Parks and Wildlife Act 1974*
- *Native Vegetation Act 2003*
- *Rivers and Foreshores Improvement Act 1948*
- *Threatened Species Conservation Act 1995*
- *Water Management Act 2000.*

Many of these Acts apply to the early stages of planning and development. As this guide focuses on erosion and sediment control, no further information is provided here about the approvals, permits or licences required under these Acts.

## **2 Council's responsibility as a leader**

Councils have a responsibility to show leadership in environmental management and set a high standard for their job sites. Councils are both major managers of infrastructure, and the main enforcers of local environmental management for manufacturing and industrial premises, small businesses and community members. As the appropriate regulatory authority for most of the business and land development activities that take place within their area, councils can issue notices and fines for breaches of environmental laws, but it would affect their credibility if their own operational standards were not maintained.

## **3 Council's policy commitments**

Councils should demonstrate that the environment has been considered in the development of their management plans (see below). Nearly all councils will have an environmental policy or statement.

If you are proposing to develop an erosion and sediment control program for your council, select the policy commitments that support your case and put them in the rationale of your project plan. It would be helpful to have your program supported by council's policy framework to help ensure that the programs are maintained; formal policy support gives programs a longer-term future.

## **4 It's in the management plans**

All councils in NSW are required to develop a management plan. Section 402 of the Local Government Act sets out the contents of a council's draft management plan and requires it to include 'activities to properly manage, develop, protect, restore and conserve the environment'.

If you are developing an erosion and sediment control program, there should be a statement in your council management plan about minimising the environmental impact of council's operational activities. Use this as a basis for focusing on erosion and sediment control in your program rationale.

You should also refer to your council's stormwater management plan. In 1998, each council in NSW was required to develop a stormwater management plan, and these should contain a statement or commitment for council's activities to be managed in a way that improves the quality of stormwater flowing into local waterways.

Some councils also have management plans for the environment, bushland and waterways that commit them to conduct their activities in an environmentally responsible manner. Incorporate these commitments in the rationale for your program.

## **5 The community demands it**

DEC's *Who cares about the environment?* social research program<sup>1</sup> identified a high level of community demand for local environments to be properly protected. The study found that:

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<sup>1</sup> For more information on the 2003 research see [www.environment.nsw.gov.au/whocares](http://www.environment.nsw.gov.au/whocares)

- 54% of people ranked the environment 'a very important part of their lives'. Only family (93%) and friends (70%) ranked higher
- 87% of people say they are concerned a 'great deal' or a 'fair amount' about environmental problems
- 66% of people think councils could do more to help protect the local environment. Others identified as needing to do more included retailers (71%), state government (76%), Commonwealth government (77%), manufacturing industry (80%) and individuals (85%).

Clearly there is a high level of community expectation that local councils accept and act on their responsibilities to protect local environments.

## **6 It's expensive not to deal with it**

'Fixing up' problems caused by poor erosion and sediment control practices can be very expensive. Typical expenses incurred by council for poor practices include:

- costs of maintaining assets that are full of sediment
- higher maintenance levels of street sweepers which pick up excessive soil
- more frequent maintenance of gross pollutant traps.

There are also costs associated with poor water quality in local waterways and the impact on environmental flows from excessive sediment.

## **7 ... and, most importantly, the local environment deserves it**

A growing population, and all of the impacts that it has, is increasing the pressures on our waterways. Poorly managed erosion and sediment control programs only add to that pressure, whereas well-managed programs can help to minimise the impacts on local environments.



## 1.5 Common questions and answers about erosion and sediment control

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There are a number of general and technical questions commonly asked of council rangers, building surveyors, specialist erosion and sediment control teachers, TAFE teachers and other training professionals. These questions and appropriate responses are outlined below to support anyone putting an erosion and sediment control program together.

### What is erosion?

Erosion is the wearing away of land by the action of rainfall, running water, wind, moving ice or gravitational creep. Soil detachment (erosion) occurs when the erosive forces (e.g. heavy rain or flowing water) exceed the soil's resistance, causing the soil particles to move.

### How do I stop erosion?

Protect the soil surface from the erosive forces of raindrop impact, water flow and wind, and convey water through or around the site in a non-erosive manner. Mulch, rock or grass will all slow running water and reduce the rate of erosion.

### What is sediment and sedimentation?

Sediment is the result of erosion, and consists of small detached soil particles. Sedimentation occurs when the transportation of detached soil particles ceases or slows and the soil particles then settle or fall out of suspension.



*Badly managed construction sites are all too common*

## **What is the difference between erosion control and sediment control?**

Erosion control aims to reduce the movement of soil from rain or flowing water by preventing the problem in the first place, and is therefore preferable to sediment control.

Sediment control aims to minimise the impacts of erosion by capturing sediment before it is discharged to the environment. In general terms, sediment control measures capture flowing water and hold it in place long enough for the sediment to settle out.

## **What is more important, erosion control or sediment control?**

Specialists always recommend erosion control be considered before sediment control. The more effective the erosion control, the less sediment control is required. However, in most cases, both components are essential.

## **What are the penalties if I break the erosion and sediment control laws?**

A range of legislation governs the installation and maintenance of erosion and sediment controls on council and building and development sites. Most council approvals require controls to be in place before work begins. For builders and developers these conditions form part of their conditions of approval and, if not complied with, can result in on-the-spot fines of \$600 under the EP&A Act (see section 1.4).

The POEO Act is the other major legislation that councils and DEC officers can use to require more effective erosion and sediment control on building, development and council work sites. Under this Act, authorised officers have a range of enforcement options. More details are included in section 1.4.

## **Why are people so concerned about the environmental impact of soil or sediment?**

There are a number of reasons why dirt, soil or sediment needs to be kept out of our waterways. These include:

- increased sediment in waterways can smother the habitats of plants and animals living in the waterway and may damage the gills of aquatic animals
- suspended sediment in waterways increases turbidity levels, thus decreasing the amount of light available for aquatic plants and animals and detracting from the appearance of the waterway
- sediments from building and development sites can affect the way our rivers flow by accumulating on the river bed or near the banks
- most soils contain some 'plant food' or nutrients like phosphorus or nitrogen which can dissolve in stormwater or be carried with sediment into waterways where they lead to excessive growth of weeds and algae
- soils running off building sites may be contaminated with chemicals from common building materials, sprays, or paints containing heavy metals and other poisons. These could harm the plants and animals found in waterways
- sediment from building sites can block local stormwater drains, leading to local flooding. Clearing these blockages is an extra cost for the developers or council.

## 1.6 The top ten rules for effective erosion and sediment control

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During consultations for this guide, erosion control specialists were asked: 'If you were given the power to emphasise three key erosion and sediment control rules on council engineers, operational personnel, builders and developers, what would those rules be?' The ten most common responses were:

1. Control erosion before controlling sediment. Sediment is only generated when erosion occurs.
2. Recognise that all sites are different. It is essential that project design takes into account site constraints.
3. Accept that erosion and sediment controls are an integral part of managing construction or maintenance activities and not an annoying added extra.
4. Minimise the extent and duration of disturbance.
5. Control stormwater flows onto, through and from the site.
6. Use erosion control to prevent on-site damage.
7. Use sediment controls to prevent off-site damage.
8. Control erosion and sediment at the source.
9. Stabilise disturbed areas progressively.
10. Inspect and maintain control measures every day.

## 1.7 How effective are your control measures?

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Local councils across NSW differ in the level of development of their erosion and sediment control programs, from those with no program to those who have had systems in place for some time. Most councils are somewhere in between. Councils who are considering whether to develop an erosion and sediment control program should first assess what measures they may already have. This will help identify priority areas for attention.

A simple gap analysis is provided in appendix A. It is a checklist that covers the broad areas referred to in this guide, focusing on the planning, operational, and building and construction management activities of council. The checklist focuses on whether the council has a program in place, and if so, how effective it is.

The checklist is available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)) for modification and printing as required. The analysis refers to four broad functions of council, but not all councils will be structured in the same way. Councils are encouraged to amend the analysis to suit their individual needs.

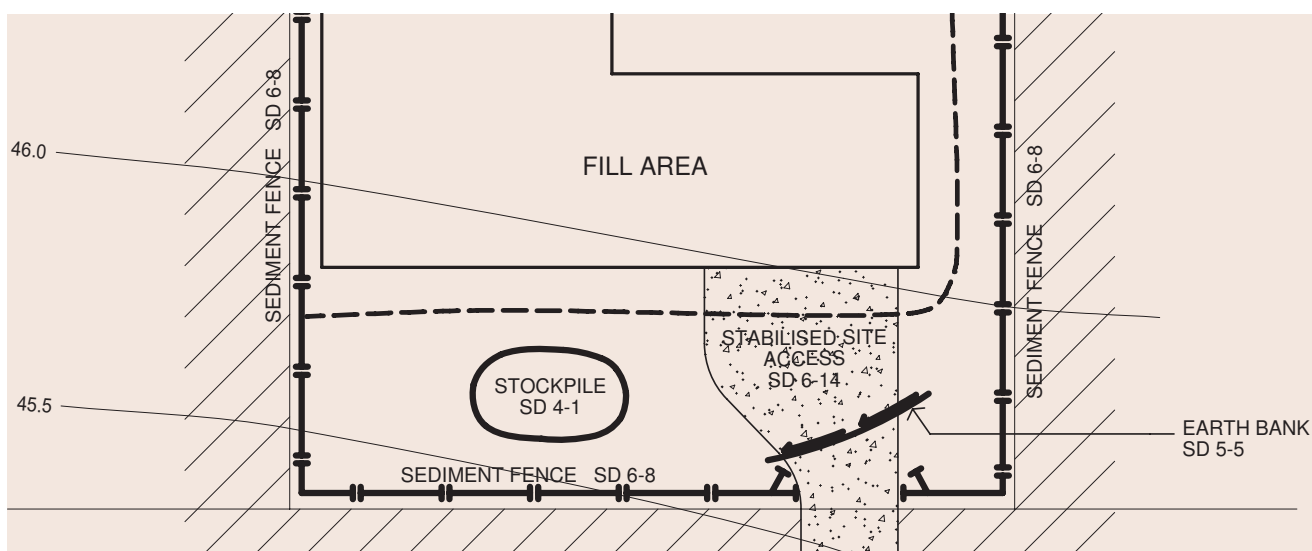
### Performance indicators

Within the gap analysis, assessing officers are asked to rate council's performance in each of the areas where they have a program in place. This will not only show where there is room for improvement, but will also create performance indicators for measuring progress in future. The following rating scale is suggested:

1. Exists in theory but not in practice
2. System in place but not effective
3. Average
4. Good
5. Excellent

## **Developing programs**

Where the gap analysis indicates a need for program development, there are cross-references to the relevant section of the guide for further information. Once you have assessed the effectiveness of your council's control program, you should identify priorities for its refinement or further development. Remember that other areas of council may have resources or protocols that can support the development of an effective program.



## 2. Planning and development assessment

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## 2.1 Overview

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There are several ways for council planners to play an active role in ensuring and encouraging more effective erosion and sediment control on council projects and private sector developments. The first of these is to develop a policy or code of practice as a sound basis for other measures (see section 2.2).

Councils can also clearly identify and detail the documentation that proponents must submit to support a development application. Most councils now require proponents to submit an erosion and sediment control plan (ESCP) or a soil and water management plan (SWMP), either with their development application or before receiving a construction certificate. All councils should require the development and submission of these documents for appropriate sites (see section 2.3).

Requiring proponents to submit such plans is, however, only the first step. Research undertaken for the development of this guide revealed significant concerns within councils about their capacity to assess ESCPs or SWMPs. The review guide (included as section 2.4) will assist non-specialist officers to assess small-scale ESCPs, as will the training program outlined in section 2.5.

Planners are also responsible for setting the conditions of approval for developments. It is important that these conditions reflect council's commitment to effective erosion and sediment control. Section 2.6 of this guide identifies issues that should be considered for small-scale (e.g. single allotment) construction sites and section 2.7 offers a set of standard conditions of approval for consideration. Planning is the first step to ensuring effective erosion and sediment control in a council area. It needs appropriate attention.

## 2.2 Model code of practice

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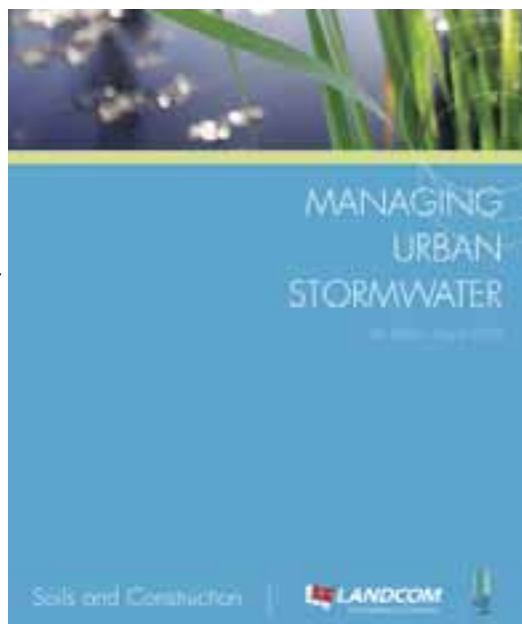
Having a policy or code of practice for erosion and sediment control is an excellent base on which to build effective long term programs as it provides a common link between all key areas of council involved in erosion and sediment control. Representatives of all key groups within council should be involved in formulating and/or reviewing the policy.

A number of councils – including the combined Hunter Region councils, and Bankstown and Camden councils – have developed good erosion and sediment control policies, copies of which can be sought directly from these organisations.

*MUS: soils and construction* vol. 1 (Landcom 2004a) provides a model code of practice for soil and water management on urban lands.

The code contains the following sections:

- intent
- scope
- general planning requirements
- environmental bonds
- SWMP/ESCP content
- access to roads
- clearing vegetation



*The Blue Book is the standard reference for managing stormwater quality on construction sites in NSW*

- site works
- stormwater control
- pollution control
- rehabilitation of landscaping
- demerit point systems
- responsibilities of council officers.

An updated copy of the code is included as appendix B, reproduced with the permission of Landcom. Councils are encouraged to use the code as a base for developing their own guideline documents. The code may be copied in whole or in part by councils, with appropriate acknowledgement to Landcom.

## 2.3 Erosion and sediment control plans, and soil and water management plans

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Many local councils in NSW now require builders and developers to prepare an ESCP or SWMP for developments where the cleared area of land exceeds 250 m<sup>2</sup>. The purpose of these plans is to show how the proponent will minimise soil erosion and trap sediment from the site during the construction phase of the development. Some councils require an ESCP or SWMP to be submitted with the development application, while others require the documents to be submitted before they will issue a construction certificate.

*MUS: soils and construction* vol. 1 recommends that an ESCP be required where the area of land to be developed is between 250 m<sup>2</sup> and 2500 m<sup>2</sup>, and a SWMP where the disturbance is greater than 2500 m<sup>2</sup> or for developments in or near critical habitats. It does not recommend formal plans for developments under 250 m<sup>2</sup>, but builders or developers should still aim to minimise erosion and control sediment impacts, even for these smaller activities.

Many councils are frequently dissatisfied with the quality of the ESCPs and SWMPs they receive, but at least these plans require the developer to focus attention on the importance of erosion and sediment control as a key environmental issue. To encourage more councils to adopt a policy of having effective ESCPs as part of development approval, the following sections outline the rationale and aims for ESCPs or SWMPs.

The most effective way of improving the quality of submitted documents is to have suitably qualified or experienced people prepare them. All SWMPs, and ESCPs developed for complex or difficult development sites, should be prepared by qualified and experienced personnel, for example, personnel who have completed:

- the Certified Professional in Erosion and Sediment Control (CPESC) program – offered by the International Erosion Control Association
- National Statements of Attainment for units of competency in soil erosion and sediment control from the National Training Package in Conservation and Land Management.

For engineering and hydrology issues, the plan should include specialist input from a certified engineer where necessary. Similarly, the collection or analysis of soil data may need to be commissioned from professionals certified by the Australian Society for Soil Science.

## Rationale

ESCPs/SWMPs are necessary to ensure that:

- erosion and sediment control is considered early in the planning process
- the area of site disturbance is limited, thereby minimising erosion and sediment pollution
- erosion and sediment control measures are an integral part of the initial site development plan
- construction activities and erosion and sediment control are jointly planned and implemented.

## Aims

Any ESCP/SWMP should aim to:

- understand the site features and related limitations on the type of controls used
- minimise site disturbance, with strict limitations on the extent and exposure time of exposed surfaces
- control water from the top of the site, through and beyond the bottom of the site
- prevent or minimise sediment leaving the site
- progressively rehabilitate disturbed areas
- ensure regular maintenance of control measures.

An ESCP/SWMP should address all aspects of site disturbance, stormwater management, erosion and sediment control and site rehabilitation for the duration of the construction phase, from initial clearing to project completion.

## Preparation of ESCPs

The standard format of ESCPs will vary depending on the complexity of the proposal and its potential environmental impact. They may be individual statements or detailed engineering drawings. Most ESCPs will incorporate the following components:

- site map or drawing
- supporting information or commentary
- standard and project-specific drawings.

As an example, pages 18–19 outline a model ESCP developed by Landcom for a single lot residential building. It contains each of these key components. Councils wishing to improve the quality of submitted ESCPs may consider providing this to builders and developers as an example for single lot dwellings.

## Example ESCP

A model ESCP for a single lot dwelling prepared by Landcom is outlined on pp.18–19, figure 2.1.



## Standard drawings

*MUS: soils and construction* vol. 1 contains standard drawings for the more common erosion and sediment control measures. These drawings are also provided in *MUS: soils and construction – the hip-pocket handbook* for ready access by developers or builders on small sites.

It is good practice to attach standard drawings to an ESCP. Figure 2.2 provides examples of standard drawings for a sediment fence and stabilised site access.

## Soil and water management plans

SWMPs are typically required when a development is large (disturbing an area greater than 2500 m<sup>2</sup>) or for sites that have the potential to impact on environmentally significant local features. They are more detailed than ESCPs and should be prepared by people with expertise in erosion and sediment control.

In addition to the information required in an ESCP, *MUS: soils and construction* vol. 1 suggests SWMPs should also include the locations of:

- lots, public open space, stormwater drainage systems, schools and shopping or community centres
- land designated or zoned for special uses
- all necessary erosion and sediment control best management practices, with general diagrammatic representations
- all necessary sediment basins, with engineering details and supporting design calculations
- other facilities proposed as part of the development, with basic details of works such as constructed wetlands, gross pollutant traps, trash racks, or trash collection separator units.

Detailed design criteria for these latter (permanent) facilities should be sourced from other manuals/reports and are not part of a construction-phase SWMP. Usually they are considered as a separate function of the development approval process.

The plan should specify the scale, type, operation and, critically, maintenance of all soil and water management devices in the soil and water management program.

## Example ESCP

### The commentary

A commentary is usually provided with the drawing (figure 2.1) outlining the sequence of events that will take place on-site. Below is a sample commentary.

- Site works will not start until the erosion and sediment controls are installed and functional.
- The entry/exit of vehicles from the site will be confined to one stabilised point. Sediment or barrier fencing will be used to restrict all vehicular movements to that point. Stabilisation will be achieved by either:
  - constructing a sealed (e.g. concrete or asphalt) driveway to the street
  - constructing a stabilised site access following standard drawing SD 6-14 or other suitable technique approved by the council.
- Sediment fences and barrier fences will be installed as shown on the attached drawing (see SD 6-8 in *MUS: soils and construction* vol. 1).
- Topsoil from the works area will be stripped and stockpiled for later use in landscaping the site (see SD 4-1 in *MUS: soils and construction* vol. 1).
- All stockpiles will be placed in the location shown on the ESCP and at least two metres clear of all areas of possible areas of concentrated water flow, including driveways.
- Lands to the rear of the allotment and on the footpath will not be disturbed during works except where essential (e.g. drainage works across the footpath). Where works are necessary, they will be undertaken in such a way to minimise the occurrence of soil erosion, even for short periods. They will be rehabilitated (grassed) as soon as possible. Stockpiles will not be placed on these lands and they will not be used as vehicle parking areas.
- Approved bins for building waste, concrete and mortar slurries, paints, acid washings and litter will be provided and arrangements made for regular collection and disposal.
- Guttering will be connected to the stormwater system or a rainwater tank as soon as practicable.
- Topsoil will be re-spread and all disturbed areas will be stabilised within 20 working days of the completion of works.
- All erosion and sediment controls will be checked at least weekly and after rain to ensure they are maintained in a fully functional condition.

# The plan

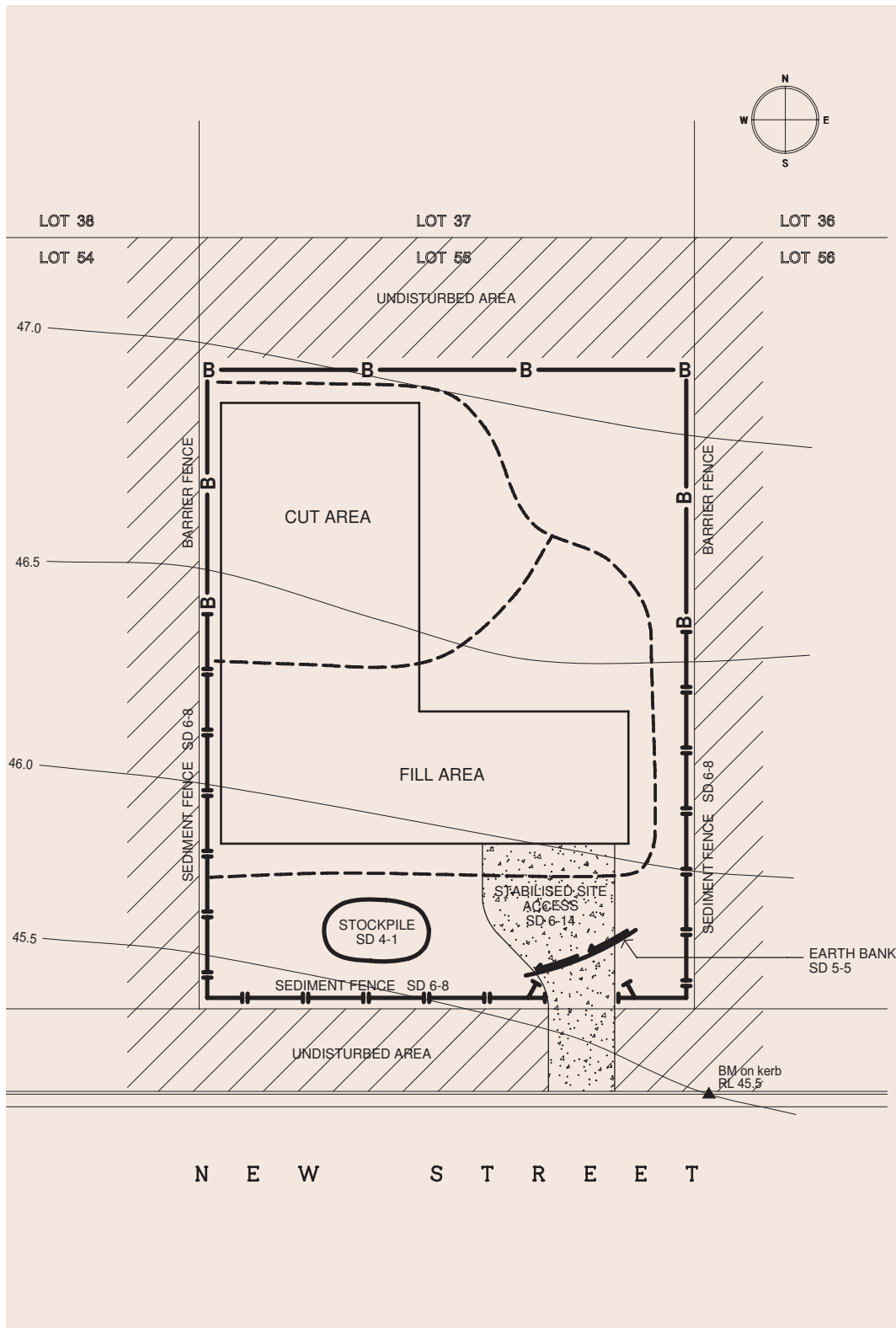


Figure 2.1 Example of a drawing as part of an ESCP (Landcom 2004)



## **2.4 Assessment checklist for erosion and sediment control plans**

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Appendix C outlines a checklist to help council officers assess whether all the basic elements of an ESCP have been provided. With greater experience, assessment officers may be able to sign off the ESCPs, but any SWMPs should bypass this initial review process and be reviewed by more experienced or qualified officers.

A number of critical factors may trigger the need for an ESCP to receive further detailed review. Councils may wish to formulate a list of factors, and the following checklist provides a sample list. The list is not exhaustive; councils should add other items as needed. The checklist is available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)) for modification and printing as required.

## **2.5 A training program framework for planning and development assessment staff**

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Planning officers responsible for statutory planning and development assessment can play an important preventative role in the management of erosion and sediment control. By drafting appropriate conditions of consent, and competently assessing proposed environmental controls as defined in ESCPs (for small sites, at least), officers can help minimise erosion and sediment pollution impacts.

Despite this significance, most erosion and sediment control programs do not address statutory planning considerations, and many planning officers do not have adequate training in erosion and sediment control. Table 2.1 provides an example framework for a training program on erosion and sediment control suitable for council planning and development assessment staff.

**Table 2.1 Example training program framework for planning and development assessment officers**

<b>Course component</b>	<b>Learning outcomes – Knowledge and understanding of:</b>	<b>Resources required</b>
1. The environmental impact of sedimental	<ul style="list-style-type: none"> <li>• the impact of sediment on waterways</li> <li>• building sites are a significant source of sediment</li> </ul>	<ul style="list-style-type: none"> <li>• Case study of sediment loss from a building site</li> </ul>
2. Erosion and sedimentation: what causes it?	<ul style="list-style-type: none"> <li>• the difference between erosion and sedimentation</li> <li>• factors influencing erosion and sedimentation</li> </ul>	
3. Principles of erosion and sediment control	<ul style="list-style-type: none"> <li>• need for proper planning, installation, maintenance of controls</li> <li>• principles of erosion and sediment control</li> </ul>	<ul style="list-style-type: none"> <li>• Planning for erosion and sediment control on single residential allotments – pamphlet</li> <li>• <i>Keep the soil on the site</i> – video</li> </ul>
4. The legislation in relation to erosion and sediment control: an overview	<ul style="list-style-type: none"> <li>• requirements of POEO Act</li> <li>• environmental requirements of LG Act</li> <li>• enforcement provisions available to authorised officers</li> <li>• needs to be considered at all stages</li> </ul>	<ul style="list-style-type: none"> <li>• Sample infringement notices</li> <li>• Clean-up notice</li> <li>• Penalty notice</li> <li>• Non-compliance notice</li> </ul>
5. Erosion and sediment control: the tools and systems	<ul style="list-style-type: none"> <li>• erosion control is more cost-effective than sediment control</li> <li>• what erosion and sediment control involves</li> <li>• several tools, each with pro's and con's</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Keep the soil on the site</i> – booklet and video</li> </ul>
6. ESCPs/SWMPs	<ul style="list-style-type: none"> <li>• requirement for ESCPs/SWMPs for different size projects</li> <li>• purpose and nature of plans for different size of development</li> <li>• plans comprise both a map and commentary</li> </ul>	<ul style="list-style-type: none"> <li>• Planning for erosion and sediment control on single residential allotments – pamphlet</li> <li>• Sample ESCPs and SWMPs</li> </ul>
7. Planning and development control considerations	<ul style="list-style-type: none"> <li>• benefits of a comprehensive policy/code of practice</li> <li>• typical/standard conditions of consent</li> <li>• assessing ESCPs</li> </ul>	<ul style="list-style-type: none"> <li>• Model code of practice</li> <li>• Standard conditions of consent</li> <li>• Suggested minimum controls – small construction sites</li> <li>• Draft tool for assessing ESCPs</li> </ul>

## 2.6 Issues to consider – small construction sites

For small (i.e. single-lot) construction sites the following issues and practices will typically need to be considered. Clearly the significance of these issues, and the need to apply these techniques, will be determined on a site-by-site basis. In all cases, maintaining the controls will be critical to their continued effective functioning. You may also need to consider other environmental issues not addressed here at an appropriate stage of the planning and development consent process.

### Access

- All access to and within the construction site should be controlled, restricting vehicle and plant access to a single, well-defined area to avoid excessive ground disturbance.
- No soil or gravel should be placed in the gutter to improve site access.
- All runoff from driveways and access surfaces should be drained into an adjacent, approved sediment-trapping device before leaving the site.
- All-weather access surfaces shall be provided, and care should be taken that this material itself does not become eroded.
- Vehicle wheel washers and/or other devices to remove soil materials from wheels, where appropriate, should be placed at the access point.



*Controlled access to a site reduces erosion and controls sediment*

### Site layout

- Site excavation should be designed and located to minimise site disturbance and cut and fill requirements.

### Vegetation removal

- No vegetation should be cleared before council approval is given to start work on any stage of the development. This will help ensure that on-site vegetation is disturbed only when necessary, thereby minimising the soil exposure period.
- Where appropriate, the branches, leaves and seeds of native plants from the site should be salvaged and respread on bare ground to reduce erosion and help re-establish native vegetation.

## Building material stockpiles

- Stockpiles of erodible building materials including sand and soil should not be placed on nature strips, footpaths, roadways, kerbs, accessways, or within drainage lines.
- Stockpiles are to be retained on-site with protective covering or an appropriately located sediment fence (e.g. a boundary filter fence).

## Topsoil management

If topsoil within the area is to be disturbed, it should be stockpiled for later resspreading on all exposed areas once final land shaping has been completed. The stockpile should not be located on a nature strip, footpath, roadway, kerb, or accessway, nor within a drainage line. It should have a sediment fence placed to control the loss of any topsoil in runoff. If the stockpile will be kept for more than four weeks, it should be grassed immediately and stabilised within fourteen days. Surplus topsoil can be removed from the site.

## Drainage

All stormwater runoff flowing onto disturbed areas, including stockpiles, should be intercepted, diverted or safely disposed of. Constructing a temporary earth bank around the up-slope extent of the construction site will divert flows. The earth bank should be stabilised by turfing, seeding, placing rocks or geotextile, or by concreting. The banks should redirect stormwater to a stable holding or disposal area. Adjoining landholders would need to approve in writing any runoff proposed to be redirected to their property.



*Building materials stockpiled with sediment fence*

*Rick Morse / Morse McVey*



## **Sediment fences**

Sediment fences should be located on the down-slope boundaries of construction sites in order to slow down any runoff and retain sediment on the site. Sediment fences adjacent to street kerbs should be located on the construction (boundary) side of the vegetation filter strip.

## **Sediment traps**

Appropriate sediment traps should be located at all points where stormwater leaves the construction site or leaves the gutter and enters the drainage system. In most cases this would include the drainage inlet(s) immediately down-slope of the site. This will reduce the sediment load entering the stormwater system.

## **Turf filter strips**

Strips of turf should be placed along the nature strip or footpath area adjacent to street kerbs to aid in filtering stormwater runoff. In areas adjoining bushland, care is necessary to ensure that turf grasses or hydromulch materials do not spread into the bushland; in this case either local species or sterile seed/grass stock should be used. Native vegetation on the nature strip should not be removed to make way for turf.

## **Roof guttering**

All roof guttering and downpipes should be installed and connected to council's drainage system or other approved drainage system (e.g. a rainwater tank) before any roofing material is installed. This will improve site drainage and access during wet conditions and prevent erosion caused by concentrating roof stormwater onto unstable or unprotected ground surfaces.

Where there are no existing stormwater drains, roof water should be drained through downpipes into an approved structure or flow spreader.

## **Progressive revegetation and stabilisation**

All disturbed areas should be progressively stabilised and/or revegetated so that no areas remain exposed to erosion damage for more than 14 days (or other approved period) once earthworks are completed. All driveways and parking areas should be stabilised with compacted sub-grade as soon as possible after their formation. The responsibility for progressive revegetation and stabilisation rests with both the person (usually the builder) who submitted the ESCP and building application, and the owner of the site.

## **2.7 Suggested standard conditions**

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Councils can include standard conditions in development approvals to help apply their erosion and sediment control policy uniformly and consistently (see appendix D). An electronic copy of these conditions is available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)) for modification and printing as required. These conditions relate only to erosion and sediment control requirements and councils will also need to consider any statutory approvals, permits or licences required by environmental legislation.



David Beharrell/Warringah Council

## 3. Building and development

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## 3.1 Overview

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Building and development activity, if not managed effectively, can cause significant environmental harm. In the planning phase of any building and development work, councils should require proponents to prepare plans in order to minimise erosion and sedimentation impacts. These plans may vary from simple erosion and sediment control plans (ESCPs) for developments with disturbed areas up to 2500 m<sup>2</sup>, and soil and water management plans (SWMPs) for more substantial projects (section 2.3).

Once developments are approved, councils may also impose a series of conditions that include effective erosion and sediment controls (section 2.7).

Builders and developers should put their erosion and sediment control measures in place before starting any construction activity. Some builders do not know how to control erosion and sediment effectively. To help remedy this, section 3.2 provides lists of resources and other materials that can be used to train builders and developers, and section 3.3 outlines a basic training course for them.

Council compliance personnel, including rangers, building surveyors and environmental health officers, should visit sites regularly during the construction phase. They have a number of measures available in order to encourage effective erosion and sediment control on their sites (section 1.4). Some enforcement personnel do not know what constitutes effective erosion and sediment control; section 3.4 provides an outline of a training course for enforcement officers while section 3.5 provides a checklist for use in auditing building and development sites.

The responsibility for compliance management on building and development sites is not always clearly defined. Some councils engage a specialist erosion and sediment control officer, while others leave it to their rangers to encourage compliance. Others look to their building surveyors and environmental health officers to meet those responsibilities. Appendix E provides a sample enforcement protocol for managing the building and development sector, including a review of the approaches taken by different councils.

## 3.2 Basic information for builders and developers

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A number of councils have developed specialised resources for different building trades as well as for builders and developers. Councils also use building site signs as a way of promoting appropriate environmental behaviour. Samples of these materials are provided in the following sections.

### Environmental leaflets for specific trades

Educational materials addressing environmental aspects of specific trades on building and development sites have been developed by state government agencies and local councils. Trade-specific information is particularly helpful for encouraging everyone who works on-site to accept some level of responsibility for appropriate environmental management. The full suite of leaflets is available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)) for modification and printing as required and it covers the following groups:

- bricklayers
- landscapers
- plumbers
- plasterers

- delivery drivers
- excavators
- homeowners.

Councils may reproduce copies of these leaflets and insert their own crests or logos, with appropriate acknowledgement to the Department of Natural Resources. The artwork has been kindly provided by the City of Sydney.

## Erosion and sediment control guides

*MUS: soils and construction* vol. 1 includes a six-page pamphlet entitled *Planning for erosion and sediment control on single residential allotments*. This document explains and illustrates the application of the basic principles of erosion and sediment control, while providing a model erosion and sediment control plan for a single building allotment. An electronic copy of this pamphlet is available from the Landcom website, suitable for adoption by local councils.

A number of organisations, including the Southern Sydney Regional Organisation of Councils (SSROC) and the *Keep the soil on the site* program, have developed comprehensive erosion and sediment control guides for builders and developers. An electronic copy of *Keep the soil on the site* for building and development sites is available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)). This guide includes the following useful fact sheets:

- site planning
- stabilised entry and exit point
- sediment fencing
- straw bale filters
- diversion of up-slope runoff
- stockpiles and storage of materials
- grass filter strips
- litter and building waste
- service trenches
- early roof downpipe connection.

Many of these materials are offered in a way that allows councils to incorporate their own crests or logos, with appropriate acknowledgement. These materials can be displayed at council offices, distributed with DA consents or provided to builders and developers on-site.

Councils have indicated that these resources have been extremely successful in encouraging better erosion and sediment control on building and development sites in their areas.

## Sediment signs

A number of councils require builders and developers to display erosion and sediment control reminder signs on their sites throughout the course of their development. Appendix F provides a sample sign as used by Woollahra Council. One of the most effective aspects of the Woollahra signs is its large size – 59 × 42 cm (compared to the usual 42 × 30 cm). The larger sign and the requirement to include the contact number of the private certifier and builder have led to greater attention to environmental management on building and development sites within the area.

### 3.3 Framework for a training program for builders and developers

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A lack of knowledge among some builders about erosion and sediment control on building and development sites is one of the major challenges.

Some councils have offered builders training in erosion and sediment control to achieve better environmental outcomes, from providing some of the resources outlined in the previous section to formal training courses. Other councils have promoted training courses offered by building industry professional associations including the Master Builders Association and the Housing Industry Association.

If councils are considering offering training it is important that they work with local industry leaders to:

- identify the specific needs of the target audience
- develop a course framework and promotion strategy.

Councils that have offered training programs without sector support have had only limited success, while those councils that have offered training in partnership with the local industry have had greater success.

Table 3.1 provides an example framework of a training program on erosion and sediment control for builders and developers.

**Table 3.1 Example training program framework for builders and developers**

<b>Course content</b>	<b>Learning outcomes – Knowledge and understanding of:</b>	<b>Resources required</b>
1. The environmental impact of sediment	<ul style="list-style-type: none"> <li>• the impact of sediment on waterways</li> <li>• building sites are a significant source of sediment</li> </ul>	<ul style="list-style-type: none"> <li>• Case study of sediment loss from a building site</li> </ul>
2. Erosion and sedimentation: what causes it?	<ul style="list-style-type: none"> <li>• the difference between erosion and sedimentation</li> <li>• factors influencing erosion and sedimentation</li> </ul>	
3. Principles of erosion and sediment control	<ul style="list-style-type: none"> <li>• need for proper planning, installation, maintenance of controls</li> <li>• principles of erosion and sediment control</li> </ul>	<ul style="list-style-type: none"> <li>• Planning for erosion and sediment control on single residential allotments – pamphlet</li> <li>• <i>Keep the soil on the site</i> – video</li> </ul>
4. The laws in relation to erosion and sediment control: an overview	<ul style="list-style-type: none"> <li>• requirements of council's conditions of approval</li> <li>• requirements of POEO Act</li> <li>• environmental requirements of Local Government Act</li> <li>• enforcement provisions available to authorised officers</li> <li>• this issue needs to be considered at all stages of development</li> </ul>	<ul style="list-style-type: none"> <li>• Sample infringement notices</li> <li>• Clean-up notice</li> <li>• Penalty notice</li> <li>• Prevention notice</li> <li>• Cost compliance notice</li> </ul>
5. Erosion and sediment control: the tools and systems	<ul style="list-style-type: none"> <li>• erosion control is more cost-effective than sediment control</li> <li>• what erosion and sediment control involves</li> <li>• range of tools available, and pro's and con's of each</li> </ul>	<ul style="list-style-type: none"> <li>• Samples of sediment fence, mulch blanket, mulch etc.</li> <li>• <i>Keep the soil on the site</i> – booklet and video</li> <li>• Landcom's hip-pocket handbook</li> </ul>
6. ESCPs/SWMPs	<ul style="list-style-type: none"> <li>• requirement for ESCPs/SWMPs for different size projects</li> <li>• purpose and nature of plans for different size of development</li> <li>• plans comprise both a map and commentary</li> </ul>	<ul style="list-style-type: none"> <li>• Planning for erosion and sediment control on single residential allotments – pamphlet</li> <li>• Sample ESCPs &amp; SWMPs</li> </ul>
7. Common problems on building and development sites	<ul style="list-style-type: none"> <li>• importance of using the right system in the right place</li> <li>• problems caused by poorly installed /maintained controls</li> <li>• what areas should be a priority</li> </ul>	<ul style="list-style-type: none"> <li>• Sample audit checklist</li> <li>• Photographs</li> </ul>

### **3.4 Training program for council enforcement personnel**

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Council's enforcement personnel can play a critical role in ensuring effective erosion and sediment control on building and development sites, but they need to be properly trained in identifying whether a builder is meeting their consent conditions, and whether the control systems are adequate. They also need to be able to use the enforcement provisions of the various Acts effectively. Table 3.2 provides an example training program framework on erosion and sediment control suitable for council enforcement officers.



**Table 3.2 Example training program framework for council enforcement personnel**

<b>Course content</b>	<b>Learning outcomes – Knowledge and understanding of:</b>	<b>Resources required</b>
1. The environmental impact of sediment	<ul style="list-style-type: none"> <li>• the impact of sediment on waterways</li> <li>• building sites are a significant source of sediment</li> </ul>	<ul style="list-style-type: none"> <li>• Case study of sediment loss from a building site</li> </ul>
2. Erosion and sedimentation: what causes it?	<ul style="list-style-type: none"> <li>• the difference between erosion and sedimentation</li> <li>• factors influencing erosion and sedimentation</li> </ul>	
3. Principles of erosion and sediment control	<ul style="list-style-type: none"> <li>• need for proper planning, installation, maintenance of controls</li> <li>• erosion and sediment control documentation required</li> </ul>	<ul style="list-style-type: none"> <li>• Planning for erosion and sediment control on single residential allotments – pamphlet</li> <li>• <i>Keep the soil on the site</i> – video</li> </ul>
4. The laws in relation to erosion and sediment control: an overview	<ul style="list-style-type: none"> <li>• requirements of council's conditions of approval</li> <li>• requirements of POEO Act</li> <li>• environmental requirements of Local Government Act</li> <li>• enforcement provisions available to authorised officers</li> <li>• this issue needs to be considered at all stages of development</li> </ul>	<ul style="list-style-type: none"> <li>• Sample infringement notices</li> <li>• Clean-up notice</li> <li>• Penalty notice</li> <li>• Prevention notice</li> <li>• Cost compliance notice</li> </ul>
5. Erosion and sediment control: the tools and systems	<ul style="list-style-type: none"> <li>• erosion control is more cost-effective than sediment control</li> <li>• what erosion and sediment control involves</li> <li>• range of tools available, and pro's and con's of each</li> </ul>	<ul style="list-style-type: none"> <li>• Samples of sediment fence, mulch blanket, etc.</li> <li>• <i>Keep the soil on the site</i> – booklet and video</li> <li>• Landcom's hip pocket handbook</li> </ul>
6. ESCPs/SWMPs	<ul style="list-style-type: none"> <li>• requirement for ESCPs/SWMPs for different size projects</li> <li>• purpose and nature of plans for different size of development</li> <li>• plans comprise both a map and commentary</li> </ul>	<ul style="list-style-type: none"> <li>• Planning for erosion and sediment control on single residential allotments – pamphlet</li> <li>• Sample ESCPs &amp; SWMPs</li> </ul>
7. Common problems on building and development sites	<ul style="list-style-type: none"> <li>• importance of using the right system in the right place</li> <li>• problems caused by poorly installed/ maintained controls</li> <li>• what areas should be a priority</li> </ul>	<ul style="list-style-type: none"> <li>• Sample audit checklist</li> <li>• Photographs</li> </ul>
8. Site visits	<ul style="list-style-type: none"> <li>• each site has its own challenges</li> <li>• what to look for when visiting sites</li> <li>• how to support builders who want to do the right thing</li> </ul>	<ul style="list-style-type: none"> <li>• Sample audit checklist</li> <li>• Local sites to visit</li> </ul>

### **3.5 Checklist for building and development sites**

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Rangers, building surveyors and environmental health officers can be required to visit building and development sites to review erosion and sediment control practices.

The checklist in appendix G was developed by the *Keep the soil on the site* program and can be used to review erosion and sediment control practices. This simple, straightforward tool can be used by compliance personnel with all levels of experience and can also be provided to builders and developers for them to develop their own in-house audit system.

An electronic copy of this checklist is available from the DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)) for modification and printing as required.

### **3.6 Who should be responsible for enforcement?**

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With the emergence of private certifiers in the building and development approvals process, some councils are concerned about the level of authority they have over privately certified sites. In some councils there are no clear guidelines about whether rangers, building surveyors or environmental health officers have overall responsibility for the management of enforcement on building and development sites within their area.

This issue should be addressed to ensure a common framework and understanding regarding responsibilities for enforcement. Some councils (e.g. Hornsby, Baulkham Hills) employ a specialist enforcement officer to encourage a consistent approach to erosion and sediment control on all building and development sites. However, other authorised officers may then feel that enforcing these controls is no longer part of their role, thus reducing the overall enforcement effort.

A number of councils have developed enforcement protocols to ensure there are clear guidelines that are understood by council enforcement personnel, builders and developers, and private certifiers within their areas. Even if councils do not plan to develop something as formal as a protocol, it is important that they establish clear lines of authority for all of their enforcement team. Appendix E provides an example of such an enforcement protocol.



## 4. Engineering, design and operations

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## 4.1 Overview

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Council engineers or technical services staff may be required to develop erosion and sediment control plans (ESCPs) or soil and water management plans (SWMPs) for council projects (section 2.3). They may also be responsible for the design and construction of major infrastructure projects including, for example, sealed and unsealed roads, water and sewerage systems, building construction or upgrades, and new or redesigned landfills. All of these activities need careful planning and management to minimise the impacts of erosion and sedimentation. *Managing urban stormwater: soils and construction* vol. 2 (DEC 2006a) provides some useful guidance for these infrastructure projects.

Similarly, council operational staff may be required to build and maintain unsealed roads, water mains, sewer mains etc. Their actions too have implications for erosion and sediment control. To minimise the impact of their activities, operational staff need support such as:

- training
- clear standard operating procedures or guidelines
- regular internal audits to check that operating procedures are being implemented
- regular updates on new developments in erosion and sediment control.

The publication *A resource guide for local councils: environmental management of council operations* (DEC 2006b) provides advice on many areas such as:

- environmental awareness training
- development of standard operating procedures
- environmental risk assessment
- effective internal environmental auditing
- emergency response procedures
- managing sub-contractors.

It is strongly recommended that any officer involved in developing erosion and sediment control programs for operational teams within a local council should obtain a copy of the guideline from DEC. Engineering and operations staff may also need advice on:

- the advantages and disadvantages of basic erosion and sediment control tools
- selecting erosion and sediment controls for specific situations
- training for operational staff
- site auditing on erosion and sediment control.

The following pages provide further information on these basics. Appendix H provides a checklist for use on council operational work sites.



*Progressive revegetation and stabilisation of batter*

## 4.2 Basic erosion and sediment control tools – advantages and disadvantages

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### Introduction

The function of erosion control measures is to either protect or reinforce the soil surface from the forces of erosion or convey runoff in a non-erosive manner. Sediment control measures aim to capture eroded soil particles usually by slowing the velocity of water flow so that soil particles can settle out by gravity.

As sediment is only generated when soil erosion occurs, the installation or construction of erosion control measures should be the first priority. Erosion control is typically easier and cheaper than sediment control.

Erosion and sediment control is usually straightforward, but inappropriate or poorly designed or installed control measures can cause more problems than they solve. When in doubt seek independent expert advice. Be aware that some 'practitioners' are product suppliers and therefore may have a vested interest in promoting certain products or solutions over others.

Expert advice can be obtained from Certified Professionals in Erosion and Sediment Control (CPESC), accredited through the International Erosion Control Association (Australasia) (IECA). *MUS: soils and construction* vol. 1 is a very useful reference that can assist in selecting erosion and control measures.

### Erosion and sediment control measures

This section provides a comprehensive list of measures that can be used for erosion and sediment control. New erosion and sediment control technologies are being developed all the time. Those described here are known to work if designed and implemented correctly. Some erosion and sediment control measures (e.g. sediment basins and major diversion works) require formal design if unacceptable risk is to be avoided. It is important to choose a measure that addresses the identified problem.



*Track walking using a dozer [left] helps reduce erosion and encourage vegetation to establish [right]*

### **Surface roughening – track walking**

**Description:** Track walking involves driving a bulldozer or similar ‘tracked’ (rather than wheeled) vehicle up and down a slope, leaving small, horizontal depressions in the soil surface. This roughened state increases water infiltration, decreases and slows runoff, and helps to retain sediment and establish vegetation.

**Application:** For any slope that is safe for the use of machinery. For track walking, the maximum slope should be 2(H):1(V).

**Installation aspects:** Up-slope runoff should be diverted away from the slope to be treated.

**Problems:** Significant erosion is likely to occur if up-slope stormwater is not diverted around area.



*Turf strips control sediment in low flows*

## **Turf**

**Description:** A layer of topsoil and grass harvested from the field by specialist machinery. Rolls can be supplied up to 5 metres wide and 9 metres long. Reinforced turf is similar to conventional turf except that the grass is grown through an artificial two-dimensional polypropylene grid to provide additional strength.

**Application:** Turf and reinforced turf can be used where there is both sheet flow and concentrated flow. It is often used as a 'softer' alternative to 'hard' channel linings such as rock and concrete in urban situations.

**Design/construction aspects:** Turf is capable of withstanding only relatively low flow velocities. Reinforced turf can withstand higher flow velocities than ordinary turf. Deposited sediment can kill turf and so upstream erosion protection and sediment detention measures should be installed before the turf can be placed. As turf and reinforced turf rely on the grass root system for strength, the underlying soil must be suitable for plant growth – i.e. fertile and with good structure. The edges of the turf must be installed flush with the existing soil surface to avoid erosion along the turf/soil interface.

**Problems:** Turf can be killed by significant amounts of deposited sediment. Reinforced turf may become 'root bound' and may therefore take longer to bind into the soil surface. Turf should be watered until adequately established.



*Jute matting stabilises newly planted area*

### **Erosion mats and blankets**

**Description:** A rolled mat or blanket made from jute, coconut fibre, wool, nylon and polypropylene that is placed on the soil surface to protect it from raindrop impacts and low velocity sheet and concentrated flows.

**Application:** Erosion control blankets and mats have different applications. Erosion control blankets are used on batters and embankments and other sheet-flow environments to protect the soil from erosion and promote vegetation. They are generally temporary measures and are designed to degrade, being composed of wood fibre, wool and jute. Erosion control mats are designed to be used in concentrated flow environments and are therefore made from more durable materials such as coconut fibre, nylon and polypropylene, as well as jute.

**Design/construction aspects:** Due to the many types of proprietary products available, independent advice should be sought on the appropriate mat or blanket for a particular situation. Manufacturers provide specifications and installation guidelines with their products.

**Problems:** Problems can occur when blankets are placed in concentrated flow areas. A blanket is designed to protect the ground from raindrop impact, while a mat is a heavier product designed for concentrated flow.





*An effective check dam traps sediment by slowing flows*

## Check dams

**Description:** A small temporary weir structure that can be constructed from rock, sandbags or logs.

**Application:** Check dams provide temporary protection from erosion and retain limited amounts of coarse sediment in concentrated flow areas such as perimeter and table drains, but are not suitable for use in major flow lines or streams. They act by limiting flow velocity.

**Design/construction aspects:** Check dams are temporary measures and therefore do not require formal design. The middle of the check dam must have a spillway to stop water flowing around the dam. Check dams should be installed so that the toe of the up-slope check dam is at the same level as the crest of the immediate down-slope dam.

**Problems:** Erosion can occur around the edge of the dams if the spillway is too shallow. Erosion immediately down-slope of the check dam indicates insufficient rock protection.



*Surface mulching using a tritter [left] keys mulch into the surface to aid stability and revegetation [right]*

## Surface mulching

**Description:** Mulching involves placing a cover of (usually) coarse organic material to protect the soil surface from the erosive effects of raindrop impact and shallow sheet flows. Common mulch materials include wood chips, straw, wood fibre, paper pulp, bagasse, brush matt and bitumen emulsion.

**Application:** The type of mulch used will depend on a number of factors: the environment to be protected, the climatic conditions, the location and the type of mulch material available.

**Design/construction aspects:** Commonly, flows should be diverted away from the area to be protected. The mulch material should be applied evenly and uniformly.

**Problems:** Mulch will be washed away where flow diversion fails. Soils can erode where insufficient mulch or soil binding agent is used. Some mulches can cause weed infestation (e.g. where hay is used instead of clean straw).

## Vegetation

**Description:** Vegetation planted to prevent erosion may include native and introduced grasses, ground covers, shrubs and trees.

**Application:** Any erosion control program will benefit from temporary and permanent vegetation cover. Vegetation protects the soil from raindrop impact, slows flow velocities and traps eroded soil particles. Roots bind the soil surface and thus help prevent erosion.

**Problems:** Weed infestations may occur where contaminated seed is used or where soil is disturbed. Climatic/soil constraints may impede vegetation establishment.



*Sediment fence in operation*

## **Sediment fence**

**Description:** A sediment fence is a temporary barrier of permeable geotextile, partially installed in a trench and supported by posts.

**Design/construction aspects:** Sediment fences are not to be used in areas of concentrated flow. The fence should be installed on the contour with the ends turned up, anchored in a 150 mm deep compacted, backfilled trench. The sediment fence posts must be on the down-slope side of the fabric otherwise the fabric will come away from the peg when put under pressure.

**Problems:** Water will run around the ends of the fence if turnbacks are omitted at either end. If the trench is too shallow, the fabric may pull out of the ground. Water will tunnel under the fence if the trench is not compacted after installation.



*Poorly installed straw bales*

## **Straw bales**

**Description:** Straw bales are used to form a small temporary dam. They are suitable only for low flows of water to reduce water velocity.

**Design/construction aspects:** Straw bales are unsuitable for use in concentrated flow areas. They should be installed on the contour with the ends turned up-slope so that the turn-up ground level is equal to the top of the middle bale. Straw bales should be embedded to a depth of 100 mm below the ground surface, and well anchored with a star picket. The minimum number of straw bales to be used is four – you cannot make a dam with just one or two straw bales.

**Problems:** Insufficient spillway depth or too few bales will lead to erosion around the edge of the dam. Erosion immediately down-slope of the straw bale dam is caused by insufficient rock protection.



Sandbags can control sediment effectively [left] or be a hazard if neglected [right]

## Sandbags

**Description:** Sandbags, used to form a temporary sediment trap, capture eroded sediments by slowing the water so that the soil particles settle out.

**Application:** Sandbags trap coarse sediments in both concentrated and (less commonly) sheet flow areas. They should be located immediately downstream of disturbed areas.

**Design/construction aspects:** Sandbags or other materials (such as rocks, logs and rock-filled wire baskets) can be used to form a pond to act as a sediment trap.

**Problems:** Commonly, the structures are too small to contain all the water washed from the site. Poor location and design can cause difficulty in cleaning out sediment.



*A simple but effective sediment trap made with fencing and straw bales*

## **Sediment traps**

**Description:** Sediment traps capture eroded sediments by slowing the velocity of water so that the soil particles settle out. They generally consist of a stable inlet and outlet, and some form of pond.

**Application:** Their function is to trap coarse sediments in concentrated flow situations. They should be located immediately downstream of disturbed areas.

**Design/construction aspects:** Sediment traps need to be formally designed. They can be formed by excavating an earthen pond, or by constructing some form of structure to form a pond using materials such as rocks, logs, sandbags and rock-filled wire baskets.

**Problems:** Common problems include inlet and outlet erosion due to inadequate erosion protection, and poor location and design causing difficulty in cleaning out sediment.

### 4.3 Deciding what type of system to use – a basic flowchart

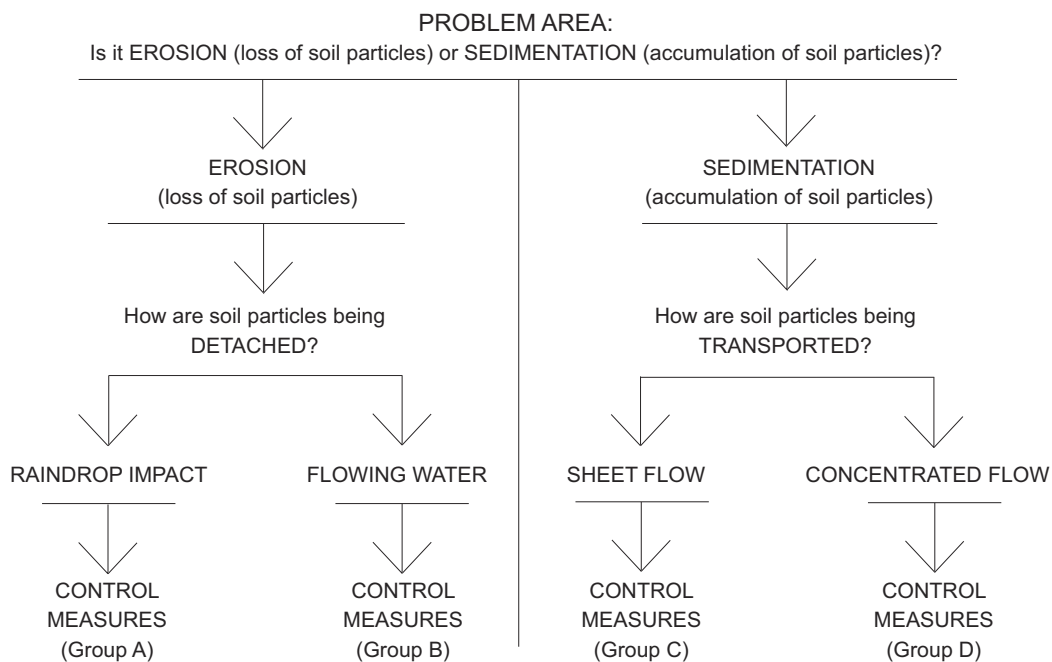
One of the main challenges facing council personnel responsible for developing erosion and sediment control systems is deciding what type of measures to use. Should they use sediment fences, rock and geotextile sediment traps, gravel-filled sandbags or erosion control blankets?

Figure 4.1 provides a simple flowchart for guiding these decisions. This flowchart deals with the basic questions first, asking whether the problem is:

- erosion or sedimentation
- rain drop impact or flowing water
- sheet flow or concentrated flow.

The flowchart then guides the user to potential groups of treatment options (table 4.1). The table includes the erosion and sediment control measures commonly employed in council projects, as described in section 4.2, plus other measures which are described in detail in *MUS: soils and construction* vol. 1 (references shown as 1: section 3.3.2 etc.).

**Figure 4.1. Decision-support flowchart for selection of erosion and sediment control measures<sup>1</sup>**



<sup>1</sup> Modified from Soilcon Pty Ltd. Used with permission

**Table 4.1 Erosion and sediment control measures**  
(source: Modified from Soilcon Pty Ltd. Used with permission)

<b>Group A</b> <b>Erosion control – raindrop impact</b>	<b>Group B</b> <b>Erosion control – flowing water</b>
<p><b>Vegetation</b></p> <ul style="list-style-type: none"> <li>• temporary vegetation (cover crop only)</li> <li>• permanent vegetation (introduced (exotic) species or native (endemic) species)</li> <li>• see 1: sections 4.3.2, 7.1, 7.2, appendix A6 and appendix G</li> </ul>	<p><b>Check dams</b></p> <ul style="list-style-type: none"> <li>• stacked rock</li> <li>• sandbags and geotextile sausages</li> <li>• straw bales</li> <li>• logs</li> <li>• proprietary products</li> <li>• see 1: section 5.4.3, SD5-4 and figures 5.3(a) and (b)</li> </ul>
<p><b>Batter blankets</b></p> <ul style="list-style-type: none"> <li>• vegetation promotion blankets</li> <li>• vegetation suppression blankets</li> <li>• needle-punched geotextile membrane</li> <li>• builder’s plastic membrane</li> <li>• see 1: section 5.4.2, SD5-2, appendices A6 and D</li> </ul>	
<p><b>Soil surface mulching</b></p> <ul style="list-style-type: none"> <li>• hydromulch or hydraulic bonded fibre matrix</li> <li>• blown straw, hay or other crop residue, with bitumen tack</li> <li>• tub-ground or chipped organic mulch</li> <li>• brush-matting</li> <li>• rock or gravel mulch</li> <li>• see 1: section 7.4, figure 7.3, appendices A6 and D</li> </ul>	
<p><b>Surface roughening</b></p> <ul style="list-style-type: none"> <li>• roughening parallel to contour</li> <li>• contour ripping or scarifying</li> <li>• trackwalking</li> <li>• see 1: section 4.3.2 and figures 4.3(a) and (b)</li> </ul>	
<p><b>Additional measures (and MUS: soils and construction vol. 1 references)</b></p>	
<p><b>Geocellular containment systems</b> 1: section 5.4.2, SD5-3 and appendix D</p> <p><b>Geobinders</b> 1: section 7.1.2, appendices A6 and D</p>	<p><b>Batter drains</b> 1: section 5.4.4 and appendix D</p> <p><b>Outlet dissipation structures</b> 1: section 5.4.5, figure 5.8, 5.9, 5.10, 5.11 and SD5-8</p> <p><b>Soft armour channels</b> 1: sections 5.4.3, 7.3, SD5-7 and appendix D</p> <p><b>Hard armour channels</b> 1: section 5.4.4, table 5.2, figure. 5.4 and appendix D</p> <p><b>Up-slope diversions</b> 1: section 5.4.4, SD5-5 and SD5-6</p> <p><b>In-stream diversions</b> 1: section 5.3.5 and appendix I</p> <p><b>Grade control structures and flumes</b></p> <p><b>Revetments and retaining walls</b></p>



Group C Sediment control – sheet flows	Group D Sediment control – concentrated flows
<p><b>Turf/vegetative buffers</b></p> <ul style="list-style-type: none"> <li>• well established sward with good groundcover</li> <li>• see 1: section 6.3.8, table 6.4, SD6-13 and appendix G</li> </ul>	<p><b>Sediment traps</b></p> <ul style="list-style-type: none"> <li>• stacked rock/timber with geotextile</li> <li>• excavated sumps</li> <li>• detention areas</li> <li>• straw bale or sand bag structures</li> <li>• gully pit, field inlet and kerb inlets</li> <li>• see 1: section 6.3.6, figure 6.11, SD6-11 and SD6-12</li> </ul>
<p><b>Sediment barriers/fences</b></p>	
<ul style="list-style-type: none"> <li>• sediment fences</li> <li>• vegetation and brush windrows</li> <li>• rock and gravel windrows</li> <li>• earthen downslope diversion directing sheet flows to sediment traps or sumps</li> <li>• straw bale barriers</li> <li>• see 1: section 6.3.7, SD6-7, SD6-8, figure 6.10 and appendix D</li> </ul>	
<p><b>Site exit points</b> 1: section 6.3.9 and SD6-14</p>	<p><b>Sediment retention basins</b> 1: sections 6.3, SD6-3, SD6-4, appendices E and J</p> <p><b>Sediment curtains / turbidity barriers</b> 1: section 6.3.7, SD6-10 and appendix D</p>

## 4.4 A training program framework for council operations staff

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The design and construction of some erosion and sediment control measures requires the active involvement of professionally qualified and/or accredited individuals. Substantial training and/or experience is required to undertake these tasks.

It is important, however, to offer some basic training in erosion and sediment control to council operational personnel, particularly those with decision-making responsibilities. This training needs to go beyond environmental awareness. A training course should strive to develop decision-making skills, particularly about the basic systems they need to put in place for routine maintenance and construction works. The training should also reinforce the importance of councils doing what they can to minimise the amount of sediment flowing into local waterways.

A number of the resources provided within this guide may be used to support such a training program. Table 4.2 outlines an example framework for a half-day training course focusing on the needs of operational personnel. This should be helpful for councils who want to develop their in-house training activities. It is important, however, that course content be customised in consultation with a specialist trainer, to ensure that training meets the needs of the target audience.

This course is recommended for line management and operational personnel in the areas of road construction and maintenance as well as water and sewer construction and maintenance. These areas have the highest risk of any in council of affecting erosion and sediment control.

Council engineers responsible for the development of environmental management plans or major works including SWMPs and ESCPs should also be encouraged to attend.

It is recommended three hours be set aside for this course if there is no field component, or four and a half hours with a field component.

Evaluating the effectiveness of this program can use an indicator such as an internal environmental review program. Developing and implementing this indicator will enable council staff to track changes in erosion and sediment control practices on their job sites. Other indicators could include changes in the council's:

- erosion and sediment control purchasing practices
- standard operating procedures to incorporate erosion and sediment control requirements.

A number of consultants also offer specialised erosion and sediment control training programs at a range of levels. The NSW chapter of the International Erosion Control Association (IECA) provides information on potential trainers. It is also suggested you contact other councils in your area to investigate trainers they may have used successfully.

**Table 4.2 Example training program framework for council operations staff**

<b>Learning outcomes</b>	<b>Course components and content</b>
<p>Through completing this course participants will:</p> <ul style="list-style-type: none"> <li>• have an awareness and understanding of erosion and sedimentation, and its impacts on local waterways</li> <li>• know and understand the difference between erosion and sediment control</li> <li>• know and understand the difference between erosion caused by raindrop impact and flowing water</li> <li>• know and understand the difference between sediment control when transportation of soil particles is through sheet flow or concentrated flow</li> <li>• gain an understanding of basic erosion and sediment control methods and where each should or should not be used</li> <li>• know what to consider when choosing the most effective erosion and sediment control methods for a site</li> <li>• understand the importance of reviewing the effectiveness of erosion and sediment control devices on a regular basis</li> </ul>	<p><b>Introduction</b></p> <hr/> <ul style="list-style-type: none"> <li>• principles of erosion and sediment control</li> <li>• quick snapshot of case studies illustrating good and bad practice</li> </ul> <hr/> <p><b>Erosion and sediment control methods</b></p> <hr/> <ul style="list-style-type: none"> <li>• advantages and disadvantages of products and methods for erosion and sediment control, including hay bales, vegetation promotion blankets, vegetation suppression blankets, temporary up-slope diversions, erosion control mats, gravel sausages, sediment fences, excavated sediment traps, sandbags and check dams</li> </ul> <hr/> <p><b>Selecting the most effective methods</b></p> <hr/> <ul style="list-style-type: none"> <li>• factors to be considered when selecting erosion and sediment control methods, including slope, time of year, soil type, weather forecasts, area and duration of disturbance, maintenance requirements, rehabilitation techniques and proximity to local waterways</li> <li>• case studies where participants are asked to decide on the most appropriate erosion and sediment control methods for particular sites and particular jobs – their recommendations are then reviewed by the group</li> </ul> <hr/> <p><b>Case studies</b></p> <hr/> <ul style="list-style-type: none"> <li>• further case studies can be reviewed featuring good and poor practices</li> <li>• if time allows, visit a field site where participants can see and assess control methods in real situations</li> </ul>





## References and resources

The DEC website ([www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater)) provides a large range of resources suitable for use by council officers, developers and builders. Other important references are listed below.

1. *Managing urban stormwater: soils and construction* vol. 1 (4<sup>th</sup> edition) (Landcom 2004a).

The 'Blue Book', the definitive guide to erosion and sediment control on all types of urban development sites. Any engineer or designer involved with erosion and sediment control should have a copy of this document.

2. *Managing urban stormwater: soils and construction – the hip-pocket handbook* (Landcom 2004b).

A small field guide containing the standard drawings and construction notes from the Blue Book.

3. *Planning for erosion and sediment control on single residential allotments* (Landcom 2004c).

A six-page pamphlet providing simple guidance on erosion and sediment control for single lot construction sites, including the preparation of erosion and sediment control plans for such sites.

For more information on 1, 2 and 3, contact:

Landcom

Phone: 9841 8600

Email: [bluebook@landcom.nsw.gov.au](mailto:bluebook@landcom.nsw.gov.au)

Website: [www.landcom.nsw.gov.au](http://www.landcom.nsw.gov.au)

4. *Managing urban stormwater: soils and construction* vol. 2 (DEC 2006a)

This document complements the technical erosion and sediment control guidance provided in the Blue Book for activities other than urban development, such as waste landfills, main road construction, unsealed roads and service installation projects.

5. *A resource guide for local councils: environmental management of council operations* (DEC 2006b)

This document guides local council operational staff, supervisors and managers in reducing the environmental impact of works undertaken by local government. It includes environmental awareness training, developing standard operating procedures, environmental risk assessment, environmental auditing and emergency response procedures.



## Appendices

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### Checklists

Note that some of these appendices (marked with **W**) may be downloaded from the DEC website, [www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater).

## Appendix A: Gap analysis tool for local government W

### Performance indicators

Assessing officers are asked to rate council's performance in each of the areas where they have a program in place. This will not only show where there is room for improvement, but will also create performance indicators for measuring progress in future. The following rating scale is suggested:

1. Exists in theory but not in practice
2. System in place but not effective
3. Average
4. Good
5. Excellent

Council name

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Assessing officer

---

Assessment date

---

### Program planning

PROGRAM ELEMENT	PROGRAM IN PLACE? (Y=yes, N=no)	PERFORMANCE (Rate from 1–5)	FOR MORE INFORMATION <sup>1</sup>
General understanding of erosion and sediment control			Section 1
General commitment to erosion and sediment control			Section 1
Code of practice on erosion and sediment control in place			Section 2.2
ESCPs/SWMPs required for development			Section 2.3
Appropriate system for assessing erosion and sediment control plans and soil and water management plans in place			Section 2.4
Appropriate conditions of approval in place			Section 2.7
Information available for builders and developers on council's erosion and sediment control policies and other requirements			Section 3.2

<sup>1</sup> Refers to *A resource guide for local councils: erosion and sediment control* (DEC 2006)



## Program – building and development

PROGRAM ELEMENT	PROGRAM IN PLACE? (Y=yes, N=no)	PERFORMANCE (Rate from 1–5)	FOR MORE INFORMATION <sup>1</sup>
Guideline/information for builders/developers			Section 3.2
Training/information/guidelines for enforcement personnel			Section 3.4
Audit/review checklist for building/development sites			Section 3.5
Enforcement protocol and action plan			Section 3.4

## Program – engineering, design and operations

PROGRAM ELEMENT	PROGRAM IN PLACE? (Y=yes, N=no)	PERFORMANCE (Rate from 1–5)	FOR MORE INFORMATION <sup>1</sup>
Basic information available on erosion and sediment control systems			Section 4.2
Standard operating procedures incorporating erosion and sediment control measures			See DEC (2006b)
Training available on erosion and sediment control			Section 4.4
Regular in house environmental audits			Section 4.5

## Program – resources and training

PROGRAM ELEMENT	PROGRAM IN PLACE? (Y=yes, N=no)	PERFORMANCE (Rate from 1–5)	FOR MORE INFORMATION <sup>1</sup>
Opportunities for professional development identified			Section 2.5
Budget allocated for professional development program			

<sup>1</sup> Refers to *A resource guide for local councils: erosion and sediment control* (DEC 2006)

## Appendix B: Model code of practice for erosion and sediment control

### Background

This appendix outlines a draft code of practice for erosion and sediment control. It updates appendix M, *Managing urban stormwater: soils and construction* vol. 1 (Landcom 2004) and is reproduced with permission of Landcom. Local councils in NSW may copy and adopt this code with appropriate acknowledgment to Landcom.

### Model code of practice for soil and water management on urban lands

#### Intent

The code of practice applies to urban subdivision and building activities. The code aims to minimise the effect of soil erosion and stormwater pollution resulting from land development. It is designed to give consent authorities a model that can be easily adapted to their own needs, while meeting the needs of government agencies and industry. It seeks to impose the least onerous conditions consistent with ecologically sustainable development.

#### Scope

All urban development activities are covered by this code where these might result in pollution of receiving waters and more than 250 m<sup>2</sup> of land will be disturbed. The activities include the building of single dwellings through to large-scale, greenfield subdivisions.

Different levels of control are required depending on how much land is being disturbed and the type of activity (table B.1).

Area of disturbance (m <sup>2</sup> )	Nominal type of activity	Scope of works
< 250	<ul style="list-style-type: none"><li>• house extensions</li><li>• small driveways</li><li>• garages</li></ul>	not covered by this code
250 to 2500	<ul style="list-style-type: none"><li>• long driveways</li><li>• most houses</li><li>• small commercial developments</li><li>• small subdivisions</li><li>• medium/high density housing developments</li><li>• small civic works</li></ul>	ESCP plan addressing soil erosion and sediment pollution only
> 2500	<ul style="list-style-type: none"><li>• large subdivisions</li><li>• large civil works</li><li>• large medium/high density housing, etc.</li></ul>	SWMP plan addressing soil erosion and pollution by sediment, including: <ul style="list-style-type: none"><li>• nutrients held on sediment particles</li><li>• calculation of the need for a sediment basin</li></ul>

The code does not address activities that are clearly not considered urban development, such as farming, market gardening, highway construction and equestrian activities. It does cover the whole process of construction, from initial planning of urban works through to the completion of the construction phase and subsequent rehabilitation. It outlines the requirements for best management practices (BMPs) applicable to the construction phase, including:

- controlling run-on water
- marking out areas to be disturbed
- stripping and stockpiling of topsoil/reshaping the site
- controlling movement of water on, through and off the site
- generally, managing the impacts of works
- rehabilitation (including revegetation).

### **Other needs**

It is hoped that consent authorities throughout New South Wales will adopt this code so that similar standards apply to development across the state. This can be achieved by inserting the name of the appropriate organisation wherever '[the consent authority]' appears in this text. Further, it is anticipated that consent authorities will make available to prospective developers maps of their area of influence at suitable scales (1:25,000) and containing information about:

- soil erodibility
- soil loss classes
- soil hydrologic group
- soil texture group
- proportion of whole subsoil likely to be dispersible
- other data relevant to local needs.

Alternatively, consent authorities could provide copies of the relevant sections of appendices B and C of *Managing urban stormwater: soils and construction* (Landcom 2004) and other information about rehabilitation. Nevertheless, it is expected that developers will collect their own site-specific information where:

- the data above are not generally available
- the development is regarded as environmentally sensitive.

Consent authorities might have local needs that go beyond this model code and which will be addressed in other areas.

### **General planning requirements**

Unless otherwise marked, each paragraph applies to all urban works activities, including building, subdivision and infrastructure development.

1. Erosion and sediment control plans (ESCPs) are required where between 250 and 2500 square metres of land will be disturbed for:
  - single dwellings and other developments if approval is required from the consent authority; and
  - minor civil infrastructure works, including:
    - urban and minor rural road construction and reconstruction
    - stormwater, sewerage and water pipelines, including culverts in urban areas

- bulk earthworks, including retention basins and sports fields
- electricity, telephone and natural gas lines in urban areas.

Nevertheless, [the consent authority] might vary this requirement especially where, in their view:

- a high risk of polluting receiving waters exists, i.e. requiring a SWMP, or
  - a very low risk of polluting receiving waters exists, i.e. waiving the need for an ESCP.
2. Soil and water management plans (SWMPs) are required for all development works where more than 2500 square metres of land will be disturbed and/or where development consent is required.
  3. Any SWMP/ESCP (plans) will, when approved, create an agreement of intent between [the consent authority], government agencies, government business enterprises, corporations and private landholders. All site works must be carried out following the approved plan or as varied by the designer with the concurrence of [the consent authority].
  4. The SWMP/ESCP (plans) must be prepared by suitably experienced people such as those approved by the consent authority or those certified by:
    - the Institution of Engineers, Australia, for engineering and hydrology matters
    - the International Erosion Control Association for soil conservation matters
    - the Australian Society of Soil Science for collection or analysis of soil data.
  5. Where development consent is not required, earthworks may only be undertaken if:
    - the shape of the land is not materially altered
    - the land on which this work is undertaken is not:
      - regarded as waterfront land (see appendix I, *Managing urban stormwater: soils and construction* vol. 1, Landcom 2004)
      - steeper than 1(V):4(H) (approximately 14° from the horizontal)
      - designated by [the consent authority] as geotechnically unstable
      - subject to any other state or council legislative provisions

and the activity does not:

    - affect any native habitat vegetation or tree of significance without the written notice of [the consent authority] (including by lopping, removal, undermining, filling around or otherwise injuring)
    - include cut or fill greater than 1 metre
    - affect a land area greater than 250 square metres.
  6. Any earthworks that cause significant disturbance to the soil surface and are ancillary to any purpose for which [consent authority] approval is required must not be started before the issue of that approval. Further, these earthworks must only be undertaken following any plans attached to the approval.
  7. A controlled activity approval (CAA) must be gained from the Department of Natural Resources on waterfront land before any of the following works are undertaken:
    - the erection of a building or the carrying out of a work (within the meaning of the *Environmental Planning and Assessment Act 1979*)
    - the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise
    - the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise
    - the carrying out of any other activity that affects the quantity or flow of water in a water source.

The CAA must be submitted to the council before beginning any work.

8. Before the commencement of construction activities, the developer must nominate a representative to [the consent authority] in writing who has authority to:
  - ensure compliance with the conditions in this code and described on the approved plan
  - undertake additional practical measures and modify design to prevent or reduce pollution of waters
  - inform [the consent authority] of such additional measures when practicable.

### **Environmental bond**

9. Before starting construction activities, the applicant must provide to [the consent authority] an environmental bond that takes one of the following forms:
  - a security, such as a deed of agreement, in a form satisfactory to [the consent authority]
  - a deposit as a bank cheque from an approved financial institution
  - other financial guarantee.

[The consent authority] will permit the bond to be transferred from one development to another.

10. The amount of the bond shall be as follows:

<b>Area of lands to be disturbed (m<sup>2</sup>)</b>	<b>Amount</b>
Less than 1000	Nil
1000 or more	\$2000 plus \$1 for each 10 m <sup>2</sup> of disturbed land in excess of 1000 m <sup>2</sup> to a maximum total payment of \$20,000

11. An amount may be forfeited from the security deposit or bond where, in the view of [the consent authority]:
  - a developer/builder/applicant has failed in their duty of care to the approved plan
  - this has placed surrounding environments at an unacceptable risk from soil erosion or stormwater pollution.

The amount of the forfeiture in these cases will be determined by a demerit point system detailed as attachment B.1.<sup>1</sup>

12. The environmental bond may be partially released during the construction phase:
  - upon the developer demonstrating diligent completion and operational readiness of works specified in the plan, or
  - at agreed rates corresponding to completion of development stages.

However, the residual bond amount must not be less than the cost of implementing the plan over the remainder of the construction period.

13. Final release of the environmental bond must not occur before rehabilitation or before landscaping is installed. Sometimes, maintaining temporary rehabilitation is acceptable providing C-factors are always kept at less than 0.05 (e.g. 70 per cent grass cover, attachment B.2).

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<sup>1</sup> The monies collected from such forfeiture will be transferred to an environmental collections fund for financing strategies or rectifying damage or establishing devices on-site that improve the protection of the environment from soil erosion and stormwater pollution.

## SWMP/ESCP content

14. All plans must accord with the guidelines presented in chapter 2 of *Managing urban stormwater: soils and construction* vol. 1 (Landcom 2004). The principles of total catchment management and ecologically sustainable development are strongly encouraged.
15. On smaller sites (where less than 2500 square metres of land is disturbed), show:
  - the following background information on the drawing(s):
    - location of site boundaries and adjoining roads
    - approximate grades and indications of direction(s) of fall
    - approximate location of trees and other vegetation, showing items for removal or retention (consistent with any other plans attached to the application)
    - location of site access, proposed roads and other impervious areas (e.g. parking areas and site facilities)
    - existing and proposed drainage patterns with stormwater discharge points
    - north point and scale.
  - how the various soil conservation measures will be carried out on-site, detailed in a separate commentary, including:
    - timing of works
    - locations of lands where a protective ground cover will, as far as is practicable, be maintained
    - access protection measures
    - nature and extent of earthworks, including the amount of any cut and fill
    - where applicable, the diversion of runoff from up-slope lands around the disturbed areas
    - location of all soil and other material stockpiles including topsoil storage, protection and reuse methodology
    - location and type of proposed erosion and sediment control measures
    - site rehabilitation proposals, including schedules
    - frequency and nature of any maintenance program
    - other site-specific soil or water conservation structures.
16. On larger sites (where more than 2500 square metres of land is disturbed), identify all items listed in clause 15, above, as well as:
  - the following information:
    - the location of lots, public open space, stormwater drainage systems, schools, shopping/community centres
    - the location of land designated or zoned for special uses
    - existing site contours.
  - the location and general diagrammatic representations of all necessary erosion and sediment control BMPs
  - location and engineering details with supporting design calculations for all necessary sediment basins
  - location and basic details of any other facilities proposed to be included as part of the development or works, such as:
    - constructed wetlands
    - gross pollutant traps
    - trash racks or trash collection/separator units.

Detailed design criteria for these latter facilities should be sourced from other manuals/reports and are not an integral part of a construction phase SWMP. Usually they are considered as a separate function of the development approval process.

17. Specify the scale, type, operation and maintenance of all soil and water management devices in the soil and water management program. Include maps and/or specifications of measures proposed to control soil erosion and pollution by sediment.

### **Access and roads**

18. Vehicular access must be confined to approved areas. Where practicable, access must be stabilised and confined to one location.
19. Runoff from access surfaces must be drained into a nearby sediment-trapping device before leaving the site. Where appropriate, devices to remove soil materials from vehicles must be placed at site exit locations.
20. On subdivisions, priority must be given to road and road shoulder stabilisation based on erosion hazards. Where circumstances preclude the sealing of road shoulders and/or the construction of kerbs and guttering, and:
  - where grades permit grass shoulders (usually less than 5 per cent), the shoulders and associated table drains must be topsoiled and turfed, having dimensions that simplify maintenance mowing; and
  - where grades do not permit grass shoulders (generally more than 5 per cent), the shoulders and associated table drains must be stabilised with appropriate erosion control measures (e.g. jute mesh and bitumen, cross drains, erosion matting, etc.) and revegetated.
21. Where practical on subdivisions, newly sealed hardstand areas must be swept thoroughly after sealing/surfacing to prevent excess aggregate or gravel entering street drains.

### **Clearing vegetation**

22. Nothing in this code releases any person, proponent, council or authority from their obligations under the *Native Vegetation Act 2003*. Further, approval given for clearing does not exempt anyone from requirements to:
  - obtain additional approval as might be required by other government agencies
  - meet the requirements of other legislation.
23. Site-clearing for ground survey, geotechnical investigation or other purposes can be undertaken without development consent or approval, provided the work is:
  - consistent with the council's tree preservation order and/or policy
  - undertaken so that the ground surface is not disturbed and at least 150 mm stubble remains on the surface
  - provides site access with a minimum number of corridors
  - on land that is not subject to State Environment Protection Policy (SEPP) 14 (Coastal Wetlands), SEPP 19 (Bushland in Urban Areas), SEPP 26 (Littoral Rainforests) or SEPP 44 (Koala Habitat Protection)
  - on land that is not subject to the *Native Vegetation Act 2003*
  - only involves clearing that is excluded from the operation of the *Native Vegetation Act 2003*
  - involves erection of a fence within 1 metre of the boundary of lands owned or occupied by different persons
  - involves maintenance of services and utilities by [the consent authority] or public authorities
  - involves the destruction of weeds declared under provisions of the *Local Government Act 1993*
  - involves removal of trees in conformity with AS 2870.2: 1996 for specific sites.

24. Consent is not required for clearing where that work is carried out following a notice issued for excess vegetation and/or noxious weeds under the *Noxious Weeds Act 1993* or the *Local Government Act 1993*.
25. Clearing for the erection of a building for which development consent is not required must:
- be in accordance with [the consent authority's] LEP, tree preservation policy and SEPPs 14, 19, 26, and 44, and the *Native Vegetation Act 2003*
  - be limited to land within 3 metres of the outermost projection of a building (or other structure), a permanent driveway, access way, or carpark. The distance required can be varied to accord with AS 2870: 1996 (*Residential slabs and footings – construction*) on reactive soils.
26. The positive role of vegetation in protecting the ground surface from erosion must be used minimising the removal or disturbance of trees, shrubs and ground covers.
27. Where other studies, reports or consent conditions have identified specific requirements to be addressed in environmentally sensitive areas identified by [the consent authority], then SWMPs shall:
- show how appropriate measures will be taken to ensure that the activity does not unnecessarily affect any vegetation or trees of significance unnecessarily, including any process of lopping, removal, undermining, filling around or otherwise injuring them
  - be prepared by a suitably qualified person as approved by [the consent authority]
  - be submitted to the [the consent authority] for approval.
28. On building sites:
- the footpath or nature strip must not be disturbed by construction activities other than where shown on the plan for:
    - access to the site
    - installation of services
    - other works specifically approved by [the consent authority] and
  - removal and disturbance of vegetation must be confined to:
    - the approved building envelope area and/or permanent access ways
    - areas within 3 metres of the outermost projection of approved works and storage areas (or as required by other authorities).
- Retained vegetation must be protected by a suitable barrier.
29. For subdivisional work:
- clearing for works must be limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans
  - where practicable to do so, development must be phased, with clearing undertaken only with the development of each stage
  - understorey ground cover vegetation may be slashed, except in areas shown on the plan, providing ground surface disturbance is minimised and a rubber-tired vehicle is used.
30. All reasonable care must be taken to protect other vegetation from damage during construction. This might involve:
- clearly marking trees to remain
  - avoiding compaction of ground within the drip line of trees to remain
  - clearly delineating the area of disturbance and keeping all vehicles, building materials and refuse within that area
  - limiting the number of access points to the site
  - clearly restricting access to 'no go' areas.



31. No vegetation will be removed before approval by [the consent authority] to start work on any stage and not before the approved sediment control measures are in place.
32. Vegetation can be removed either without consent or to accord with approved plans for the purposes detailed in clause 23.
33. Where practical for subdivision and infrastructure works, vegetative debris must be salvaged either as logs or as woodchip for later reuse to control erosion or to rehabilitate the site. Non-salvageable materials, such as stumps and roots, can be removed.

### **Site works**

34. Site disturbance must not be undertaken before the issue of appropriate approvals.
35. Where works do not require approval, they can be undertaken provided they are in accordance with clause 5.
36. Where practicable, schedule the construction program to minimise the potential for soil loss so that the time from the beginning of land disturbance activities to rehabilitation is less than six months. Further, on lands with a high erosion hazard:
  - attempt to confine land disturbance to those times of the year when the rainfall erosivity is low
  - show special measures on the plan to address the high erosion hazard.
37. Site excavation must be designed and located with an aim to minimise cut and fill requirements.
38. Runoff and erosion controls must be installed before clearing and must include:
  - diversion of up-slope runoff around cleared and/or disturbed areas or areas to be cleared and/or disturbed, providing that:
    - such diverted water will not cause erosion
    - the up-slope catchment area is more than 2000 square metres
    - waters are diverted to a legal discharge point
  - sediment control fences or other measures at the down-slope perimeter of cleared and/or disturbed areas to prevent unwanted sediment and other debris escaping from the land
  - maintenance of all erosion control measures at operational capacity until the land is effectively rehabilitated.
39. On sites where more than 1000 square metres are to be disturbed, runoff and erosion controls must also include:
  - protection of areas to remain undisturbed through the erection of barrier fencing; and
  - measures to restrict slope length to 80 metres unless other surface stabilising compensatory measures are applied.
40. Where possible, topsoil must be stripped only from those areas designated on the approved plan and must be stockpiled for later use in rehabilitation and landscaping.
41. Stockpiles (topsoil, spoil, subsoil, sand or otherwise) must be:
  - located at least 2 metres from any hazard areas, including surfaces with grades greater than 15 per cent, zones of concentrated flow, driveways, footpaths, nature strips, kerb line gutters, swales or standing vegetation
  - protected from up-slope stormwater surface flows
  - provided with sediment filters down-slope
  - provided with a protective cover that reduces the C-factor (attachment B.2) on bare surface areas to 0.15 or less where they are unlikely to be worked for more than 20 working days.

42. For subdivisional and infrastructure works, fill batters should be located to avoid established trees. Where this is not possible, advice from a tree surgeon or [the consent authority] should be obtained to minimise damage to affected tree(s). Where retention is not practicable, the affected tree(s) must be removed to maintain slope stability.
43. For infrastructure works trenches must be backfilled, compacted to 95 per cent standard compaction, and capped with topsoil up to the adjoining ground level. The ground then must be turfed or sown with an approved seed and fertiliser mix.
44. Excess soil may be retained on-site provided the stockpile area is prepared by stripping topsoil from beneath the fill site and respreading it later over affected areas.
45. Trails and tracks for control of bushfires may be constructed and maintained providing they comply with:
- the appropriate council bushfire prevention and control policy
  - the chapter on unsealed roads in *Managing urban stormwater: soils and construction* (vol. 2) (DEC 2006a)
  - the provisions of the *Rural Fires Act 1997*.
46. Lands must be rehabilitated at the completion of all maintenance works where ground disturbance has occurred following clause 69.
47. All sediment control measures must be maintained at, or above, their design capacity.
48. Where more than 2500 square metres of land are disturbed, a self-auditing program must be developed for the site. A site inspection using a log book or inspection test plan (ITP) must be undertaken by the site supervisor:
- at least each week
  - immediately before site closure
  - immediately following rainfall events that cause runoff.
- The ITP can take the form of a checklist, completed by simple tick and brief comment entries.
49. The self-audit must be undertaken systematically on-site (e.g. walking anticlockwise from the main entrance) and recording:
- installation/removal of any BMPs
  - the condition of each BMP employed, noting whether it is likely to continue in an effective condition until the next self-audit
  - circumstances contributing to damage to any BMPs, accidental or otherwise
  - storage capacity available in pollution control structures, including:
    - waste receptacles and portable toilets
    - trash racks
    - sediment barriers and traps
    - gross pollutant traps
    - wetlands/water quality control ponds
  - time, date, volume and type of any additional flocculants
  - the volumes of sediment removed from sediment retention systems, where applicable, and the site where sediment is disposed
  - maintenance requirements (if any) for each BMP
  - circumstances contributing to the damage to BMPs
  - repairs effected on erosion and pollution control devices.

50. Signed, completed logbooks or ITPs must be available on-site and be available for council officers, officers of the NSW DEC or any other bona fide person who might seek to review them (attachments B.3 and B.4).
51. Irregularities noted by such bona fide persons must be dealt with immediately. If there is a breach or infringement of conditions, action will be taken consistent with the nature and seriousness of the breach or infringement. Actions taken by council (attachment B.4) can include:
  - issuing a 'stop work' notice
  - recording demerit points that can result in forfeiture of part or all of the environmental bond
  - issuing a fine under provisions of the *Protection of the Environment Operations Act 1997* (attachment B.5)
  - issuing a notice to comply pending reinspection of the site.

### **Stormwater control**

52. When a building's roof structures are in place, roof water is to be managed in a manner that reduces the likelihood of erosion. The stormwater system must prevent sediment from being eroded from the site and deposited downstream. The roof water system must be functional before roof runoff begins.

### **Pollution control**

This section applies only to sites where a SWMP is required (clause 2) or where, in [the consent authority's] view, the lands have a very high pollution hazard.

53. All pollution control measures and facilities must be installed and stabilised before other site earthworks or measures are commenced including stormwater diversion facilities.
54. Sediment basin(s) must be constructed where the calculated total annual soil loss from the disturbed lands is more than 150 cubic metres. Where the calculated basin size is less than 150 cubic metres, other erosion and sediment control devices can be installed instead.
55. Where sediment basins are required, construct these upstream of any wet ponds or receiving waters and, preferably, off-line.
56. A marker must be placed within each sediment retention basin to show the level above which the design capacity occurs. Advice about whether the basin is intended to be temporary or permanent must be provided by the proponent.
57. Where sediment retention basins are required, they must be designed to treat the sediment-laden stormwater emanating from the site during the subdivision works during the design rainfall event. They must remain in place at least until the developer has fulfilled all conditions of development consent. [The consent authority] can take over responsibility for the basin(s) or, alternatively, request the developer remove them after all compliance with all relevant consent conditions.
58. Where eroding soils contain more than 10 per cent of dispersible fines:
  - all waters captured in sediment basins must be treated with an approved flocculating agent. This treatment should ensure that discharges from such basins contain no more than 50 milligrams per litre of non-filtrable residues or as specified in [the consent authority's] stormwater management plan. Following settlement of soil materials, the structure must be pumped out using a floating skimmer collection device. [The consent authority] might consider approval of alternative options for flocculation or stored water removal where appropriate technical documentation is provided;

- sediment retention basins must be maintained at a low water level in readiness for treatment and discharge of further runoff. All stormwater captured in basins must be treated and discharged within two to 20 days of the cessation of a rainfall event depending on the appropriate design criteria; and
  - a minimum stockpile of flocculating agents must be retained on-site to provide for at least three complete treatments. It must be stored in a secure undercover location.
59. All sediment control structures described in a SWMP or in this code must be operated and maintained in an effective operational condition by following good engineering practice. A maintenance program must be established that should ensure that accumulated sediment does not impinge on the capacity of the settling zone up to the design storm event. Solid materials removed from sediment retention basins must be disposed of in a way that does not pollute waters.
60. Suitable all-weather access must be provided to all wetlands, sediment basins, detention basins and trash racks to ensure clearing and maintenance programs will not be compromised by inclement conditions.
61. Where practicable to do so, surface waters from any undisturbed lands must be diverted away from pollution control equipment to prevent contamination of clean runoff.
62. Appropriate measures must be provided to ensure that works do not cause flooding, erosion or scour. Such works include diversion and drainage structures, spillways, weirs, pipes and channels.
63. Chemical products, including petroleum, must be prevented from entering the stormwater system or contaminating the soil. Where necessary, impervious bunds must be constructed around all storage areas with an enclosed volume large enough to contain 110 per cent of the volume held in the largest tank.
64. Adequate bins for trade waste and litter must be provided on-site and serviced regularly.
65. Concrete wastes or washings from concrete mixers must not be deposited in any location where those wastes or washings can flow, or can be washed, into any areas of retained vegetation or receiving waters.

### **Rehabilitation and landscaping**

66. All ground disturbed because of the development must be progressively stabilised and rehabilitated so that it no longer acts as a source of sediment.
67. Other than on the footpath or nature strip, additional ground disturbance for final rehabilitation work may be undertaken without consent, if such work satisfies all other requirements of this code.
68. Reduce the C-factor to less than 0.15 (e.g. greater than 50 per cent grass cover, attachment B.2) on all lands, stockpiles and other exposed materials scheduled to remain unattended for more than 20 working days.
69. Schedule the final rehabilitation or landscaping program so that less than 20 working days will elapse from final land shaping to permanent rehabilitation. Sometimes, maintaining temporary rehabilitation is acceptable providing the C-factor is less than 0.05 (e.g. greater than 70 per cent grass cover, attachment B.2). Here, rehabilitation is defined in two ways, depending on rainfall erosivity:

- In periods of expected low rainfall erosivity during the rehabilitation period, achieve a C-factor of 0.15 and keep it there by vegetation, paving, armouring, etc.<sup>2</sup>
    - 'Low' rainfall erosivity is defined as a month with an erosivity of less than 100  
The erosivity for a month at a location is calculated by:  
R-factor x percentage of annual EI occurring per month
  - In periods of moderate to high rainfall, achieve a C-factor of less than 0.1 and set in motion a program that should ensure it will drop permanently by vegetation, paving, armouring, etc. to less than 0.05 within a further 60 days.
70. For building works, all landscaping must be installed following with the approved landscape or rehabilitation plan before occupation or use of the premises. All such works must be maintained in a stable and effective condition.

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<sup>2</sup> Attachment B.2 shows that C-factors of 0.15 can be achieved in various ways, for example:

- a C-factor of 0.15 can be achieved with about 30 per cent ground cover where the soils have not been disturbed recently and 50 per cent cover where they have been disturbed (as at most construction sites)
- a C-factor of 0.05 can be achieved with about 55 per cent and 70 per cent cover on undisturbed and disturbed soils respectively

## Attachment B.1: Demerit point system

This demerit system outlines the maximum number of points that can be deducted for any lack of care or diligence in applying a plan. Funds so collected will be used only for rectification of problems arising from neglect.

A total of 100 points will be allocated for each plan so that each point represents 1 per cent of the total amount held in security. Table B.2 lists matters that can attract demerit points.

Development sites will be routinely checked against the demerit activities to determine any inadequacies in implementing the plan. The following procedure will be used while carrying out the routine checks:

- a. If any problems or inadequacies are noted by the responsible government officer, 24 hours notice will be given to rectify them and a \$750 or \$1500 on-the-spot fine may be issued under the *Protection of the Environment Operations Act 1997* for individuals or corporations respectively;
- b. If the problems or inadequacies are not rectified within 24 hours, 'first offence' loss of points will apply and/or a \$750 or \$1500 fine can be imposed under the *Protection of the Environment Operations Act 1997* for individuals or corporations respectively;
- c. If at a subsequent site inspection a similar offence occurs, then 'second offence' loss of points will apply and/or a \$750 or \$1500 fine can be imposed under the *Protection of the Environment Operations Act 1997* for individuals or corporations respectively.

**Table B.2** Issues attracting demerit points

	Points lost	
	1st offence	2nd offence
Failure to regularly complete or keep a logbook or inspection test plan (ITP)	10	10
Failure to secure the site against erosion, sediment and pollution during work site absences satisfactorily	5 points per day for the first 2 days, thereafter 2 points per day.	
Failure to implement and maintain erosion, sediment and pollution control devices/ structures/ procedures satisfactorily at the optimum operating capability specified in the plan	5	15
Disturbance of soil surfaces beyond those specified on the plan, including parking or work site vehicles in protected areas	5	10
Unacceptable amounts of sediment carried to neighbouring road surfaces, gutters and kerbs, including that carried on the wheels of vehicles leaving the site	5	10

## Attachment B.2: C-factor

The cover factor, C, is the ratio of soil loss from land under specified plant or mulch conditions to the corresponding loss from cultivated, bare soil. It is different to the runoff coefficient used in the rational method. The most effective method of reducing the C-factor is maintenance, or formation of, a good ground cover. The best practices (figure B.1, table B.3) are those that reduce both the soil exposed to raindrop impact and the erosive effects of runoff. Additional information is presented in *Managing urban stormwater: soils and construction* vol. 1 (Landcom 2004).

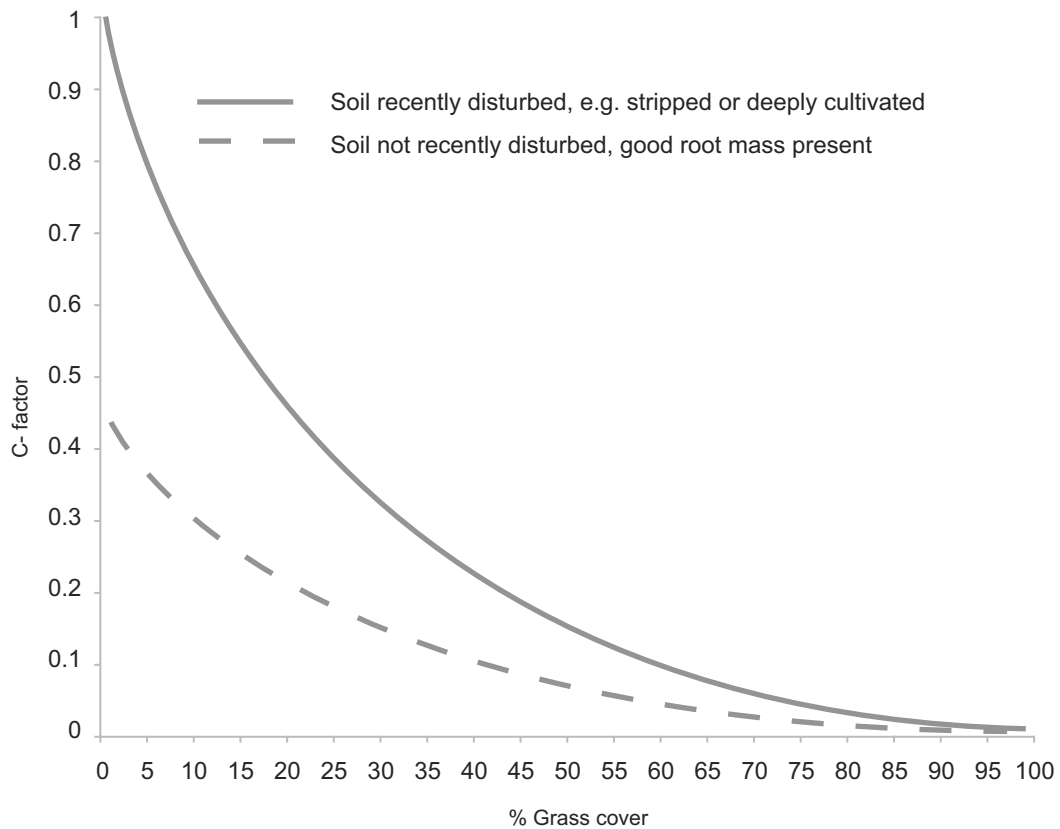


Figure B.1 C-factors for established grass cover

## Attachment B.3: Environmental bond

The applicant must lodge a security, deposit or other financial guarantee with [the consent authority] as an assurance that any erosion, sediment and pollution control strategy described in the plan will be diligently established, implemented and maintained as specified by the approval.

Where the contractor is shown to fail to carry out any part of the approved plan diligently, a part or all the bond monies might be forfeited and used for carrying out various strategies or rectifying any environmental damage that has occurred as a result. Bond monies will be applied specifically to rectification of problems arising from neglect.

Reimbursement of remaining bond monies will be based on 'diligent performance' and 'duty of care' indicators separate from any indicators that acceptable levels of erosion, sediment and pollution have been achieved (see attachment B.4). This is to provide incentives for a level of risk management that is sustainable in all conditions of weather and climate, no matter whether such conditions occur during the development covered by the particular plan.

**Table B.3 Soil stabilisation control matrix Landcom (2004), adapted from various sources**

<b>Class</b>	<b>Type</b>	<b>Suitable for vegetation type <sup>1</sup></b>	<b>Design life (months)</b>	<b>Use in concentrated flow <sup>2</sup></b>	<b>Availability (days) <sup>3</sup></b>
<b>BIODEGRADABLE MULCHES <sup>7</sup></b>					
Straw (anchored)	4.5 tonnes per hectare	Grass	1 to 6	No	< 5
Wood chip	16 tonnes per hectare	Grass/Shrubs	1 to 6	No	< 5
Wood chip	27 tonnes per hectare	Shrubs	1 to 6	No	< 5
Wood chip	56 tonnes per hectare	Shrubs	1 to 6	No	< 5
Hydromulching	1.5 tonnes mulch + 300 litres binder per hectare	Grass	1 to 3	No	< 5
Bonded fibre	5 tonnes fibre per hectare	Grass	1 to 6	No	< 5
<b>ROLLED EROSION CONTROL PRODUCTS (RECPs) <sup>7</sup></b>					
Biodegradable	Jute mesh	Grass	6 to 12	Yes	< 5
	Coconut fibre mesh	Grass	6 to 12	Yes	< 5
	Curled wood fibre	Grass	6 to 12	Yes	< 5
	Jute matting (~350 gsm)	Grass	6 to 12	Yes	< 5
	Jute matting (~600 gsm)	Shrubs	6 to 12	Yes	< 5
	Coconut fibre matting (~450 gsm)	Grass	6 to 12	Yes	< 5
	Coconut fibre matting (~900 gsm)	Shrubs	6 to 12	Yes	< 5
Photodegradable	Mesh (< 5 mm openings)	Grass	1 to 6	Yes	< 5
Non-biodegradable	Plastic fibres with netting	Grass	> 12	Yes	< 5
	Composite with biodegradable	Grass/Shrubs	> 12	Yes	< 5
<b>HYDRAULIC SOIL STABILISERS <sup>7</sup></b>					
	Polymers/Polyacrylamide (rate depends on type)	Grass	1 to 6	No	< 5
	Bitumen emulsion (12 kL/ha)	Grass	1 to 6	No	< 5
<b>TEMPORARY SEEDING</b>					
	Annual	NA	6 to 12	No	< 5
	Perennial	NA	> 12	No	< 5
<b>INSTANT TURF <sup>7</sup></b>					
	Kikuyu	Grass	> 12	Yes	< 5
	Reinforced turf (pregrown)	Grass	> 12	Yes	5-15



Relative cost bracket <sup>4</sup>	Residual impact <sup>5</sup>	C-factor <sup>6</sup> <33%, <6 m	C-factor <33%, 6–15 m	C-factor <33%, >15 m	C-factor 33–50%, <6 m	C-factor 33–50%, 6–15 m	C-factor 33–50%, >15 m
Low	Moderate	0.17	0.17	0.20	0.20	0.20	0.20
Low	Moderate	0.08	0.08	0.08	No data		
Low	Moderate	0.05	0.05	0.05	No data		
Low	Moderate	0.02	0.02	0.02	0.02	0.02	0.02
Low	Low	0.00	0.03	0.07	0.03	0.06	0.10
Low	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Low	Moderate	0.10	0.20	0.40	0.20	0.40	0.60
Low	Moderate	0.10	0.20	0.40	0.20	0.40	0.60
Medium	Moderate	0.01	0.05	0.10	0.10	0.15	0.20
Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Low	Moderate	0.01	0.05	0.10	0.10	0.15	0.20
High	High	0.00	0.05	0.10	0.03	0.05	0.10
High	High	0.00	0.03	0.07	0.03	0.06	0.10
Low	Low	0.01	0.05	0.10	0.10	No data	
Low	Low	0.01	0.05	0.10	0.10	No data	
Low	Low	0.05	0.05	0.10	0.10	No data	
Low	Low to moderate	0.05	0.05	0.10	0.10	No data	
Medium	Low	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
High	High	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

## Notes

- 1 Whether vegetation is required, and its type if so, will affect the technique used. Biodegradable mulches, RECPs and hydraulic soil stabilisers can all be used on their own to provide short-term protection. However, their effectiveness is less when used in isolation than when used with vegetative growth. Most techniques are used to help establish vegetative growth using sown grasses. Should the client specify shrubs (primarily planted as tubestocks), then thicker mulches, RECPs or biodegradable mulches should be used. Non-biodegradable RECPs are used to reinforce grasses (turf) permanently. They are not suitable for use with individual shrubs. They can work synergistically with the established grass to increase its resistance to shear stress and, therefore, increase its resistance to erosion by concentrated flow.
- 2 Products may or may not be suitable for use in areas of concentrated flow. All products are suitable for sheet flow conditions, although some would be over-designed in such cases.
- 3 Whether or not a product is readily available is critical to the selection process. Many RECP and hydraulic soil stabiliser techniques use products that might be 'off the shelf' and available from several suppliers. Biodegradable mulches can be affected by seasonal variation, although they might also be available on site after initial clearing and grubbing. Temporary seeding might also be seasonal.
- 4 For any given technique, cost can vary greatly depending on geographic location, size of project and installation requirements. In addition, costs can vary over time. Because of these factors, giving accurate installed costs is not possible. However, if a product is relatively inexpensive to purchase and install close to its point of manufacture, it will still be relatively inexpensive to purchase and install remote from it.
- 5 This criterion relates to the impact that a particular practice might have on construction activities once they are resumed on an area that was temporarily stabilised.
- 6 The performance of an erosion control technique is quantified by assigning a C-factor to it (appendix B, attachment B.2). The C-factor will vary from near zero for full cover to 1.0 for no cover on highly disturbed soils. The C-factor strongly affects the soil loss calculation (RUSLE) and users need to be careful in specifying its value, particularly when values < 0.01 are quoted. Note that the C-factor does not apply to concentrated flow. Values for the C-factor are given for various slopes, gradients and lengths and show that it can change dramatically with them. The values given are compiled from existing data and from inference between products of a similar nature. They are given as a guide only and do not profess to be accurate in all respects. Overall, accurate C-factors are only available for manufactured products, primarily from the USA (RECPs in particular) where extensive independent testing has been undertaken. Unfortunately, very little data is available for the lower cost options such as biodegradable mulches, jute mesh and hydraulic soil stabilisers. Wherever possible, the manufacturers should be contacted for their latest data on acceptable C-factors. For the RECPs in particular, the C-factors given here are for the product as installed with no vegetation. Note however that lower C-factors can be expected if vegetation is promoted with many RECPs. Indeed, non biodegradable RECPs are designed to work synergistically with turf and must be used with it.
- 7 For information on trade names and suppliers of these products, please phone the office of Australasian Chapter of the International Erosion Control Association on 1800 354 322 or (+61 2) 4677 0901.

## **Attachment B.4: Responsibilities of council officers**

During construction, council officers will inspect and report on the condition and performance-readiness of any approved plan strategies for the site. Inspections can occur at the same time as regular or unscheduled building inspections. In consultation with the site manager, officers will:

- check the logbook and ITP for completeness and accuracy
- make notations that help assessment of the current erosion hazard and allow for independent review of this assessment
- record and witness compliance/non-compliance with the approved plan
- record demerit points according to council's directions (attachment B.1) for any deficiencies or breaches of the plan
- record accumulated demerit points
- make recommendations for averting any immediate or potential erosion, sedimentation or other pollution arising, or likely to arise, from the development activities at the site
- draw the attention of the site supervisor to notations, particularly those requiring remedial actions
- report instances of any discharges that are breaches or alleged breaches of the *Protection of the Environment Operations Act 1997*
- act to the extent of delegations provided by council to issue breach or infringement notices where pollution discharges are recorded
- stamp, sign and date the logbook or ITP and initial each notation.

During any inspection, information will be gathered and can be presented to council for possible inclusion in their 'state of the environment' reporting and as an indication of the appropriateness of council's engineering and planning practices.

All council reports on this matter will be made available for an independent audit to achieve the long-term goals established by state and national policies, including council's stormwater management plan, its natural resource management strategy, and the national water quality management strategy and ecologically sustainable development guidelines.

## Attachment B.5: Issuing fines

Councils have the authority to issue fines to a builder or construction firm under provisions of the *Protection of the Environment Operations Act 1997*. The principal factor when considering whether to issue a fine would be whether the builder has adopted the standards embodied in *Managing urban stormwater: soils and construction* vol. 1 (Landcom 2004). A successful defence by the builder against prosecution will rest on an ability to produce evidence of:

- an appropriate ESCP/SWMP (plan) approved by council
- diligent application of the measures outlined in the approved plan, clearly recorded in a logbook and, where appropriate, an ITP.

Developers should understand that approval of a plan by council does not reduce the ultimate responsibility for pollution control from owners and managers. Nevertheless, the plan does provide documentary evidence of the probable level of 'diligence and duty of care' that should be exercised in attempting to control erosion of soil and pollution of sediment and, where appropriate, other materials. They should note, too, that multiple fines could be issued for the same offence if warnings are not heeded or if deadlines are exceeded.

Councils seeking successful prosecutions should establish a process of natural justice that is fair to site owners and managers. Consequently, they have a responsibility to ensure that:

- the approval processes applied to a plan include scrutiny of its compliance with the standards and guidelines embodied in *Managing urban stormwater: soils and construction* vol. 1 (Landcom 2004)
- the applicant is advised of any concerns council may hold for the plan not meeting these standards or any other doubts about its likely effectiveness in controlling soil erosion and stormwater pollution.

Councils using the legislation effectively will make entries in the site logbook/ITP and any council reports that:

- clearly establish that a breach has occurred or is occurring
- establish that clear deadlines for rectification have been set
- provide evidence that the site manager has been properly advised of the deadline
- includes records of:
  - inspections and warnings issued
  - unheeded warnings and deadlines.

Further, they should be consistent in the application of procedures.

## Appendix C: ESCP assessment checklist

W

Lot	DP Number
Builder/Developer	Licence Number
Owner	

### 'Trigger points' for detailed assessment of the plan

TRIGGER POINTS (For plan to be assessed by specialist officer)	YES / NO
Is the average slope of the disturbed area greater than 10%?	
Is the duration of the disturbance likely to exceed four months?	
Does the proposal involve modifying any existing stormwater flow path (e.g. conversion to open drains or channels?)	
Is the proposal likely to impact on protected or highly sensitive local environments?	

### The map

DOES THE SUBMITTED ESCP MAP INCLUDE:	YES / NO	NOTES
Locality of site boundaries and adjoining roads		
North point		
(Approximate) scale		
Approximate grades & indication of direction(s) of fall		
Approximate location of trees and other vegetation (showing areas for clearing or retention)		
Location of site access, proposed roads and other impervious areas		
Existing and proposed drainage patterns, with stormwater discharge points		

## Supporting information

IS THE FOLLOWING INFORMATION PROVIDED, EITHER IN THE MAP OR IN SUPPORTING INFORMATION?	YES / NO	NOTES
Timing/staging of works		
Location of areas where a protective ground cover will be maintained		
Access protection measures, such as measures to limit access to one point, and ensure that vehicle access does not contribute to erosion		
Nature and extent of earthworks, including cut and fill		
Where applicable, the diversion of runoff from up-slope lands around disturbed areas		
Location of all soil and material stockpiles		
Location and type of proposed erosion and sediment control measures		
Site rehabilitation proposal, including schedule		
Frequency and nature of maintenance program		

## Other comments

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### 1. Specifications and standards for erosion and sediment control and site rehabilitation

All erosion and sediment control measures undertaken on the site shall be undertaken to the satisfaction of council and conform to the specifications and standards contained in:

- *Managing urban stormwater: soils and construction* vol. 1 (Landcom 2004); or
- *Managing urban stormwater: soils and construction – the hip-pocket handbook* (Landcom 2004) (for small sites or the implementation of ESCPs).

### 2. Erosion and sediment control plan (ESCP)

- Erosion and sediment control shall accord with the ESCP(s) numbered ..... and dated ..... submitted/drawn by ....., or as modified in red or adjusted by any other condition in this consent/approval.
- An ESCP shall be prepared by the applicant (or applicant's agent) and approved before any approved work or activities begin upon [insert description of land].
- A revised ESCP shall be prepared at the start of the second year of operations and further revised at two-yearly intervals thereafter, if required.
- All site works shall accord with the ESCP. Implementation of the ESCP shall be supervised by personnel with appropriate training or demonstrated knowledge or experience in erosion and sediment control.
- The ESCP will include information that can be readily understood and applied on-site by supervisory staff. Items to be shown on the plan shall include: [select from this list as needed for the proposed development]
  - location of the site boundaries and adjoining roads
  - a north point and scale
  - approximate grades and direction(s) of fall
  - approximate location of trees and other vegetation, showing items/areas for removal or retention
  - location of site access, proposed roads and other impervious areas
  - the timing of works, including placement of erosion and sediment control measures
  - existing and proposed drainage patterns and stormwater discharge points
  - diversion of runoff from up-slope lands around the disturbed areas
  - measures to limit site access to one point, and control erosion of the site access
  - nature and extent of earthworks, including cut and fill
  - location of all soil and material stockpiles
  - location and type of proposed erosion and sediment control measures
  - site rehabilitation proposals
  - maintenance schedule.

### **3. Earthworks and erosion control**

The following measures shall be implemented in the sequence given below, to minimise soil erosion:

1. Approved runoff and erosion controls shall be installed before site vegetation is cleared (other than that associated with the construction of the controls). These shall be as shown on an ESCP approved by council.
2. Topsoil shall be stripped only from approved areas and stockpiled for re-use during site rehabilitation and landscaping.
3. Stockpiles of topsoil, sand, aggregate, spoil or other material shall be stored clear of any drainage line or easement, waters, footpath, kerb or road surface and shall have measures in place to prevent the movement of such materials onto the areas mentioned. All stockpiled materials are to be retained within the property boundaries.
4. Uncontaminated runoff shall be intercepted up-site and diverted around all disturbed areas and other areas likely to be disturbed. Diversion works shall be adequately stabilised.
5. Runoff detention and sediment interception measures shall be applied to the land. These measures will reduce flow velocities and prevent topsoil, sand, aggregate, or other sediment escaping from the site or entering any downstream drainage easements or waters.
6. The capacity and effectiveness of runoff and erosion control measures shall be maintained at all times to conform to the specifications and standards quoted and to any conditions of approval of those measures.
7. Measures shall be applied, to the satisfaction of council, to prevent site vehicles tracking sediment and other pollutants onto any sealed roads serving the development.
8. Measures required in permits issued under the Rivers and Foreshores Improvement Act shall be implemented. This Act requires that people obtain approval for any proposed excavation or fill in or within 40 metres of a watercourse. Permits should be sought from the Department of Natural Resources.

### **4. Erosion control for small building projects (when an ESCP is not required)**

To minimise soil erosion and sediment movement during construction, the following measures shall be implemented.

- Removal and/or disturbance of vegetation shall be confined to the basal area of the approved building, the site(s) of access ways, land extending a maximum of two metres beyond the outermost projection of the approved building and within a total of two metres of service trenches (that is the sum of the two sides to be a maximum of two metres).
- Topsoil stripped from the construction site shall be stockpiled and protected from erosion until re-use during landscaping. Soil is to be retained within the property.
- Stockpiles of construction and landscaping materials, and of site debris, shall be located clear of drainage lines and in such a position that they are protected from erosion and do not encroach upon any footpath, nature strip or roadway.
- Final site spoil shall be disposed of to conform to the specifications and standards quoted and to any conditions of approval of those measures.



- Trenches shall be backfilled, capped with topsoil and compacted to a level at least 75 mm above adjoining ground level.
- Stormwater from roof areas shall be linked to a council approved stormwater disposal system immediately before placement of any roofing materials.
- Vehicular access shall be controlled so as to prevent tracking of sediment onto adjoining roadways, particularly during wet weather or when the site is muddy. Where any sediment is deposited on adjoining roadways the same shall be removed by means other than washing. All material is to be removed as soon as possible and the collected material is to be disposed of in a manner that will prevent its mobilisation.
- Vehicular access paths shall be stabilised.
- All disturbed areas shall be progressively stabilised and/or revegetated so that no areas remain exposed to potential erosion damage for more than 14 days or other such period as may be approved after earthworks cease. All driveways and parking areas shall be stabilised with compacted sub-grade as soon as possible after their formation.

## **5. Clearing**

- All reasonable measures shall be undertaken to protect all remaining vegetation on the site from damage during construction.

## **6. Responsibilities**

- Personnel with appropriate training, or demonstrated knowledge and experience in erosion and sediment control shall be responsible for supervising the installation and maintenance of approved erosion and sediment control measures – during and after construction and until the site has been restored to the satisfaction of council.

## **Appendix E: Managing the environmental impact of building and development – a draft enforcement protocol from Ballina Shire Council**

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### **Background**

The quality of environmental management on building and development sites in the Ballina Shire Council area varies significantly, despite a significant amount of education being offered to the building sector through the TAFE network, the Master Builders Association, the Housing Industry Association and council's own programs. This is also despite a formal condition of consent from council that requires appropriate sediment and erosion control measures on all building and development sites.

Education has clearly been effective – to a point. A higher level of enforcement action is now needed to support those education activities. Enforcement will support those builders and developers who are making the effort to minimise the environmental impact of their sites, and will encourage them to maintain their efforts, while acting as a deterrent to others in the local industry who may be using unsatisfactory environmental practices.

In order to develop a consistent and rigorous approach to enforcement on building and development sites in the area, council held discussions with building and development sector leaders which have resulted in the draft enforcement protocol outlined below.

### **Current inspection regime**

At the time of writing, there were no random inspections of building and development sites in the Ballina Shire Council area. Building surveyors are directly responsible for particular sites that they may visit up to five times. On each occasion they are 'booked in' by the builder. Council building surveyors or plumbing inspectors may visit privately certified sites on one or two occasions, also when booked in. Council sub-division engineers and planners visit sites at various stages of the development. Environmental health officers (EHOs) and rangers may visit sites in response to complaints.

Any enforcement protocol needs to include a process whereby council and privately certified building sites and developments may be reviewed at any time by council officers who are responsible for ensuring environmental compliance.

### **Recommendation**

It is recommended that:

- All council building surveyors, plumbing inspectors, EHOs, rangers, sub-division engineers and planners should be encouraged to note examples of non-compliance on building and development sites as they move around their area in the completion of their normal duties
- Council EHOs and rangers should be encouraged to incorporate regular visits to building and development sites into their routine inspection activities to complete more detailed checks for compliance.

## Coordinating visits

Without coordination, it is possible that more than one council officer could visit a poor site and request action. In order to ensure a coordinated approach it is recommended that:

1. non-authorised officers (planners, sub-division engineers) should complete a draft formal warning (see attachment E.1) on sites where they identify poor practice. These draft warnings should be sent to a dedicated tray at council where an appropriate officer will determine whether the reported sites are council certified or privately certified and take the following action:
  - if the site is council certified, the draft warning will be passed to the council building surveyor for that site who will be expected to revisit the site and take appropriate action as outlined later in this protocol.
  - if the site is privately certified, a copy of the draft formal warning will be passed on to council's EHOs or rangers for appropriate action.
2. Where authorised officers, such as building surveyors, EHOs and rangers, identify poor practice they should check whether the site is certified by council or privately and take the following action:
  - building surveyors should serve a formal warning notice on their sites as outlined in the protocol below. If a higher level of action is required (e.g. a clean-up notice or PIN) the building surveyor will contact councils EHOs or rangers
  - EHOs and rangers will serve formal warning notices on privately certified sites. They will also be responsible for a higher level of action if required as outlined in the protocol below.

A flow chart for this protocol is included as attachment E.2 of this appendix.

## What should happen at the site?

Authorised officers, either in receipt of a draft formal warning or when identifying poor practice themselves, will visit a selection of sites. When they visit the sites they have a number of enforcement options.

### Formal warnings

If an authorised officer finds that the erosion and sediment controls in place are unsatisfactory or absent and the potential for environmental impact is not immediate or significant, they can issue a formal warning notice.

It should be emphasised that council is not required to issue a formal warning under the POEO Act, but are offering these as a courtesy.

It is the responsibility of the issuing officer to follow up the formal warning and insert a copy on the building file.

In order to ensure that formal warnings come to be recognised by recipients at least 25 per cent of sites that receive formal warnings should be visited. A greater proportion would probably need to be visited during the implementation of the protocol.

### Clean-up notice

Clean-up notices should be issued when a council officer identifies practices that could lead to environmental harm if not dealt with urgently or if the builder/developer has not responded appropriately to a formal warning.

## **Penalty infringement notices (PINs)**

If, on visiting the site, council's representative identifies:

- a pollution incident that could cause significant environmental harm, or
- non-compliance with a clean-up notice,

they should immediately contact the EHO or ranger who will be requested to visit the site and issue a PIN.

If the EHO or ranger in visiting their sites either identifies a significant pollution incident or non-compliance with a clean-up notice they should issue a PIN.

This formal protocol does not preclude the building inspectors, EHOs or rangers giving informal advice to the builder to have them address minor problems.

## **Resourcing considerations**

The introduction of this protocol will require a refocusing of work programs and will place extra demands on council building surveyors, EHOs and rangers, at least in the short term, in issuing the formal warnings and clean-up notices and following up them up.

It is anticipated however that as the building sector becomes aware of council's new requirements, it will achieve higher levels of compliance, and so fewer site visits will be required.

It is therefore recommended that the time required for site visits should be taken into account, particularly during the introductory period of this protocol.

## **Records management**

Council should record the number of formal warnings, clean-up notices and PINs issued to council-certified and privately certified sites. These statistics will be extremely useful in evaluating the effectiveness or otherwise of this protocol. They can also be helpful in dealing with complaints from private certifiers in relation to action taken against their sites.

## **Informing the industry**

It is recommended that information on the protocol should be circulated to:

- senior management and councillors for their information
- local media for an article about the need for councils to protect local environments
- all builders to emphasise that they are expected to meet their environmental responsibilities.

The very effective informal communication network within the building and development sector should lead to greater awareness and improved environmental performance.

## Attachment E.1: Formal warning notice

W

This is a **formal warning notice** for:

Builder's name

Builder/Building  
company

Address:

Lot No:

DP No:

Phone:

Mobile:

A council officer visited the above site and identified a number of matters requiring urgent attention. They are:

- Sediment and erosion control management
- Waste management
- Excessive sediment on the roads surrounding the site
- Maintenance of access way to and from the site

### Other matters

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**A copy of this warning notice has been passed on to council rangers who could visit your site at any time from tomorrow.**

If upon visiting your site these matters have not been dealt with appropriately, the rangers have the authority to take a number of actions including the issue of on the spot fines of up to \$1500. More serious offences can attract fines of up to \$250,000 for corporations and \$120,000 for individuals.

Please attend to this matter urgently.

Issuing officer:

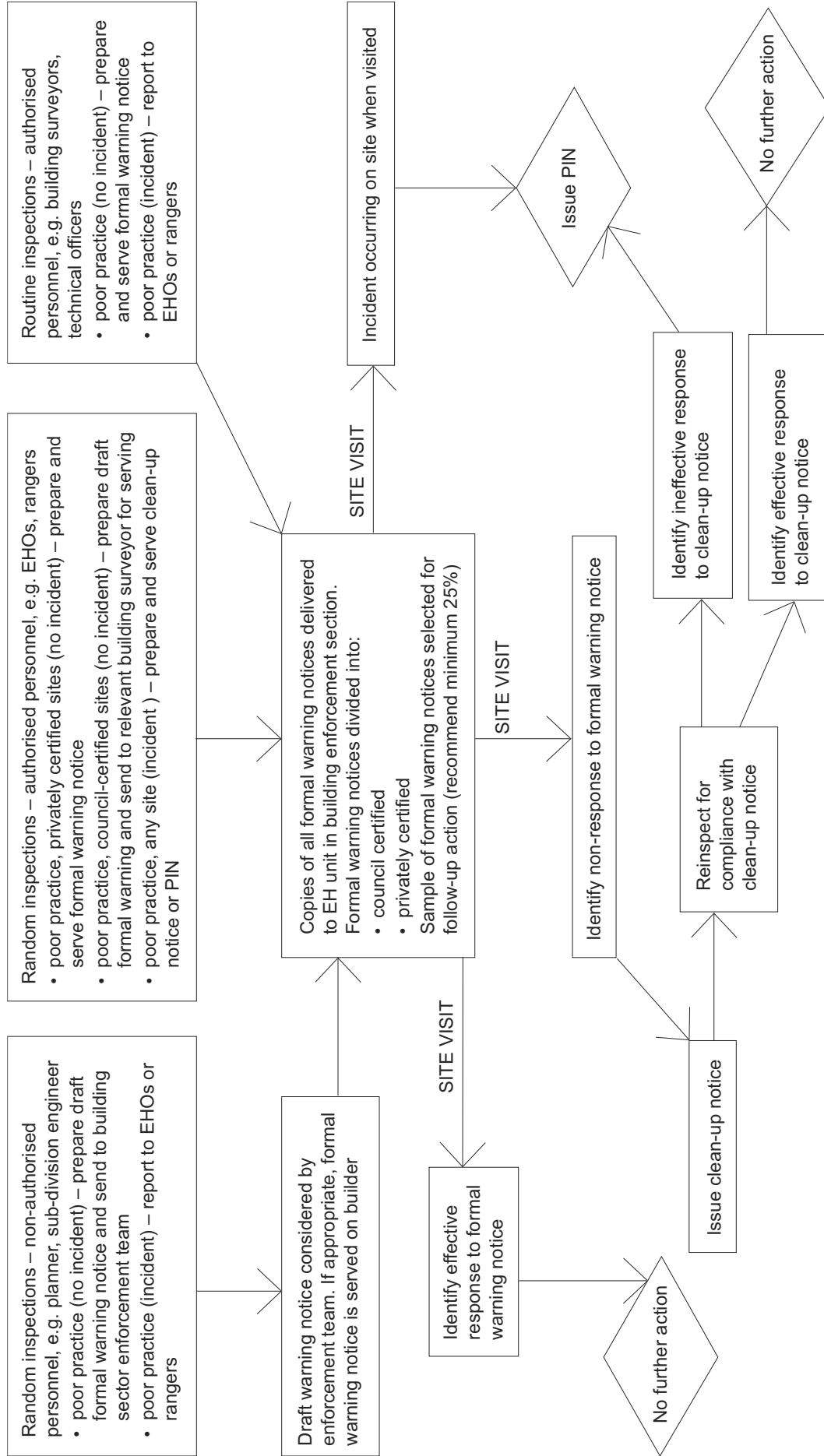
Job title:

Signature:

Date:

[council name] – Protecting our local waterways

## Attachment E.2: Flow chart of enforcement protocol



## Appendix F: Environmental compliance sign

Front of sign

<b>Site address:</b> .....	
Development consent number.....	Approved work:.....
<b>Demolition contractor:</b> .....	
ACN .....	Phone number .....
Licence number .....	24-hour phone number .....
Contact name .....	email .....
<b>Builder:</b> .....	
ACN .....	Phone number .....
Licence number .....	24-hour phone number .....
Contact name .....	email .....
<b>Principal certifying authority:</b> .....	
Address .....	
Accreditation number .....	Phone number .....
Contact name .....	email .....

Council logo here

It is a CRIMINAL OFFENCE to:  
cause, permit or allow pollution  
store materials on the road or  
footpath obstruct the road or  
footpath breach development  
consent conditions.

UNAUTHORISED ENTRY TO THE WORK  
SITE IS PROHIBITED NO WORK PERMITTED  
ON SUNDAYS OR PUBLIC HOLIDAYS  
NO WORK before 7:00 am or after 5:30 pm on  
weekdays; or before 7:00 am or after 1:00 pm  
on Saturdays

**WARNING – FINES EXCEED \$1500**

Visit council's website at [www.\[council name\].nsw.gov.au](http://www.[council name].nsw.gov.au)

This sign must be displayed on the most prominent point of the site fence or approved hoarding visible when entering the site.

Failure to erect this sign as required by the *Environmental Planning & Assessment Act 1979* and development consent conditions will result in on-the-spot penalties being issued to the owner, applicant and builder.

The owner, applicant, builder and any sub-contractors causing, permitting or allowing any breach of development consent conditions or environmental laws are personally liable to fines and/or prosecution.

Council logo here

Courtesy of Woollahra Council

Back of sign

## Appendix G: Checklist for building and development sites

W

Site address	File Ref
Builder/Developer	
Status of construction	
Estimated area	Level? Or cross fall: 2 m 3 m 4 m 5 m
Date of inspection / /	Name of inspector

DESCRIPTION	CONDITION	REMARKS
-------------	-----------	---------

### a. Sediment fence? Yes/No

Fabric buried in 150 mm trench?		
Stakes spaced at 3 m intervals?		
Constructed along contour?		
Turn-backs installed?		
Fence at least 2 m from slope?		
Subject to concentrated flows?		

### b. Stockpile entrance? Yes/No

Up-slope drainage controls?		
Catch drains or sediment fence at toe?		
Less than 2 m high?		
Covered?		

### c. Stabilised entrance? Yes/No

Material used? Average size?		
Estimated width of entrance?		
Graded to sediment fence?		
Geotextile used?		

### d. Other items

Downpipe connected?		
Do any items need repair or cleaning out?		
Evidence of drainage and sedimentation into street?		
Fencing of buffer zones?		



**Other comments**  
**(Maintenance of existing items, comments related to above)**

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**Does the site have areas at high risk of erosion?**  
**If so, what action should be taken?**

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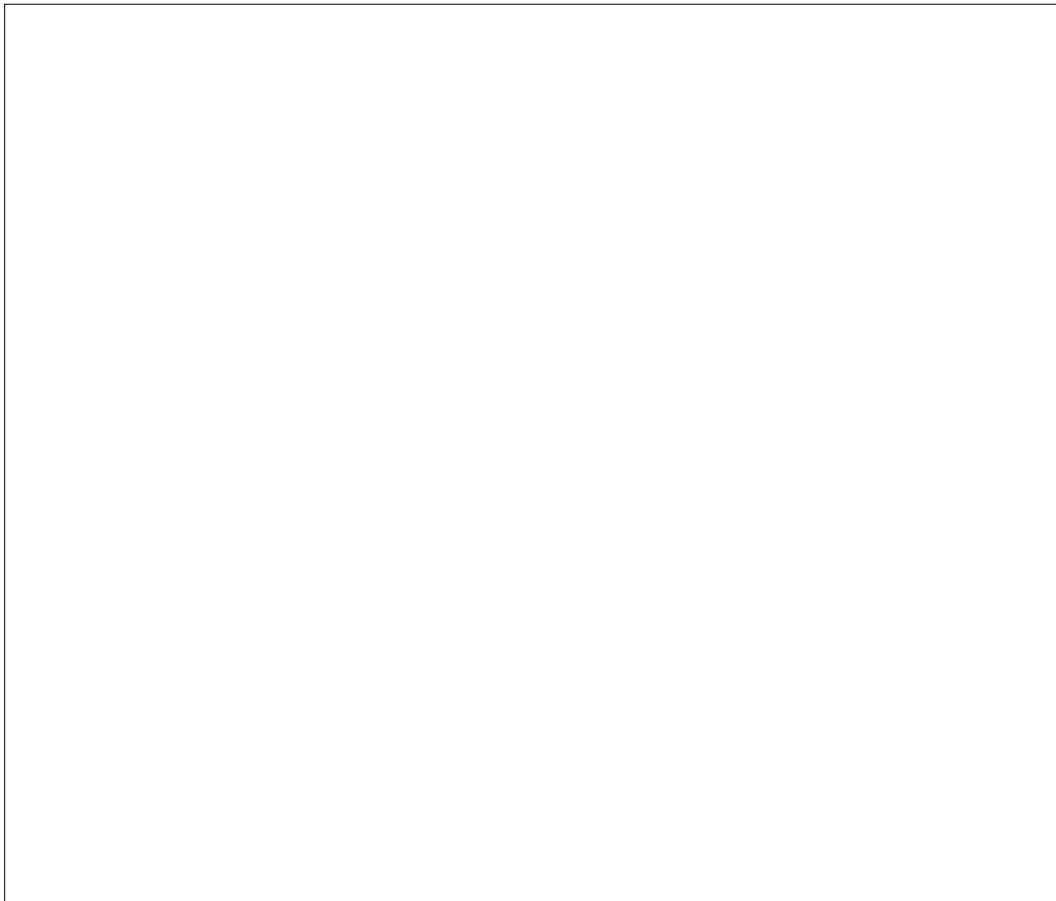
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**Diagram of site**



## **Appendix H: Checklist for council operations work sites** **W**

The following checklist can be used to assess erosion and sediment controls on council developments, from major construction sites to routine maintenance activities. Councils can adapt the checklist as required. An electronic copy can be found at [www.environment.nsw.gov.au/stormwater](http://www.environment.nsw.gov.au/stormwater).

Council name \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_

Auditors on site \_\_\_\_\_

### **Job address**

Street \_\_\_\_\_

Suburb \_\_\_\_\_

### **Staff on site**

Name \_\_\_\_\_

Name \_\_\_\_\_

### **Name of supervisor**

Name \_\_\_\_\_

Type of activity \_\_\_\_\_

### **Overall assessment (to be completed at the conclusion of the audit)**

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

## A. Major construction or maintenance activities (planning)

QUESTION	YES / NO	COMMENT
1a) Is there a formal erosion and sediment control plan for the site?		
	If <b>no</b> go to Q 2	*Please note if not necessary
1b) Are the requirements of the plan in place?		
1c) Have there been any significant amendments to the plan since the project began?		
2) Has the project manager developed an informal plan for erosion and sediment control on the site?		
3) Do you think the project should have been the subject of a formal erosion and sediment control plan?		

## B. All sites (on-site practices)

### Minimising erosion

QUESTION	YES / NO	COMMENT
1) Are any measures in place to divert water around the site?		
		*Please note if not necessary
2) Are there any measures in place to minimise the impact of rainfall on the exposed soil (e.g. mulching?)		
		*Please note if not necessary
3a) Are there any stockpiles on site containing materials that could add to erosion from the site?		
	If <b>no</b> go to Q 4	
3b) Is there any up-slope or down-slope protection of the stockpiles?		
3c) Are stockpiles covered?		
		*Please note if not necessary
4a) Is there a single stabilised entry/access point to the site?		
	If <b>no</b> go to Section C	*Please note if not necessary

4b) What material is used in the access way?	
4c) Does the access point drain to the sediment fence or other sediment control devices?	

### Managing sediment loss

QUESTION	YES / NO	COMMENT
1) Is there a possibility that sediment or any other material can be washed from the site?		
2) Are the downstream drains protected and if so in what way?		
3) What type of protection is in place?		
Sediment socks		
• are they an effective barrier?		
Hay bales		
• are they dug into the soil?		
• are they stabilised?		
Sandbags		
• will they be effective?		
Sediment fence		
• fabric buried in 150 mm?		
• stakes placed at 3 m intervals?		
• construction along contour?		
• turnbacks installed?		
• fence at least 2 m from slope?		
Other		
4) Will these devices be effective at controlling runoff from the site?		
5) How long do the devices need to stay in place after the project?		
6) What arrangements has the manager made to ensure the devices remain in place?		

### C. Maintenance

QUESTION	YES / NO	COMMENT
1a) Are the erosion and sediment control structures being maintained?		
1b) Is this part of an overall plan?		

### D. Site impacts

QUESTION	YES / NO	COMMENT
1) Are there any indications of litter, sediment or other material from the job site in the downstream drains?		
2) Is there a specified area for waste storage on-site?		
3) Is this disposal area well maintained and positioned away from any drains?		
4) Is there any indication of litter, sediment or other materials on the roads around the site?		