CCF Environmental Guidelines for Civil Construction

Civil Contractors Federation

Last revised: May 2010

Foreword

The CCF is pleased to provide this guideline for use by the Victorian Civil Construction Industry.

This document seeks to provide the civil contracting sector with guidelines on practices that minimise environmental impacts arising from construction activity. The guideline is designed to be updated periodically to provide current information on environmental management in the industry. Please check that you have the latest issue.

Contractors using this document should note that environmental management relies on risk assessment of environmental aspects. This document may be used to assist with identifying environmental risks and implementing controls but does not discuss the process of risk assessment and management. For further information on environmental risk assessment contact the CCF.

Acknowledgements

The Civil Contractors Federation acknowledges that the images and text from the EPA Victoria guidelines *Doing it Right on Subdivisions* – Publication 960 and other documents have been used and reproduced extensively in this guideline.

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Disclaimer

The information contained in this Environmental Guideline for Civil Construction is for general information only and is not intended to constitute legal advice. CCF accepts no responsibility for any loss as a result of actions taken based on any information in this document. At all times your business is responsible to determine the extent to which various legislation, regulations and standards apply to it, and to take appropriate action to ensure compliance.

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1 Contents

2 Drainage Control for site

When water enters part of a construction site, it will quickly pick up sediment and contribute to erosion. Soil removed by erosion may be carried by water into waterways and pollute them.

Off site water should therefore be diverted away from the construction site. This can be done by constructing diversion banks and intercept drains around the site and ensuring that the water discharging from these structures is not causing erosion.

2.1 Site drainage - suggested measures of management

The objectives of onsite drainage are to minimize **the generation** of contaminated **stormwater.**

- Pre –plan and install erosion controls before commencing work.
- Stabilise drains using grasses, matting or rock armouring.
- Stripped areas and stockpiles are more easily eroded than undisturbed soil. Install drains to divert waters from these areas.
- Construct drains to slow sheet water flows across exposed areas, by following contours and using rock beaching and check dams.
- Stockpiles should be located away from natural drainage lines.
- Minimise continuous slopes where flowing water can scour.
- Any natural drainage lines that discharge water up-slope of works should be directed to grass areas by intercept drains. Otherwise water will run down the slope, eroding it. Perimeter banks or sediment fences should also be constructed at the toe of the slope to contain sediment run-off.
- Use dust suppressant products to help bind soil and reduce erosion and sediment in water.
- After works are completed, on-site inlets should not be connected until the site has been stabilised and rehabilitated. By doing this, silt-laden stormwater cannot escape the site via this route and pollute surface waters and will be treated onsite.

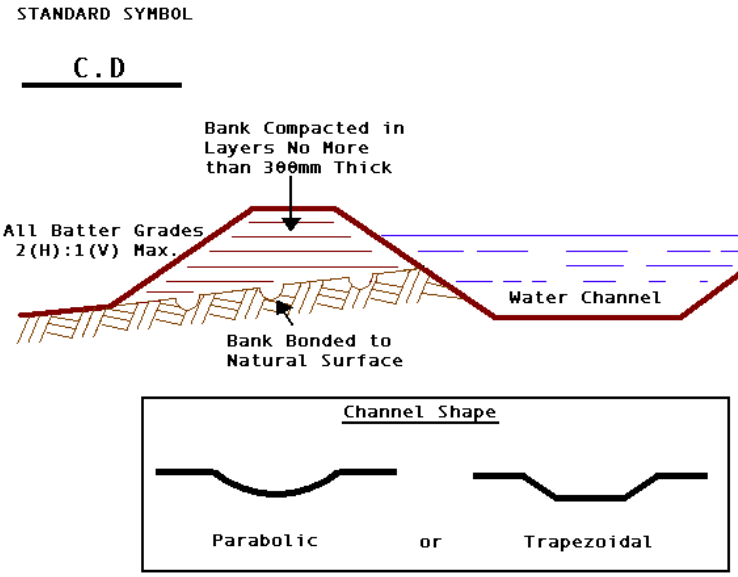
2.2 Drainage construction examples

There are a large number of control devices that will suit most circumstances. Most erosion damage occurs in the initial part of a storm, between 30 minutes and two hours into a storm, and during prolonged storms.
Designs of control structures, therefore, need to account for peak run-off flows. Where it is not possible to schedule works to avoid times of the year when high rainfall is expected, then additional controls may be required, such as installing extra sediment traps or enhancing the capacity of existing controls.

The following diagrams and photographs depict construction examples for drainage control for;

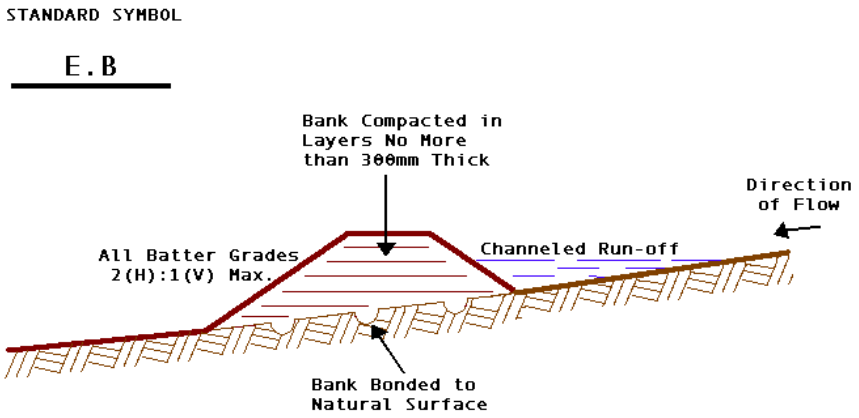
- Catch drains 2.2.1 below.
- Cut-off drains are temporary applications of catch drains and are usually constructed with a grader. These are particularly useful for capturing and channeling sheet flow from exposed areas. They reduce the length of the run-off flow path, thereby reducing the velocity and associated erosive flow.
- Cut-off drains should be constructed along the contour.
- Earth Banks 2.2.2 below.
- Level Spreaders at discharge points help to stop erosion at discharge points 2.2.3 below.
- Down drains 2.2.4 below.
- Lined Channels 2.2.5 below.
- Energy dissipaters at discharge points 2.2.7 belowStabilisation matting 3.1.1 below.
- Rock armouring / beaching 3.1.2 below.

2.2.1 Catch drains



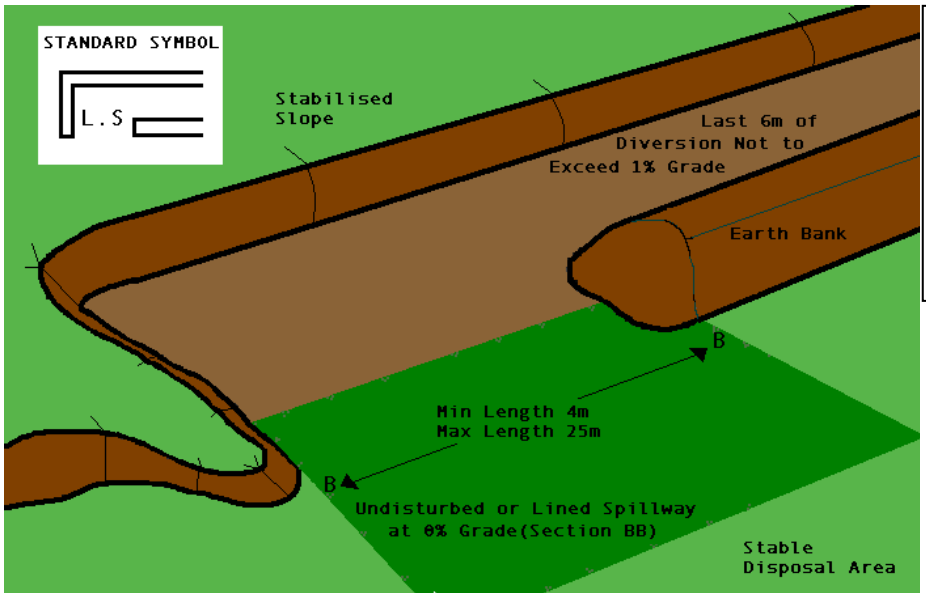
Catch Drain construction, Illustration reproduced courtesy of the ACT Environment Protection Authority (ACT, 1998.) Catch drains, also known as cut and fill diversion channels, are excavated drainage paths. Catch drains should be stabilised within 14 days of installation through the use of grassing, stabilisation matting or rock armouring.

2.2.2 Earth banks (or Cut off Drains)



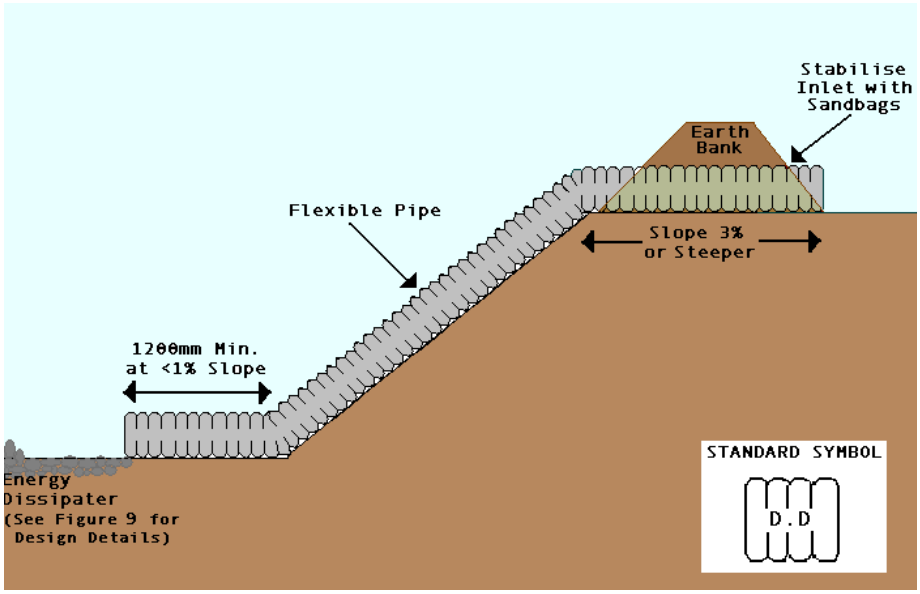
Earth Bank (or Cut off Drains) construction, from (ACT, 1998.)
Earth Banks are used for channeling water to a desired location. Earth banks should be stabilised within 14 days of installation through the use of grassing, stabilisation matting or rock armouring.

2.2.3 Level spreaders at discharge points



Level spreader, from (ACT, 1998.)
A level spreader should be used at the outlet of a catch drain or earth bank to convert the concentrated flow to sheet flow.

2.2.4 Down drains

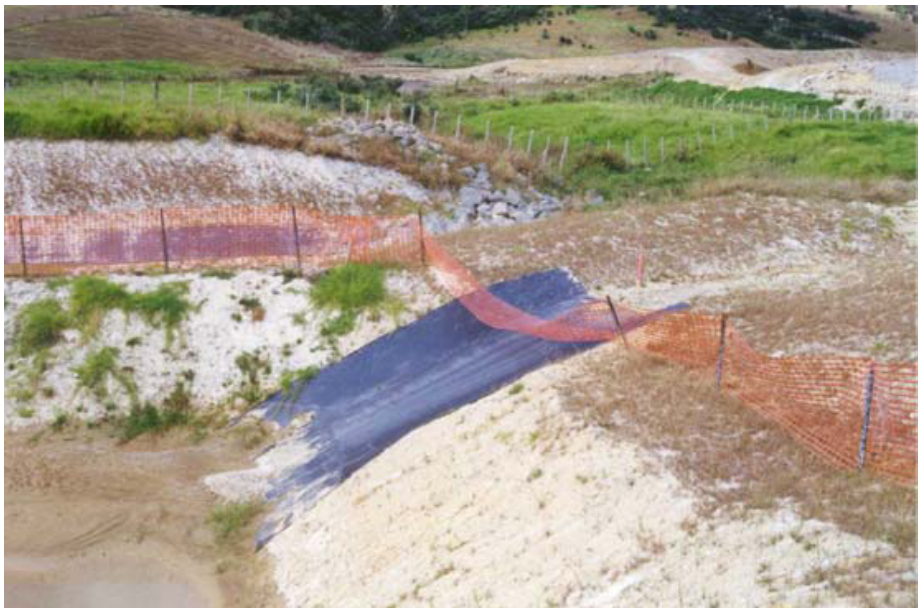


Down Drain, (NSW Dept. of Housing, 1998 and ACT, 1998.)

Down drains or lined channels may be used to transport water down slopes and batters without eroding them.

A catch drain or earth bank is constructed along the top of the batter to prevent uncontrolled flow down the batter and to direct run-off to the down drain or lined channel.

2.2.5 Lined channels



Lined Channels (courtesy of Tony King, CPESC), EPA, 2004

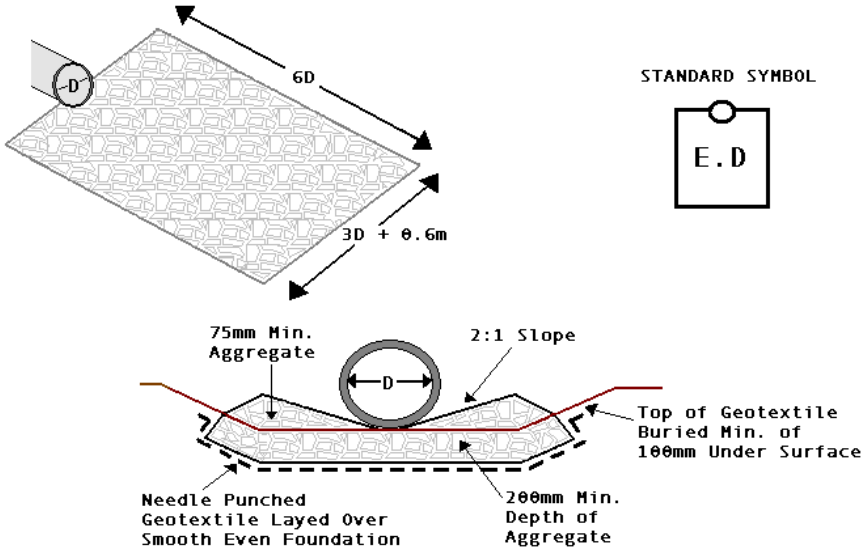
A lined channel should be constructed similarly to a down drain, excepting a channel is cut down the batter in place of a pipe and the channel is lined with stabilisation matting or geotextile.

Rock lining should be considered for more permanent structures

2.2.6 Lined channels

Lined Channels (courtesy of Tony King, CPESC), EPA, 2004

2.2.7 Energy dissipaters at discharge points



Energy Dissipater (Figures from NSW Dept. Housing, 1998 and ACT, 1998)

An energy dissipater should be used at the outlet of a down pipe or lined drain to slow velocity and associated erosive flow.

3 Drainage stabilisation - matting

Stabilisation Matting Used to Stabilise Drainage Channel (Photo courtesy of O_2 Environmental)

Stabilisation methods include:

- Stabilisation matting is particularly useful in areas where concentrated flows of run-off occur (eg within catch drains, drainage channels, outfall drains). Use the largest weave practical to aid natural re-vegetation.
- Rock Beaching (Below)
- Grassing- slows down water run-off, increases infiltration and acts as a filter to trap soil particles.
- Mulch- slows down water run-off.
- Revegetation.

3.1.1 Rock armouring / beaching – stabilise drainage

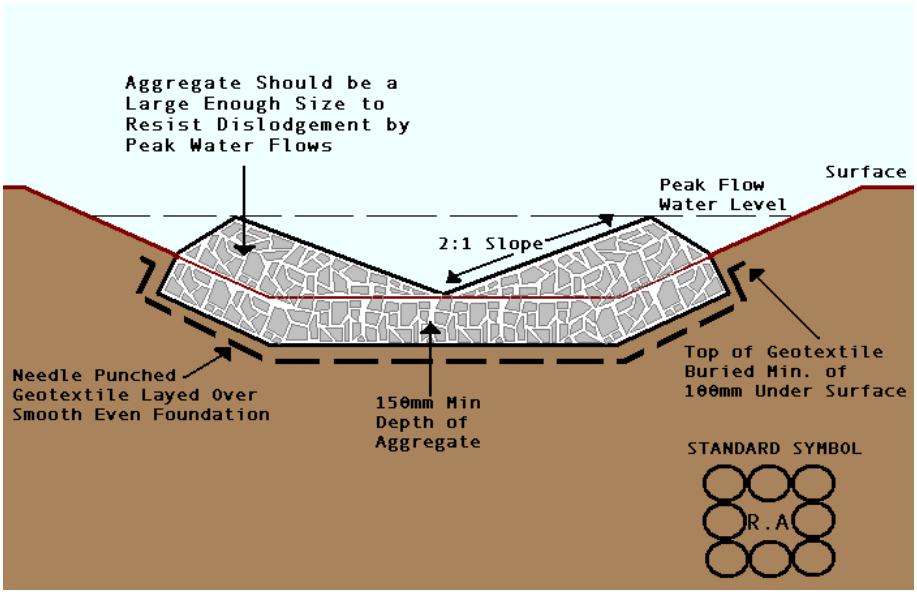
Rock Armouring, (EPA, 2004)

Rock armour slows water flow and is used in areas such as drainage channels, catch drains, outfall drains, outlets/ inlets to sediment basins, and bends of waterways.

Use of a liner under the rock will reduce undermining and can reduce the thickness of rock to be placed.

Ensure that the rocks are large enough to resist dislodgment by peak water flows. It is recommended that an assortment of rock sizes are used, instead of one uniform size (US EPA, 2003).

3.1.2 Rock armouring / beaching – stabilise drainage



Rock Armouring-Cross Section (from EPA Victoria Publication 275 and NSW Dept. of Housing, 1998)

4 Sediment Control

Soil eroded during land disturbance can wash away and contaminate stormwater and adjacent waterways.

The type of sediment controls suitable for any site will depend on the rainfall patterns, soil type and topography. These factors need to be taken into account when selecting appropriate controls and ensuring that designs are adequate on all drainage lines.

Silt loads should be treated as close to their source as possible using effective sediment traps such as geotextile fences and straw bales.

Important installation tip for sediment controls in channels

When installing sediment retention structures in channels ensure that the bottoms of the outer edges of the structure are higher than the top of the centre of the structure. This allows run-off to overtop the control in high flow events, rather than pass around it. The use of a string line is a good way to ensure that the levels are correct. This is shown in several of the following sediment control diagrams, for example see 4.1.7.

Inspection, maintenance and cleaning

The effectiveness of sediment control devices depends on an adequate inspection, maintenance and cleaning program. Inspections, particularly during storms, will show whether devices are operating effectively (see section 9.1). Where a device proves inadequate, it should be quickly redesigned to make it effective. Wind events and accessibility of the area to the public should be factored into any inspection protocols.

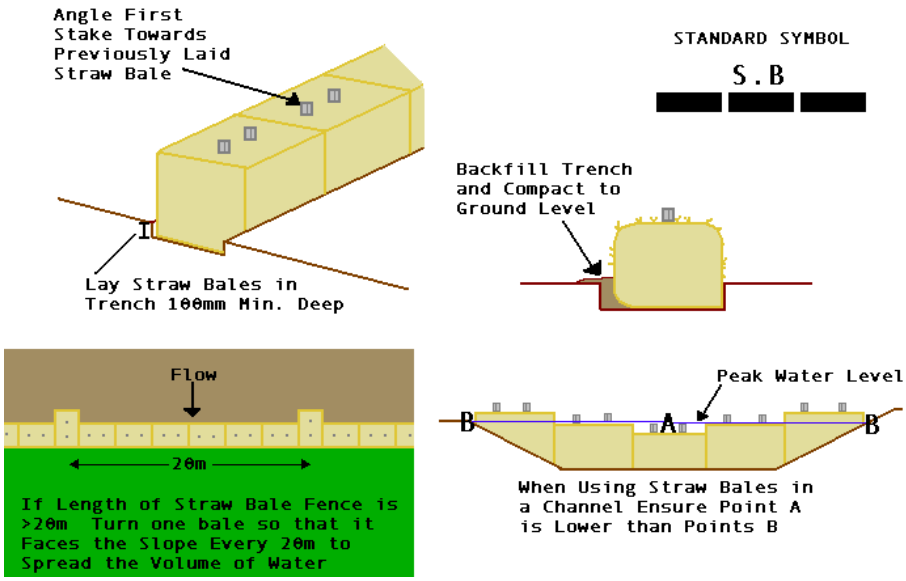
4.1 Sediment control examples

There are a large number of control methods and devices that will suit most circumstances. Most erosion damage occurs in the initial part of a storm, between 30 minutes and two hours into a storm, and during prolonged storms. Designs of control structures, therefore, need to account for peak run-off flows.

The following diagrams and photographs depict construction examples for sediment control for;

- Straw bales 4.1.1 below.
- Silt fences including geotextiles 4.1.3 below.
- Straw bale silt fence 4.1.5 below.
- Synthetic filters (e.g. dacron) 4.1.6 below.
- Biodegradable logs (Coir) 4.1.9 below.
- Rock bund 4.1.9 below.
- Stone and straw bale sediment trap 4.1.11 below.
- Check Dams 4.1.12 below.
- Silt fence sediment trap 4.1.13 below.

4.1.1 Straw bales



Straw Bales (VSAP Building Construction Sites Project Group, 2003 and LGPro, 2002) For effective treatment utilising straw bales:

- Ensure that straw bales and not hay bales are selected. Hay bales should not be used due to their seed content.
- Rock Bund or Synthetic bales are superior alternatives to straw bales
- A line of straw bales should service a catchment no greater than 0.5 Ha (ACT, 1998).
- Replace bales approximately every three months ensuring minimal disturbance.

4.1.2 Straw bales

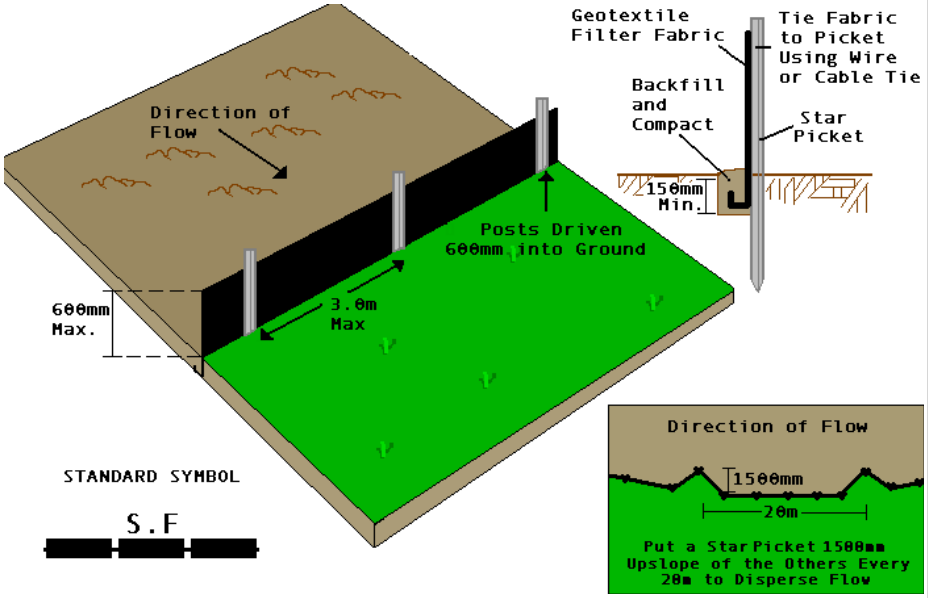
Gap Between Straw Bales make this control ineffective, (EPA, 2004,)

When installing straw bales ensure that no gaps are left between the bales. Run-off flowing through a gap concentrates flow, which can worsen erosion.

Prevent gaps between bales by angling the first stake in each bale toward the previously installed bale to push them together. Any loose straw should be placed up-slope of the straw bales, as it will fill any smaller gaps during run-off flows.

It is advisable that a silt fence is installed in conjunction with straw bales to minimise gaps.

4.1.3 Silt fences including geotextiles

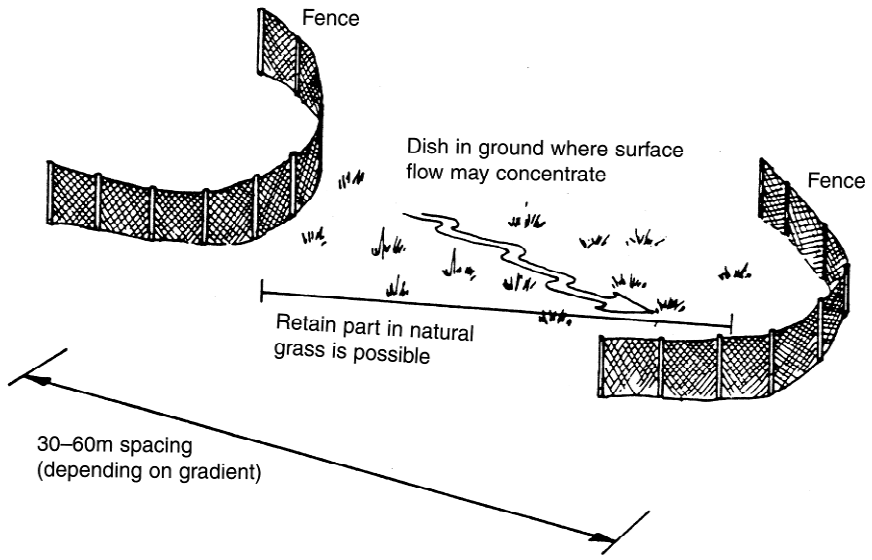


Silt Fence (VSAP Building Construction Sites Project Group, 2003)
Silt fences should not service a catchment area **greater than 0.6 Ha** per line of fence and are not appropriate for areas of high flow (ACT, 1998).

Silt fences may be reinforced with wire mesh or by placing star pickets every metre where there is a risk of them being knocked over by run-off, work activities or wind.

Silt fences are effective for removal of coarse sediment however have limited to no filtering capacity for fine clays.

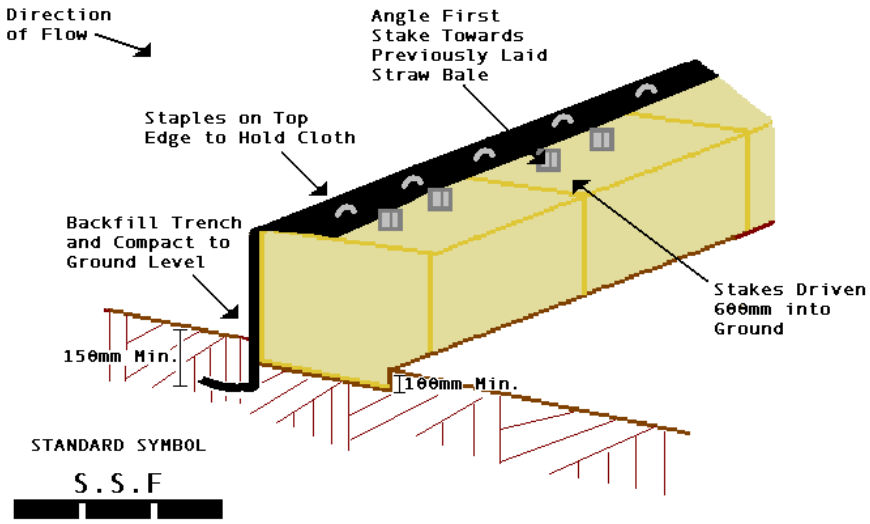
4.1.4 Silt fences including geotextiles



Line of Silt Fence, (ACT 2007, 2004**.)**

Silt fences should not be installed so that run-off can pass around them. Silt fences should be constructed along the contour, with the ends turned up slope to ensure that any build up of run-off behind the fence cannot pass around it.

4.1.5 Straw bale & silt fence

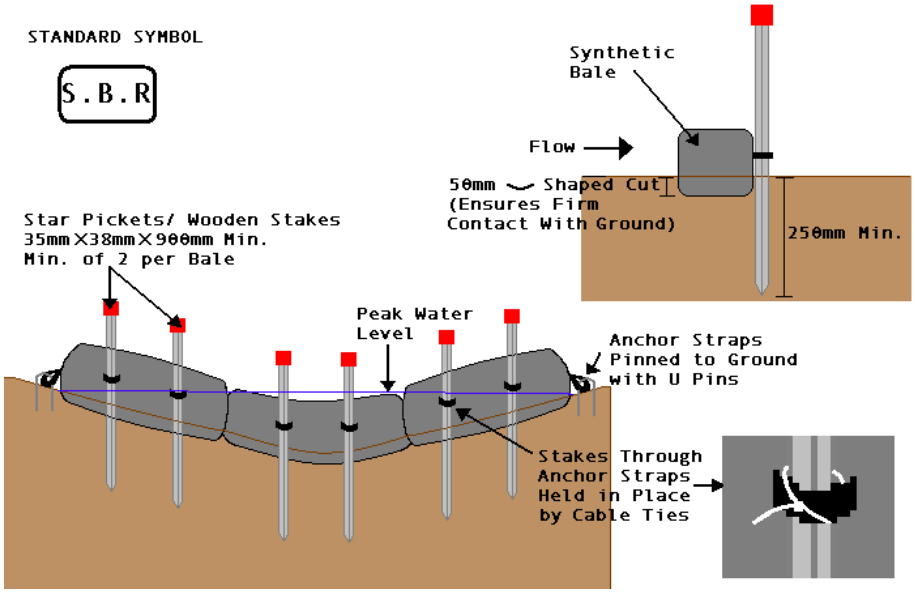


Straw Bale &Silt Fence (Figures from ACT, 1998 and VSAP Building Construction Sites Project Group, 2003)
This combination may be used in an **area of concentrated flow.**

The silt fence should be placed on the up-slope side of the structure.

Replace bales approximately every three months.

4.1.6 Synthetic filters (gravel sausage)

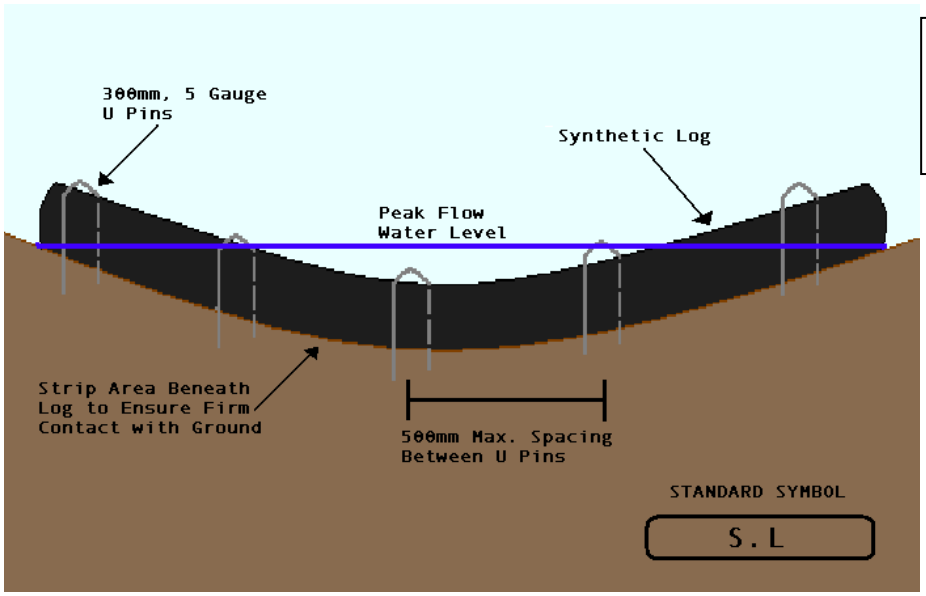


Synthetic filter (Gravel sausage), (EPA, 2004)

These permeable synthetic silt filters consist of a geotextile cover, encasing a synthetic filling. Synthetic filters are effective for removal of coarse sediment and some fine clay.

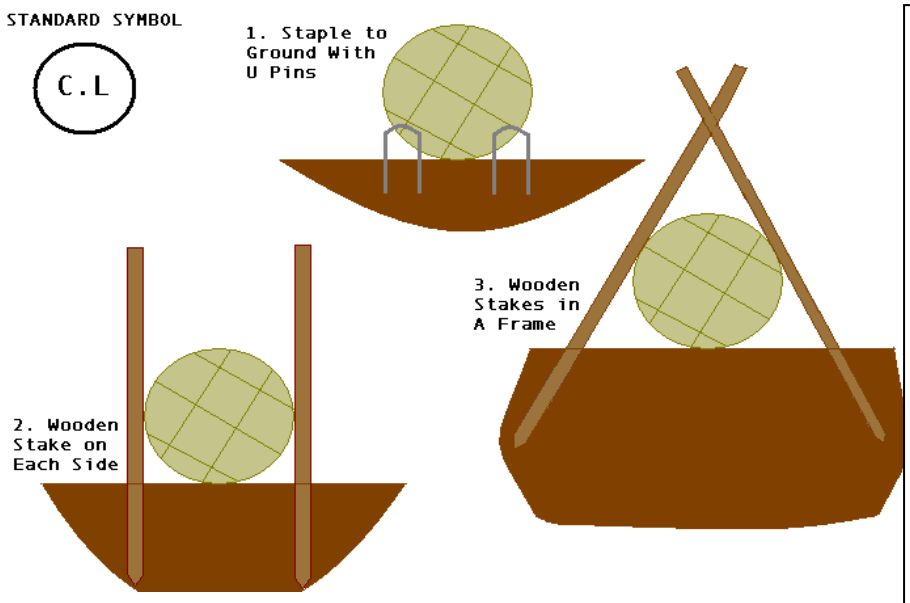
Designs of these products include straw bale replacements and short and long flexible logs.

4.1.7 Synthetic filters (gravel sausage)



Synthetic filter installation, (EPA, 2004)

4.1.8 Biodegradable logs (coir)



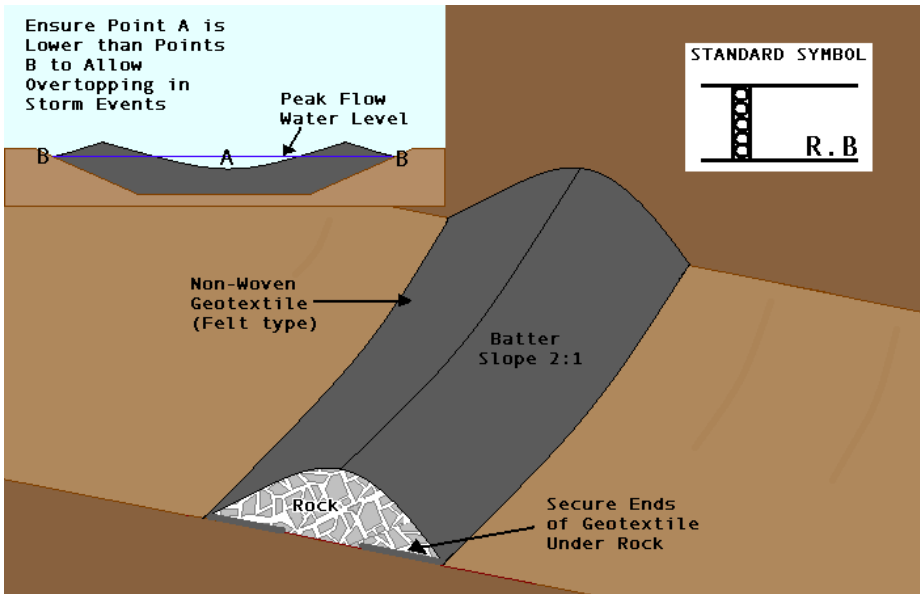
Coir Logs, (EPA, 2004**)**

Compared to straw bales, coir logs are more robust (making them appropriate for use in **concentrated flows**), longer lasting (2-5 years) and weed free. (Treemax, 2001)

The area under the coir log should be stripped prior to placement, to ensure that it can make firm contact with the ground.

Where possible, use pins to secure coir logs as shown in image 4.1.7

4.1.9 Rock bund

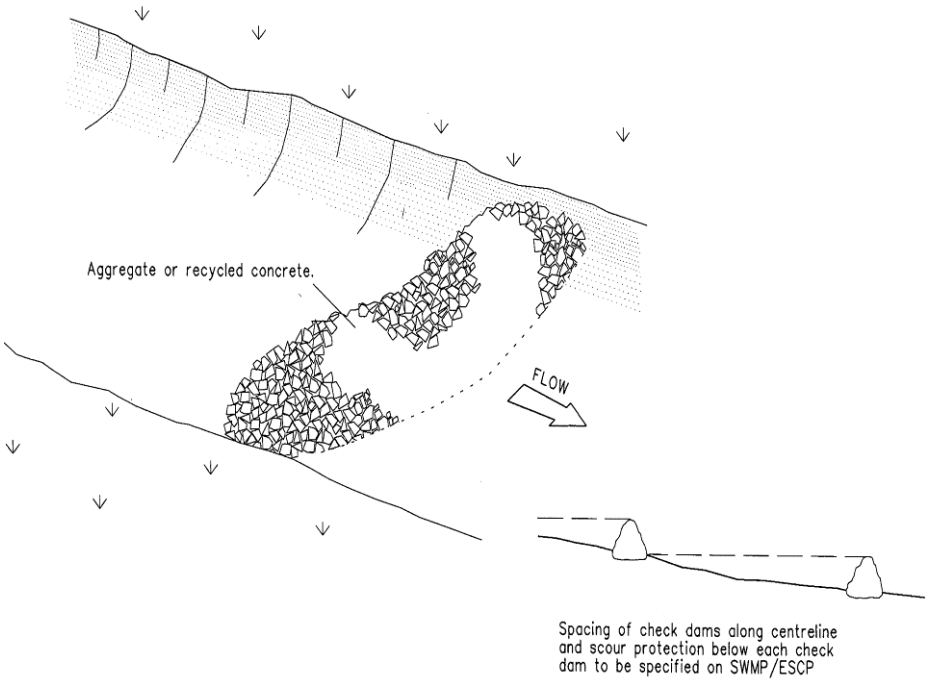


Rock Bund / weir (Figures from ACT, 1998)

Rock bunds consist of non-woven geotextile (felt type), encasing rock. The rock size varies between applications however 100mm rock is effective in many circumstances.

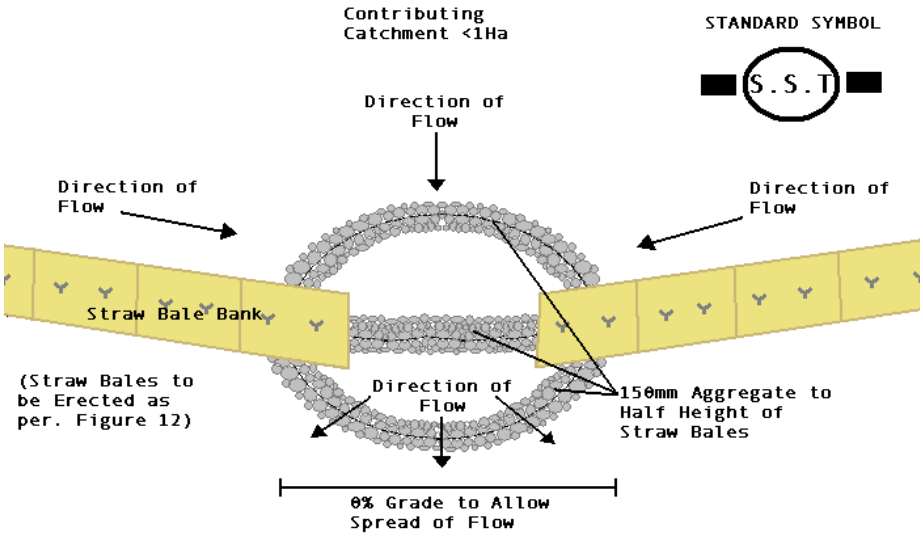
A rock bund should service a catchment no greater than 1Ha (ACT, 1998).

4.1.10 Rock Bund Spacing



Rock Bund Spacing(Figure Courtesy of Landcom)

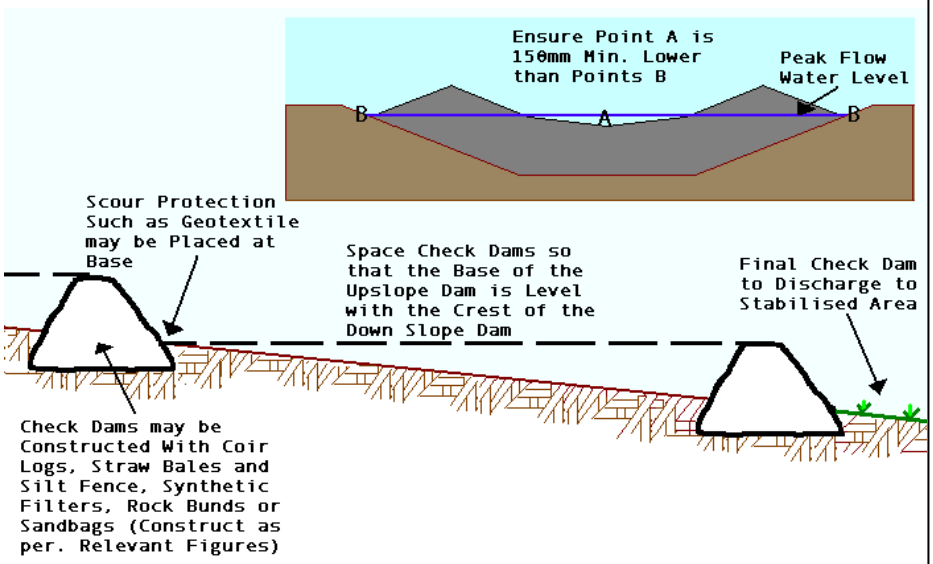
4.1.11 Stone and straw bale sediment trap



Stone & Straw Bale Trap (Figures from ACT, 1998)

Stone & straw bale sediment traps utilise a straw bale bank to divert run-off to be filtered and dispersed by the rock.

4.1.12 Check dams

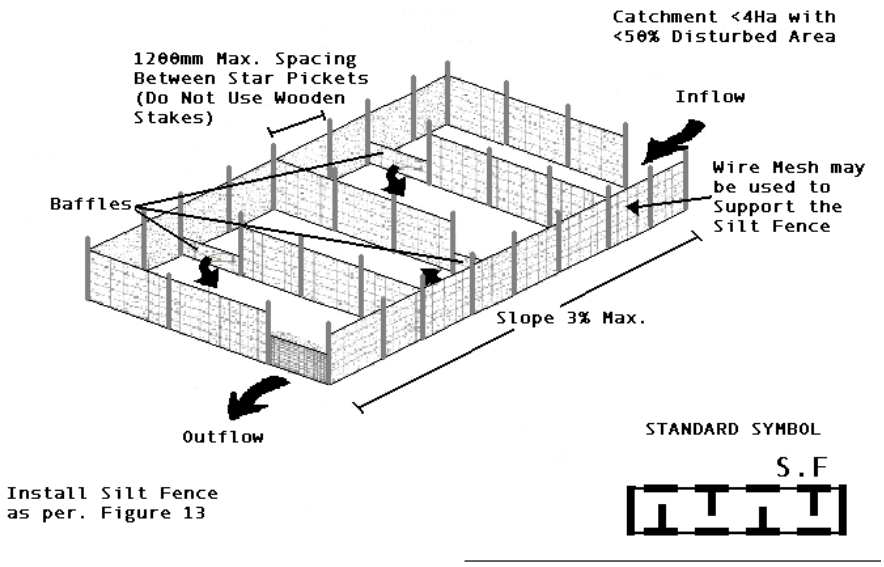


Check Dam (Figures from NSW Dept. of Housing, 1998)

Check dams are generally installed across a channel. They are particularly useful where it is not practical to line the channel. They are also useful for placement in channels that have been seeded, to provide protection until the seed strikes (US EPA, 2003).

Check dams may be constructed with straw bales & silt fence, synthetic logs, biodegradable logs, rock bunds, rock gabions or sandbags.

4.1.13 Silt fence sediment trap



Silt Fence Sediment Trap (Figures from LGPro, 2002)

Silt fence sediment traps slow flow, by increasing travel distance and by placing baffles at opposite ends for inflow and outflow.

5 Stormwater System protection

Flows to stormwater systems from site should filter sediment, while maintaining flow into the drainage system. Maintaining flow is essential, as it prevents flooding and prevents flows further down-slope.

Care must be taken to ensure sediment retention structures do not pose a hazard to traffic, as an obstacle or by creating pondage of water on the road. It is imperative that a bypass into the drainage inlet is maintained in this circumstance, to ensure run-off can enter the inlet in a storm event.

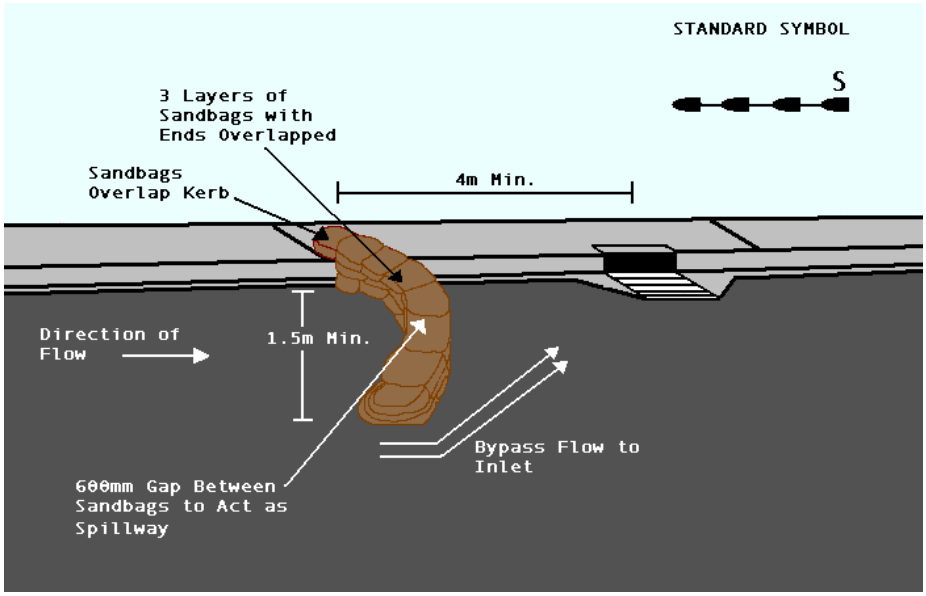
5.1 Sediment control examples – to existing stormwater systems

There are a large number of control methods and devices that will suit most circumstances. Most erosion damage occurs in the initial part of a storm, between 30 minutes and two hours into a storm, and during prolonged storms. Designs of control structures, therefore, need to account for peak run-off flows.

The following diagrams and photographs depict construction examples for sediment control for;

- Roadside stormwater - sandbag sediment barrier 5.1.1 below.
- Roadside stormwater - Gravel/synthetic filter 5.1.2 below.
- Stormwater grate - Silt mesh filter 5.1.3 below.
- Drop inlet - Silt fence/ straw bale filters 5.1.4 below.
- Drop Inlet – Geotextile and sausage filters 5.1.5 below.
- Culvert entry – timber & gravel filter 5.1.6 below.

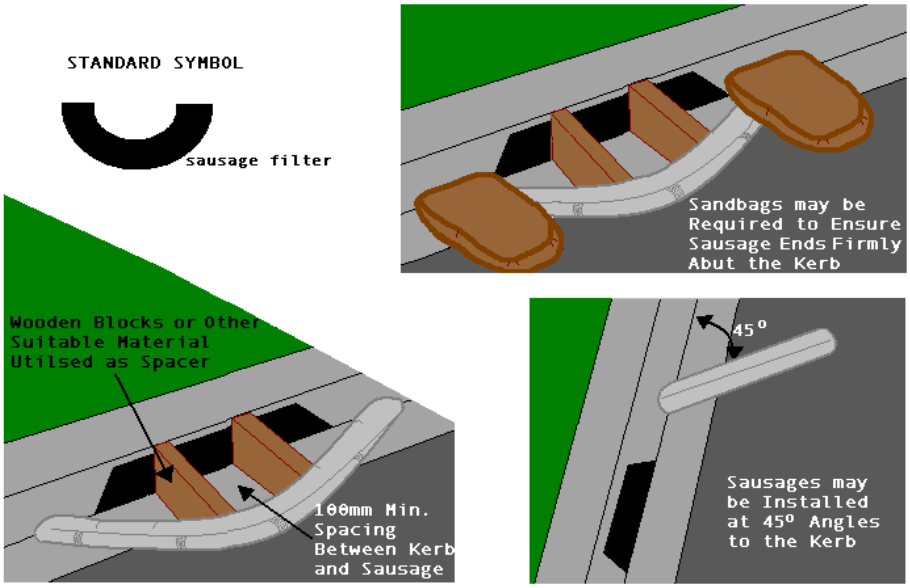
5.1.1 Roadside stormwater - sandbag sediment barrier



Sandbag Sediment Barrier (Figures from LGPro, 2002)

Sandbag sediment barriers are unsuitable controls for trafficked roads as they are an obstruction to vehicles.

5.1.2 Roadside stormwater - gravel/synthetic filter



Roadside stormwater – Gravel/synthetic filter (Figures from VSAP Building Construction Sites Project Group, 2003)

Ensure that a 100mm minimum spacing is maintained between the kerb inlet and the sausage filter. This allows excess run-off to overtop the sausage filter to the drain.

When installing sausage filters at 45 degree angle to the kerb, ensure that they face upstream and that the kerbside end of the sausage is depressed to create a spillway.

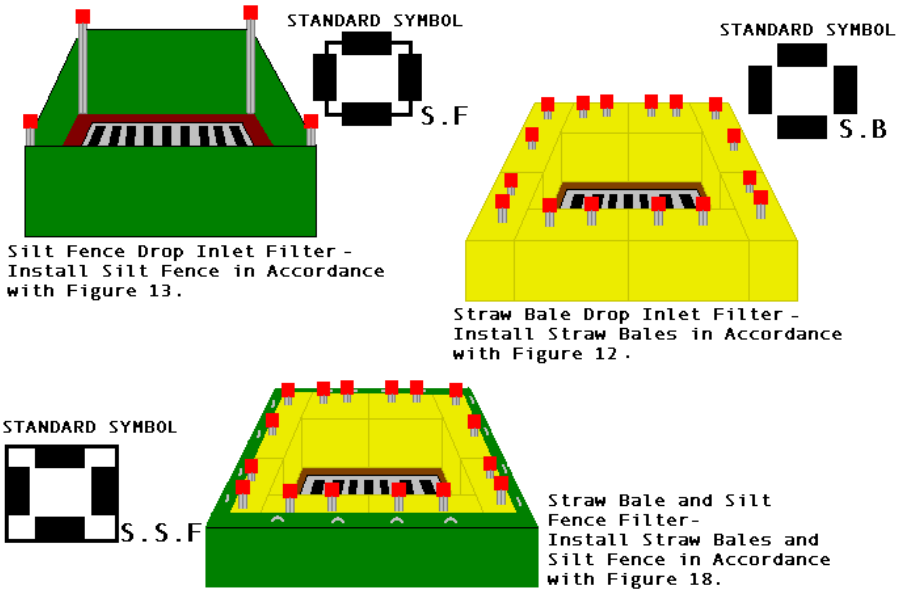
5.1.3 Stormwater grate - silt mesh filter

Stormwater grate - Silt Mesh filter, (EPA, 2004)

This photo shows sediment that has been captured by the mesh filter. Filters with this amount of sediment should be cleaned out.

This measure is best with the mesh on top of the grate rather than below.

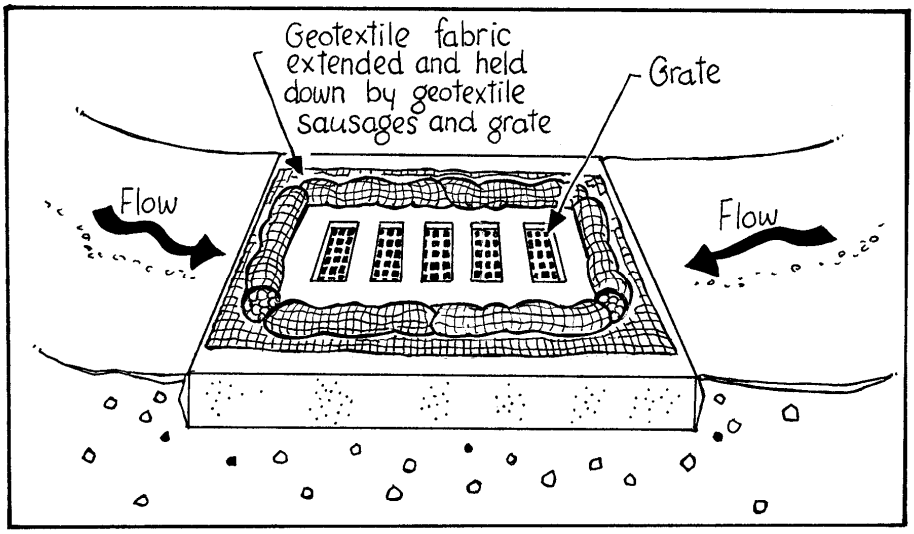
5.1.4 Drop inlet - silt fence/ straw bale filters



Drop Inlet - Silt Fence & Straw Bale Filters, (EPA, 2004.)
straw bales and silt fence should be used when high flows are anticipated. High flows can knock over weaker silt fence structures. Silt fence and straw bales will give best filtration, however ponding may occur.

See above for correct installation of silt fences "Silt fences including geotextiles"

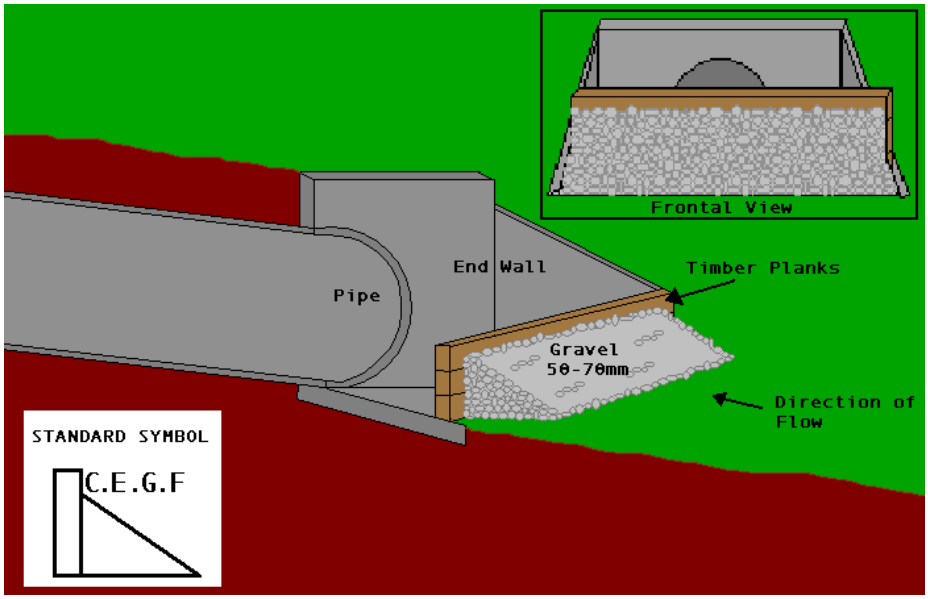
5.1.5 Drop inlet - Geotextile and sausage filters



Drop Inlet – Geotextile and sausage filter (ACT, 2007)

Suitable for areas with low flows of water.

5.1.6 Culvert entry – timber & gravel filter (section diagram)



Culvert Entry – Timber & Gravel Filter (Figures from ACT, 1998)

Timber planks and gravel may be used as a filter to a culvert entry point.

6 Ponds / Basins to contain sediment

Sediment detention dams, ponds or basins hold sediment-contaminated run-off long enough for suspended sediment to settle out. Clarified water can then be discharged to stream.

6.1 Sediment basin size

Ideally a qualified professional should design sediment basins, however the following guidance may be used to design temporary sediment basins to be utilised during the construction phase on site. It should be noted that the following methodology assumes ideal settling conditions, which rarely occurs in practice (Stormwater Committee, 1999). Therefore the sizing determined should be considered the minimum for constructing a basin on site.

The VicRoads temporary sediment basin tool may be used to estimate the size of the sediment basin required. Go to the CCF Victoria website,
http://www.civilcontractors.com/victoria/environment/proceduresguidelines/
then click **sediment basins** near the bottom of the page. This will take you to the VicRoads Website. Click on Sediment basins to open the spreadsheet.

Permanent structures that will provide ongoing sediment control, after a site has been rehabilitated, should be designed using a **50year-recurrence interval**. Examples of permanent structures are wetlands and major sediment detention dams.

Temporary sediment control structures should be designed to take predicted flows, based on a **one-in-two-year storm** (two-year ARI with intensity for six hours) and sub-catchment areas, while contingency plans should be in place to account for extreme storm events. (EPA, 2004)

6.2 Sediment basin depth

The depth of a sediment Basin should be between **900mm and 2m** (NSW Dept of Housing, 1998) and (Melbourne Water, 2002).

When determining depth of a sediment basin the following should be taken into consideration:

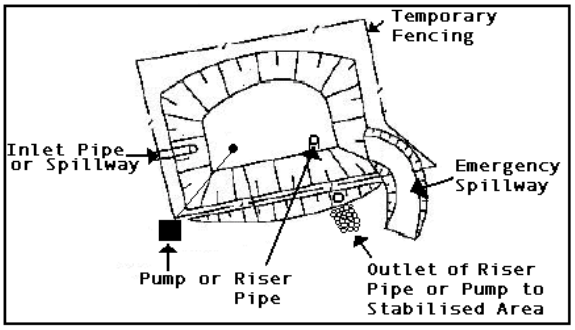
- Safety - shallower basins should be constructed if the basin is located in an area accessible to the public. It may also be necessary to fence the basin, provide gently sloping batters and/or construct benches within the basin.
- Maintenance- sediment basins should be de-silted when the capacity of the basin has been diminished by a third as a result of sediment deposition. Shallower basins will require a greater frequency of de-silting.

Where site constraints do not allow for an appropriately sized basin, baffles may be installed to create an extended, meandering flow path through the basin. Baffles can also prove useful in basins where the inlet and outlet of the basin is in close proximity. (EPA, 2004)

6.2.1 Sediment basin types include:

- Rock sediment basins - rock encased by geotextile is utilised as the basin wall.
- Gabion sediment basins - gabions (rock encased in wire) are used to construct the basin wall.
- Earth basin 6.2.2 below. The basin wall consists of compacted earth. Flows out of the pond are through a riser pipe that allows the basin to be emptied. This basin is preferred as it allows outflow from the pond to be controlled. Water may be emptied from the pond when it meets with legislative water quality parameters. Discharge from the pond can be halted by capping the end of the pipe when it does not.
- Earth basin (wet) - as with dry earth basins the basin wall consists of compacted earth. Flow out of the pond occurs during rainfall events, when the basin overflows via a spillway. (EPA,2004).

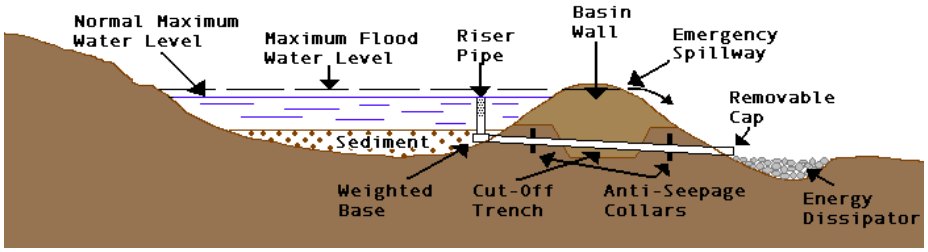
6.2.2 Sediment Basin



STANDARD SYMBOL

SB

Sediment Basin (Figures from EPA Victoria Publication275and ACT, 1998)



7 Flocculent use to Remove Contamination From Water in Ponds

Fine clays suspended in run-off require a long time to settle, often exceeding the economic or practical detention storage capacity. Flocculants may be needed to settle the clays more quickly. Care must be taken not to overdose with flocculent. Excess flocculent degrades water quality and/ or the aquatic habitat in natural waterways.

Although other settling agents exist, including ferric chloride, ferric sulfate, polyelectrolytes and common salt, only gypsum and alum will be discussed here (NSW Dept of Housing, 2003). Other flocculants are not discussed due to their high environmental impacts and/or difficulty of use. **It is strongly advised that gypsum be used** in preference to alum, as it is easier to use and has less chance of having detrimental environmental impacts.

- Gypsum is an effective flocculent comprising of calcium sulfate. Gypsum has limited effect on pH; however its use can result in a slight rise in salinity levels.
- Alum, consisting of aluminium sulfate, produces a faster rate of flocculation than gypsum. However, potential environmental impacts are greater with the use of alum in comparison to gypsum. Vigilance is necessary to ensure overdosing does not occur, as this will result in the pH being lowered. Likely toxic impacts on ecology occur at pH levels less than 5.5 due to a release of dissolved aluminium (NSW Dept of Housing, 1998). Alum should not be used in waters with a pH less than 5.5 or where dosing has the potential to lower the pH to less than 5.5. Accurate pH testing pre-dosing and post-dosing is essential when using alum.
- The use of flocculants should be minimized where water is to be discharged into a contained waterbody, such as a lake or wetland, due to the potential to become concentrated leading to adverse environmental impacts.

7.1 Using flocculent - suggested method of dosing

The methodology of dosing waters with alum or gypsum is essentially the same. When flocculating ponded water on site, ensure that the following points are followed:

- Undertake pre-dosing pH testing to ensure that the selected flocculent will not have adverse effects on the environment.
- Dosing may be undertaken on site by hand by throwing handfuls of flocculent across the ponded water. For the flocculent to work effectively it must be spread over the entire surface of the ponded water (NSW Dept of Housing, 2003).
- Dose rate (always check the dose rate with your supplier)

  Gypsum: 32 kg/100 $m^{2\ for}$ a settling time of 36-72 hrs

  Alum: 1.5-8 kg/ 100 m^2 for a settling time of 24 hrs.
- For larger areas of ponded water where dosing by hand is impractical it may be

necessary to spray the flocculent in a slurry form over the pond with a pump.

- The ponded water must remain relatively undisturbed to provide ideal conditions for settling. As a minimum ensure that the ponded water is undisturbed by inflow from pumps or further run-off from storm events for a period of 24 hours.
- Water quality should be tested prior to discharge to ensure turbidity and pH levels are in line with legislative requirements.

8 De-watering Work Sites

After rain, pooled water is often pumped offsite. Often this water is contaminated with suspended sediment so it is essential that its disposal should not contribute to water pollution.

Treatment is required before discharging runoff to a natural waterway or stormwater system, where turbidity exceeds 30 NTU (Nephelometric Turbidity Units) and is higher than upstream measurements. Hourly measurements of discharge water quality should be taken.

8.1 Determine if water can be reused on site

Re-use of water on site should always take priority over discharge because:

- Discharge to waterways can be harmful.
- Water, particularly drinking water, is a scarce and valuable resource.
- Using reclaimed water as opposed to buying water will save money.

8.1.1 Water may be re-used for

- Dust suppression and.
- Irrigation of vegetation.

8.2 De-watering - suggested measures

- The pump intake should be kept as close to the surface of pool as possible. Floating intakes should be used when the depth of water is sufficient. Care must be taken to avoid pumping from the bottom of ponds, and constant supervision is required during pumping operations to ensure this does not happen.
- The method of pumping should not stir up sediment into the discharged water at the inlet or outlet of the pump.
- The direct discharge of water into a waterway or drainage line should be avoided. Water should be directed to vegetated areas. Precautions should be made to ensure that such areas don't become waterlogged and have adequate capacity to effectively remove suspended solids.
- Pumping to natural waterways should be supervised. Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard.
- In urban areas it may be possible to discharge contaminated run-off to sewers. Such a

discharge will require approval of the relevant sewerage authority. This option is of limited usefulness as dewatering the site will usually be required during or immediately after rainfall, when the sewers may also be near capacity and unable to accept any additional volume.

- Treat contaminated water pumped into the stormwater system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU. The exception is where the receiving waters has a turbidity of less than 30 NTU (for example surface waters in less developed areas). In this circumstance a higher level of treatment is required to ensure the protection of surface waters as specified in State Environment Protection Policy (Waters of Victoria).
- Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway.

9 Waterways and Floodplains protection

The responsible authority must be consulted if there are any works that will impact on a waterway. Responsible authorities would include Melbourne Water, Local Councils and CMA's (Catchment Management Authorities). Changes to the physical nature of a waterway require prior approval from the responsible authority.

At the design stage, consider all options to avoid working in a natural waterway.

9.1 Working in and around waterways – suggested measures

- Minimise the time during which work in a waterway is required, and the extent of works.
- Schedule works for the driest months of the year and the lowest flow of the waterway.
- Avoid times of the year when aquatic population may be under stress, such as during migration spawning, or when food may be scarce.
- Establish protocols to minimise downstream damage.
- Stabilise any disturbance to a levee, bank or bed so that erosion and undercutting is avoided.
- Implement measures to ensure that vegetation cover returns to the site as quickly as possible.
- Measure turbidity continuously immediately downstream from the areas in which work is occurring, and modify work practices where continuous monitoring shows degraded water quality.
- If working in a concrete channel, use appropriate machinery to avoid damage to structures.
- Locate stack sites, toilets and servicing facilities in areas where material cannot wash into a waterway.

9.2 Stream crossings – suggested measures

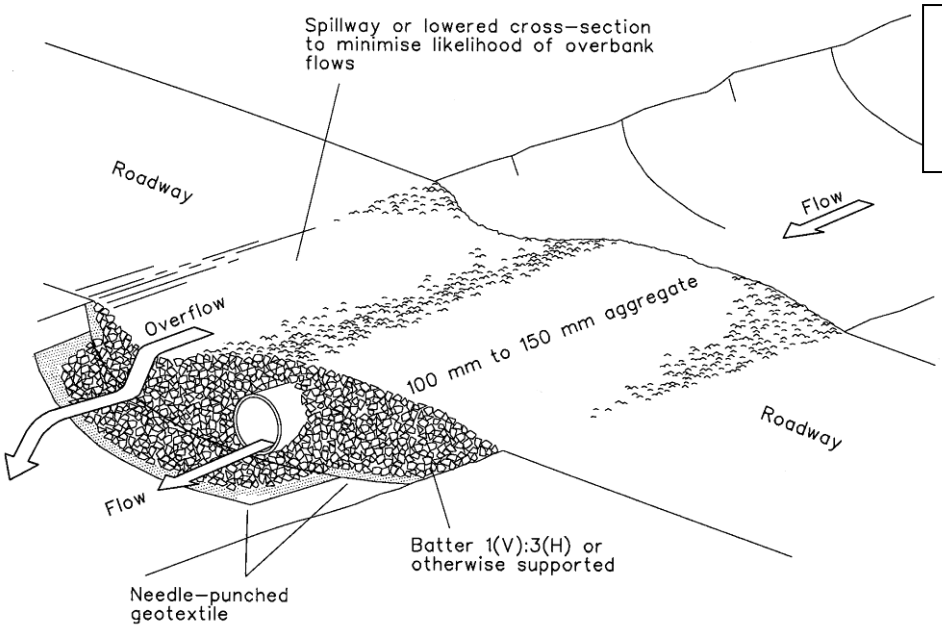
If in-stream activities require construction of a stream crossing, three types of access crossings may be considered.

Culvert: this type of crossing may be effective in controlling erosion while in use, but will cause erosion during installation and removal. In stream controls may be required to ensure that any increased velocity of water flow due to the culvert does not cause scouring of the bed of the waterway.
Ford: this type of crossing may only be used during periods of low flow. A ford is not appropriate if construction will continue during wet periods of the year.
.
Bridge: this type of crossing must be used for major waterways and for other waterways with high flows.

- The crossing should be installed during low-water flows with downstream weirs in place to trap any released sediment.

- The crossing should be protected against erosion, both to prevent excessive sedimentation in the waterway, and to prevent washout of the crossing.
- The crossing should be positioned perpendicular to the flow and located at the narrowest part of the stream.
- Damage to the stream bed and banks should be avoided.
- The crossing should be engineered to be stable under the expected vehicle loads.
- Drainage over the surface of the crossing and access road should have adequate controls to ensure that sediment run-off to the stream is minimised.
- If a cofferdam is used, minimum downstream flows should be maintained that will sustain the aquatic ecology.
- Stream crossings also act as sediment traps. Cleaning sediment out behind a crossing should follow the same procedure as for weirs.

9.2.1 Temporary Waterway Crossing



Temporary Waterway Crossing, (Courtesy of Landcom)

9.3 Contingency planning for working in waterways

Contingency plans should also be in place for intense storm events, particularly where works are planned to occur within a floodplain.

The contingency plan should address:

- The consequences on the environment of 5, 10, 20 and 100-year-frequency floods.
- Methods to limit stormwater entering excavation areas.
- Enhancement of existing measures and installation of additional controls, when an intense storm event is forecast.
- Location of construction facilities.
- Clean-up procedures, including disposal of excess water.
- A flood warning system.
- Procedures for preventing the loss of spoil, fuel, chemicals or other materials that could

adversely affect the environment.
- Notification of relevant authorities if unplanned incidents occur that could pose a risk to the environment.
- Methods for extracting plant and equipment from the works area.

9.4 Waterways reinstatement plan

Prior to works being undertaken on, a reinstatement plan should be prepared and submitted for approval to the responsible authority. The plan should include:

- Proposed changes to the waterway.
- The impact on adjacent vegetation.
- The type and form of flood protection works.
- Erosion, scouring and sediment run-off controls.
- Proposed methods for reinstatement of the waterway bed and banks.
- A revegetation plan addressing a period of no less than 12 months and including proposed species and locations, methods for weed control and ongoing maintenance until a satisfactory level of established plants is achieved.

9.5 In Stream sediment control – suggested measures

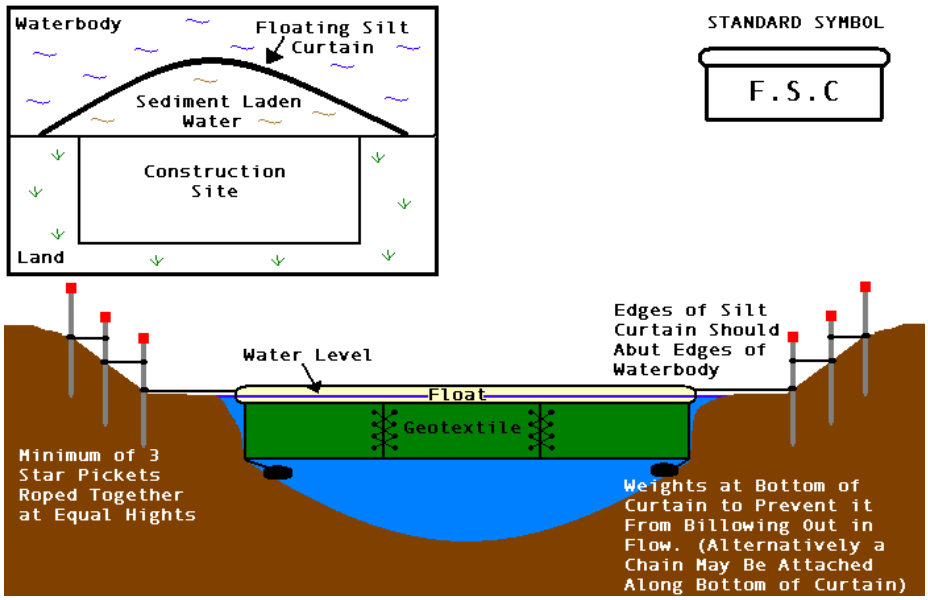
When the site is intersected by a stream, then in-stream controls such as a rock weir are required to reduce water velocity and trap sediment. In stream sediment retention measures should not be relied upon as the sole measure of erosion and sediment management.

- Install erosion and sediment control measures above and within the waterway, before construction commences.
- Design and install appropriate erosion and sediment run-off control measures appropriate to site conditions to handle a one-in-two-year storm event (two-year ART with intensity of six hours), for temporary structures, and a one-in-fifty year storm event, for permanent structures (EPA 2004).
- Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. Special precautions should be taken when cleaning behind a weir to ensure that trapped sediment is not resuspended.
- Ensure that contingency plans are in place for unusual storm events.
- Continually assess the effectiveness of sediment control measures and make necessary improvements.

The following measures are shown below;

- Floating silt curtains 9.5.1 below.
- Composite Silt Curtain 9.5.3 below.

9.5.1 Floating silt curtains



Floating Silt Curtain (Figures from NSW Dept. of Housing, 2003),

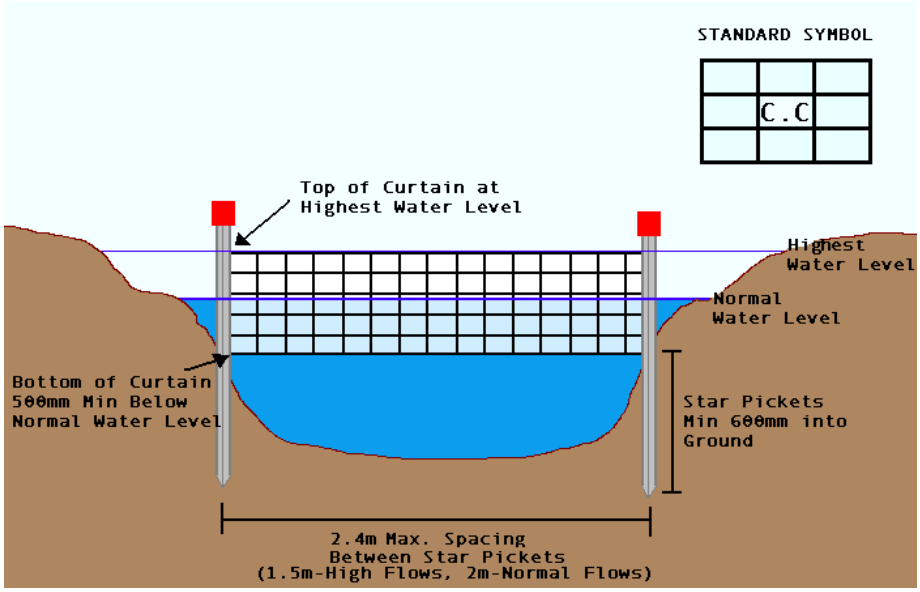
Floating silt curtains consist of a curtain of geotextile that is supported in a water body by floats and weights. They are only suitable for areas of low velocity flows.

When installing floating silt curtains in a channel, ensure that the float width equals the channel width. The geotextile curtain sides should be graduated downwards to match the channel sides. This will inhibit erosion at the sides of the channel.

9.5.2 Floating silt curtains

Floating Silt Curtain (Courtesy of Geofabrics Australasia)

9.5.3 Composite silt curtain

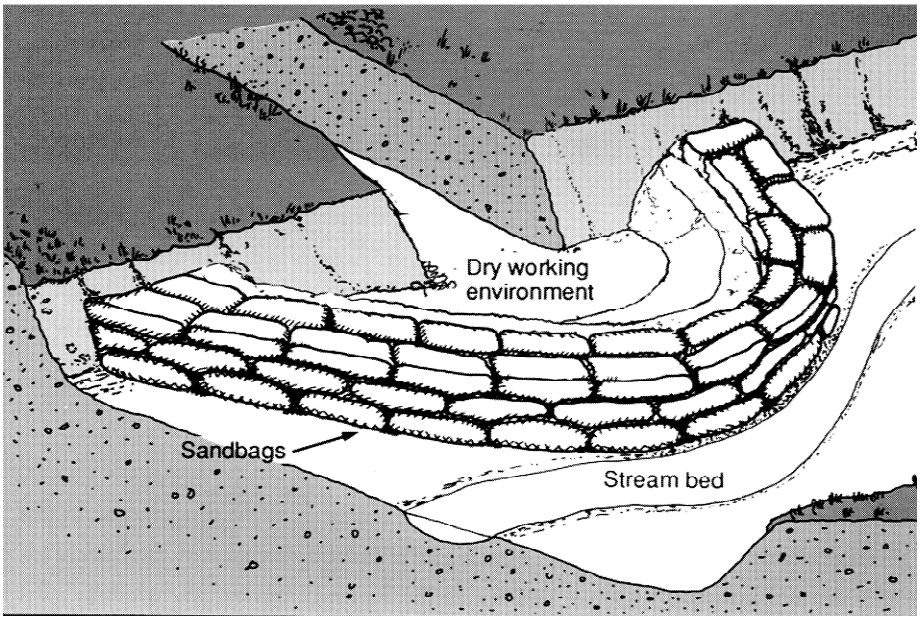


Composite Silt Curtain, (EPA 2004) Composite silt curtains may be constructed of materials such as plastic mesh encasing combed synthetic fibres. A line of composite silt curtain may be installed across a water body.

9.5.4 Composite silt curtain

Composite Silt Curtain, (EPA 2004,) Trapped Sediment Visible on a Composite Silt Curtain (Silt Cell) During Low Flow Conditions

9.5.5 Stream Diversion



Stream Diversion, (ACT, 2007)

9.6 Horizontal Direct Drilling (HDD) near waterways – suggested measures

HDD has a number of issues that have a high level of potential to cause impact to the environment, particularly when the works are done close to a waterway. These include the management of topsoils and subsoils, mud and contaminated water. The underlying geology of a site also has the potential to impact upon ability to drill through a site and the potential for a high level of environmental damage through fracturing.

To mitigate the potential impacts from HDD the following measures should be implemented:

- Underlying geology understood. Look for rock outcrops or sandy soils in the waterway.
- Entry and exit holes (Bellholes) should be constructed away from the bank of the waterway.
- Soil managed as per section 12 below.
- Subsoil from bellholes formed into a Turkey nest (mounded with a crater in the top) to allow for the storage of contaminated water on site.
- The works area to be bunded to prevent the movement of soil and water into the waterway.
- Mud from the bore hole to be kept separate from the other soil.
- All water to be discharged into the turkey nest or other storage facility. No water should be discharged to the immediate environment.

10 Water Quality Monitoring

Any water discharged to a stormwater drain will eventually flow into surface waters (for example. rivers, creeks, lakes). Whether water is discharged directly to surface waters, or reaches surface waters indirectly via stormwater drains, the quality of water discharged needs to be carefully managed to minimise impacts.

Some sites may require testing of water before discharge, and the following are common water quality parameters to monitor.

- **Turbidity (NTU)** tests for clarity of the water. This will indicate the amount of sediment being discharged into surface waters.
- **pH** indicates the amount of acid in water. This may be most relevant for concreting works, exposure to acid-sulfate soils or the use of flocculants.
- **Total dissolved solids** (**TDS)** may suggest the presence of groundwater in the discharge.

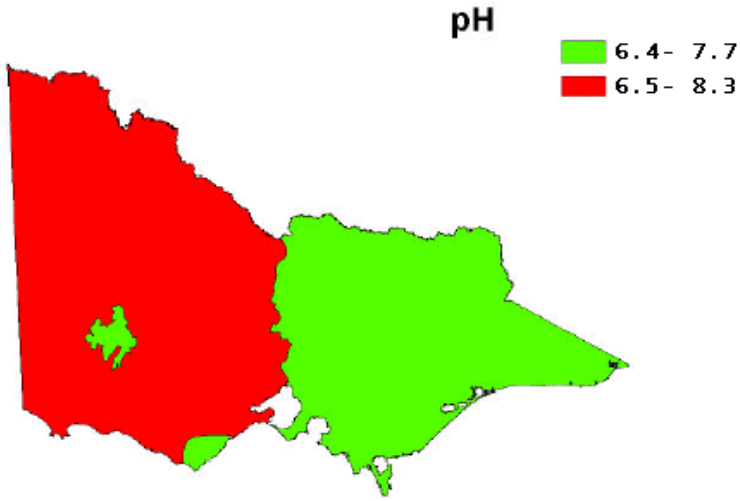
To be able to minimise the impacts of discharges, it is important to understand the condition of the water environment that you are discharging into. The current condition of surface waters varies across Victoria, so some discharges will need to be of a higher quality than others. To find out about the current condition of surface waters you can look to water quality monitoring data. This may be already available (for example from Melbourne Water or EPA), or in some cases may have to be measured. You may need to obtain expert assistance to obtain information on, and/or measure the condition of surface waters, and the potential impact of your discharges on receiving waters.

Understanding the surface waters will provide information on the type of treatment needed to make sure that water is of acceptable quality for discharge. EPA will always require the adoption of best practice management techniques to ensure that surface waters are protected (for example water to be discharged should be free of foams, scums, odours, sheens or oil on the surface, unusual colour or concrete slurry prior to discharge). EPA Victoria's *Environmental Guidelines For Major Construction Sites* (EPA Publication 480) states that water exceeding 30 NTU must be treated, so that the turbidity is 30 NTU or less during discharge. The exception is where the receiving waters has a turbidity of less than 30 NTU (for example surface waters in less developed areas). In this circumstance a higher level of treatment is required to ensure the protection of surface waters as specified in State Environment Protection Policy (Waters of Victoria).

State Environment Protection Policy (Waters of Victoria) provides Victoria's framework for the protection of surface waters. It sets environmental quality objectives for parameters such as turbidity, pH and nutrients. These environmental quality objectives vary across Victoria because the condition of surface waters varies across Victoria. If these environmental quality objectives are not met, this indicates an environmental risk to surface waters.

For example, for all surface waters east of the Campaspe/ Goulburn, Maribyrnong/ Yarra, and Maribyrnong/ Goulburn catchment boundaries, and the Grampians and the Otways, the pH should remain between 6.4 and 7.7. If monitoring of surface waters in these areas indicates that the pH is outside of this range, then the uses and values of these surface waters may be at risk.

For all areas west of the Campaspe/ Goulburn, Maribyrnong/ Yarra, and Maribyrnong/ Goulburn catchment boundaries, excluding the Grampians and the Otways pH needs to be between 6.5 and 8.3 to protect the uses and values of these water environments.



Victorian pH Ranges for Discharge (Victoria Government Gazette, 2003)

In order to demonstrate that you are managing discharges from your site adequately and that any water discharged is of a suitable quality, you will usually need to undertake water quality monitoring.

Constructing a suitable water quality monitoring program for this purpose:

- May require specialist advice.
- Will often vary depending on the type, stage and risk associated with a particular part of construction works, and.
- May need to be approved prior to construction commencing (check contractual or permit requirements).

This water quality monitoring program should be included as part of a site environmental management plan or equivalent.

Adopting the approach outlined in this section should allow you to satisfy contractual and regulatory requirements, and will complement the many management activities underway to maintain and improve the health of surface waters across Victoria.

11 Dust Control

Dust has the potential to result in; detrimental effects on the health and amenity of neighbours and employees, reduced visibility, increased wear on machinery and equipment, pollute water, complaints from neighbours and OH&S issues.

Prevent the generation of dust in preference to applying dust suppression measures.

11.1 Water used for dust control – special conditions

- For **recycled water,** use water treated to **class A** standard where possible.
- Recycled water treated to class B, or C will have environmental and health implications, and special controls must be implemented before and during use.
- As a suggested contingency plan; for areas that do not have access to a reticulated water supply, water stored on-site should never be less than 2,000 litres per hectare of disturbed land surface.
- Ensure water use does not create contaminated run-off that will contaminate surface waters.

11.2 Dust control - suggested measures of management

- Retain existing vegetation; -ensure that the area of cleared land is minimized (see 11.2.1 below).
- Grassing exposed areas including stockpiles, use native grass, domestic species or sterile rye where appropriate (see 11.2.2 below).
- Mulch areas using wood chips or straw.
- Progressive revegetation (see 11.2.5 below).
- Avoid driving over stockpiled topsoils.
- Roughen surface of exposed soil with a plough to reduce wind speed across the surface (See 11.2.4 below).
- Employ a paved parking area.
- Exits and high traffic areas should be paved with gravel.
- Spray water on exposed areas with water carts, sprinklers and hand held hoses (ensure no runoff to water ways) (see 11.2.6 below).
- Use dust suppressant products to form a crust on exposed areas.
- Cover all loads of soil being taken off site for disposal.
- Restrict vehicle movement.
- Restrict earthworks and vehicle movement activities during dry windy conditions.
- Stabilisation/erosion control matting on exposed areas (see 11.2.3 below).
- Cover stockpiles and locate them where they are protected from wind.
- Construct wind breaks such as wind fences using shade cloth.
- Stop work may be necessary in dry windy conditions due to effects on neighbours.

11.2.1 Retain existing vegetation; -ensure that the area of cleared land is minimized

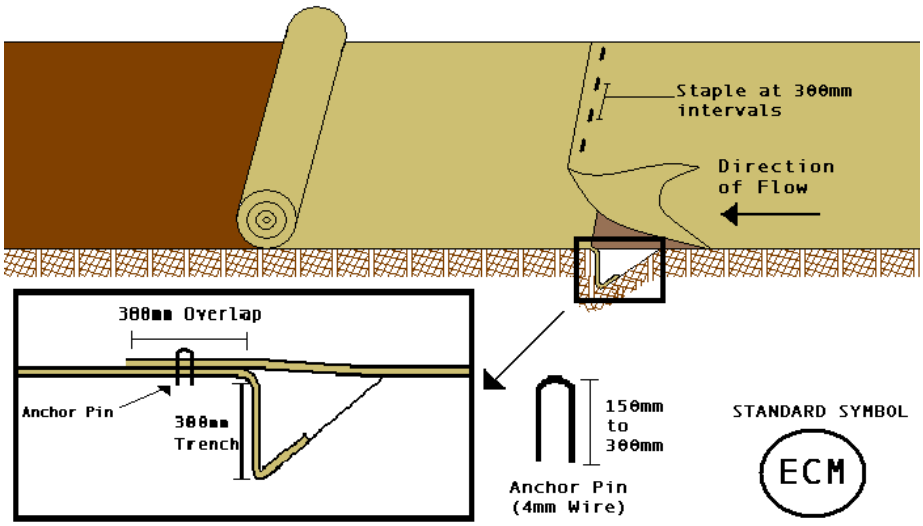
Retain Existing Vegetation (EPA, 2004)

Minimal land disturbance to prevent dust and other kinds of erosion.

11.2.2 Grassing

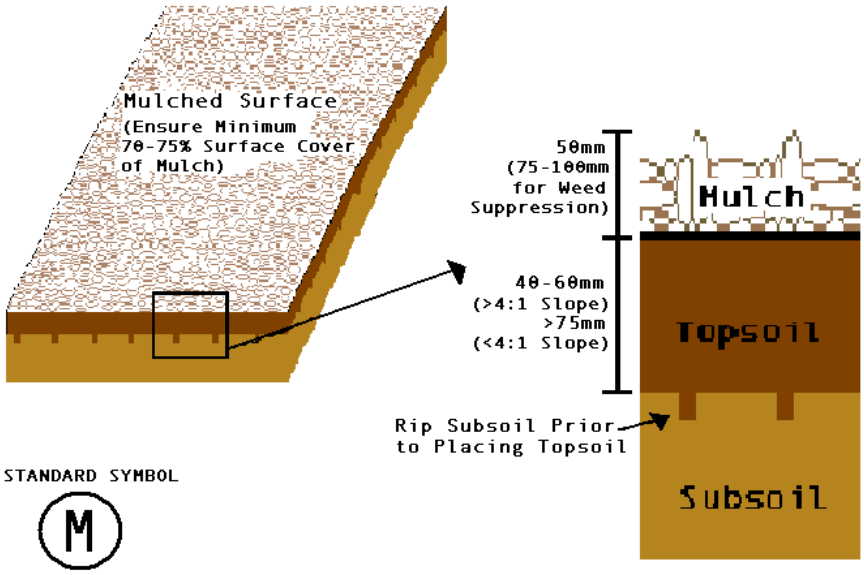
Hydro seeding, image courtesy of Aquaseeding.

11.2.3 Stabilisation/erosion control matting



Stabilization matting, from NSW Dept. of Housing, 1998

11.2.4 Roughen surface of exposed soil with a plough.



Mulching and roughening subsoil before rehabilitation. (NSW Dept. of Housing, 1998)

11.2.5 Progressive revegetation

Re-vegetation after construction.
(EPA, 2004)

11.2.6 Spray water (ensure no runoff to water ways)

Water cart spraying water to suppress dust. (EPA, 2004)

12 Topsoil Management.

The careful management of topsoil is one of the keys to obtaining a high level of success in the rehabilitation of works sites.

12.1 Top soil management- suggested measures

- Topsoil should be stripped from all works sites and windrowed.
- In areas of high environmental significance (waterways, areas of native vegetation) the organic layer of soil should be stripped prior to topsoil removal. This is usually the top 50 mm of soil but may range up to 150 mm.
- Stockpile height should be less than 2 m for top soil.
- Any grass or tufted vegetation should be slashed at least a week prior to the removal of the topsoil, to reduce the amount of vegetative material in the soil. This allows for better reinstatement of the site.
- Subsoils are to be windrowed or stockpiled separately from other soil layers.
- The mixing of topsoils and subsoils should be avoided at all times.
- Soils should only be removed immediately prior to the start of works.
- Soils should be reinstated as soon as practical to the finish of works. For lineal infrastructure in most cases this is within 3 days.

13 Stockpile and Batters management

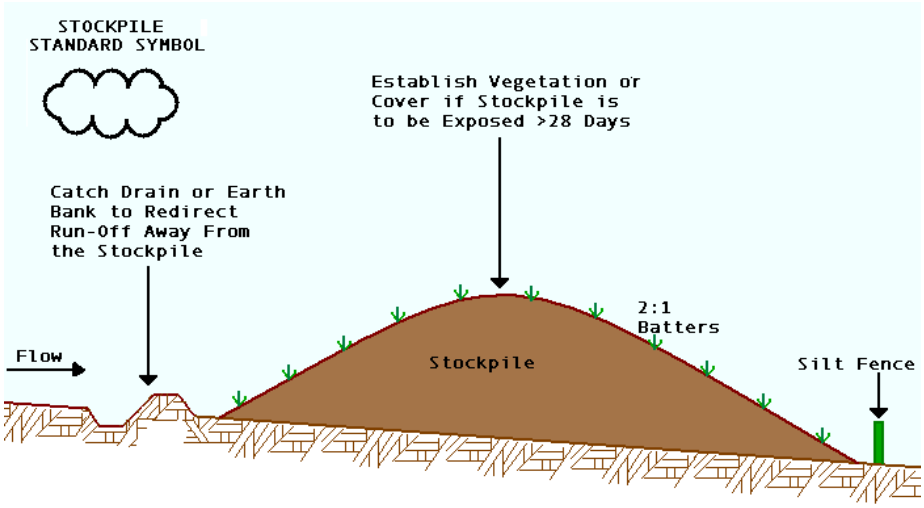
Stockpiles and batters are a potential source of dust and sediment run-off.

13.1 Stockpiles and batters - suggested measures

- Locate stockpiles away from drainage lines to where they are protected from wind.
- Locate stockpiles at least 10m from waterways where possible. This situation requires excellent control measures to prevent runoff.
- Locate stockpiles at least 2m from vegetation.
- Ensure stockpiles will not be driven over as part of construction works.
- For topsoils, retain the top 50mm to 150mm (as a guide) as it contains the most organic component of the topsoil.
- Minimise the number and size of stockpiles.
- Keep topsoil separate from subsoil stockpiles.
- Construct the stockpile with no slope steeper than 2:1 (horizontal to vertical). A less steep slope may be required where the erosion risk is high.
- Mulch, roughen and seed with sterile grasses any batter or topsoil stockpile which is to be maintained for longer than 28 days.
- Treat subsoil stockpiles in the same way, but check whether they need a layer of topsoil to provide a media for grass seeds before seeding.
- Circle all unstabilised stockpiles and batters with silt fences or a drainage system that will collect and correctly dispose of contaminated water (see 13.1.1 below).
- Hand water or install temporary sprinklers to suppress dust from unstabilised stockpiles and batters.
- Finish and contour any stockpiles located on a floodplain so as to minimise loss of

material in a flood or rainfall event.

13.1.1 Catch drain upslope of stockpile silt fence downslope



Stockpile Protection
(Stormwater Committee, 1999)
(EPA, 2004)

14 Noise and Vibration

14.1 Managing noise – suggested measures

Different EPA guidelines apply depending on the place where works are done.

The type of site where activities occur, **residential developments, existing roads, or industrial and commercial developments,** will determine which EPA guidelines apply. This section summarises the relevant guidelines.

For a residential site, see the EPA guidelines "Noise From Large Residential Subdivisions or Urban Developments", Publication 1264 (Summary in table14.1.4 below).

For most other civil construction, including road works, commercial and industrial sites follow the EPA guidelines "Noise Control Guidelines" Publication 1254 (see tables 14.2 and 14.4 below). There are guidelines for “Construction and Demolition Sites” and “Road Repair and Track Maintenance.”

For major road and infrastructure projects follow the EPA guideline “Environmental Guidelines for Major Construction Sites” publication 480. These Major projects should follow a risk management strategy, which will guide the site’s work hours and noise controls.

14.1.1 General measures.

- Restrict working hours to those under relevant EPA guidelines or legislation.
- Check with local councils in case a local law restricts hours of work.
- Where possible, schedule noisy activities for the less sensitive time of mid morning to afternoon.
- Use noise barriers – such as earth embankments or any solid barrier, between works and neighbours who may be affected by noise.
- Locate noise generating works away from neighbours.
- Inform neighbours a week in advance of particularly noisy periods of works (such as rock breaking) or out of hours works – letter drops & signage.
- Consider providing periods of respite for noisy work that impact on neighbours.
- Follow a complaint response procedure.

14.1.2 Notification and managing impacts:

- Under some guidelines, work outside of the standards hours is allowed in limited circumstances.
- Where night works are required, and permitted under the relevant guidelines, you must notify all affected premises in the residential area of the intended work, its duration and times of occurrence.
- Provide contact details, including for the relevant site manager during the time of work.
- Disturbing noise at night can carry for a significant distance. You may need to notify people in the block(s) around the activity, not just directly adjacent neighbours.
- Notification needs to be done as early as possible, to give people time to prepare for the

noise, and make alternative arrangements.
- In some cases, you may need to provide temporary accommodation for highly impacted residents who can't make alternative arrangements (for example, a family with young children, or where the noise continues for many nights).

14.1.3 Vehicles and equipment

- Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications.
- For new purchases, choose quiet plant & equipment.
- Equipment should be regularly serviced.
- Retro fit older equipment with new mufflers or noise attenuation.
- Select less noisy equipment for noise sensitive locations.
- Include lower noise reversing alarms (such as 'broadband' or 'smart' alarms) – these can be installed under OHS procedures.
- Avoid truck queuing near residential areas and minimize reversing.
- Maximise equipment distances from residences.

14.1.4 Large Residential Subdivision and Construction

For residential subdivision work, construction noise is not permitted to be audible at homes before 7am weekdays. This includes site preparation noise.Construction noise is generally not permitted before 9am Saturdays from these sites.

However, for large residential subdivision infrastructure work in 'growth areas' and greenfield sites at the fringe of Melbourne and outside of the Melbourne metropolitan area, some noise may be allowed on Saturday mornings between 7 and 9am. See below for work requirements.

The earlier start allows for road & infrastructure construction. Once the road servicing is complete the 9am noise restriction applies.

These special rules apply to Urban Growth Zones, and undeveloped sites at the Melbourne Metropolitan Fringe and rural centres.[1] For more detailed information refer to the EPA guideline "Noise From Large Residential Subdivision or Urban Development Sites" or use the CCF link; http://www.civilcontractors.com/victoria/environment/noise/

14.2 Road repair & track maintenance (EPA, 2008)

Working hours
7 am - 6 pm Monday to Saturday 9 am -6 pm Sundays Emergency work may occur outside these operating hours. If other work must be scheduled outside of these times, see notification points above.

[1] These areas include Brimbank, Casey, Cardinia, Caroline Springs, Frankston, Greater Dandenong, Hume, Kingston, Knox, Manningham, Maroondah, Melton, Mornington Peninsula, Nillumbik, Whittlesea, Wyndham

14.3 Residential Subdivision or Urban Development Sites

Working hours	Permitted Noise Levels and Distance from residences
Before 7 am	Noise from construction equipment is prohibited
7 am - 6 pm Monday to Friday 9 am -1 pm Saturdays	Noise from construction at any residential premises must not be unreasonable. Follow appropriate work practices and notification procedures.
Special provisions for Saturday morning work (qualifying sites only) 7am – 9am Once the road servicing the future residential premises is complete, the standard 9 am noise restriction applies. *(Regulation 7(3)(b), regulation 8(3).)* "Growth Areas" includes, Brimbank, Casey, Cardinia, Caroline Springs, Frankston, Greater Dandenong, Hume, Kingston, Knox, Manningham, Maroondah, Melton, Mornington Peninsula, Nillumbik, Whittlesea, Wyndham	**Buffer distances from residences and equipment restrictions** **0 -35m** No equipment may be used **35-200m** The following equipment may be used • Earthmoving machines such as graders and excavators. • Concrete trucks. • Self propelled, single drum vibrating rollers. • Non vibrating compaction machinery. **Greater than 200m** Most other machinery may be used including • Impacting, vibrating or rotating implements. • All types of compacting equipment. • Jackhammers, drills. **Pile drivers must not be used before 9am** **Permitted Noise Levels.** Noise from construction at any residential premises must not be unreasonable.
Sundays	Noise from construction equipment not generally allowed.

14.4 Industrial and Commercial Construction and demolition site noise limits (EPA, 2008)

Working hours	Permitted Noise Levels
7 am - 6 pm Monday to Friday 7 am -1 pm Saturdays	Noise from construction at any residential premises must not be unreasonable. See the guidelines for appropriate work practices.
Weekend / Evening Work Hours 6-10 pm Monday to Friday 1-10 pm Saturdays 7 am -10 pm Sundays and public holidays	Noise from construction at any residential premises not to exceed background noise by: 10 dB(A) or more for up to 18 months after project commencement 5 dB(A) or more after 18 months project commencement
Night Work Hours 10 pm - 7 am Monday to Sunday	Noise from construction must be inaudible within a habitable room of any residential premises

Notes:
1. Where work is conducted out of usual work hours there is greater risk of environmental impacts, and more controls and notification are required.
2. Noise restrictions may not apply for 'unavoidable works' defined in the guidelines. See the *Noise Control Guidelines* publication 1254 for more detail.

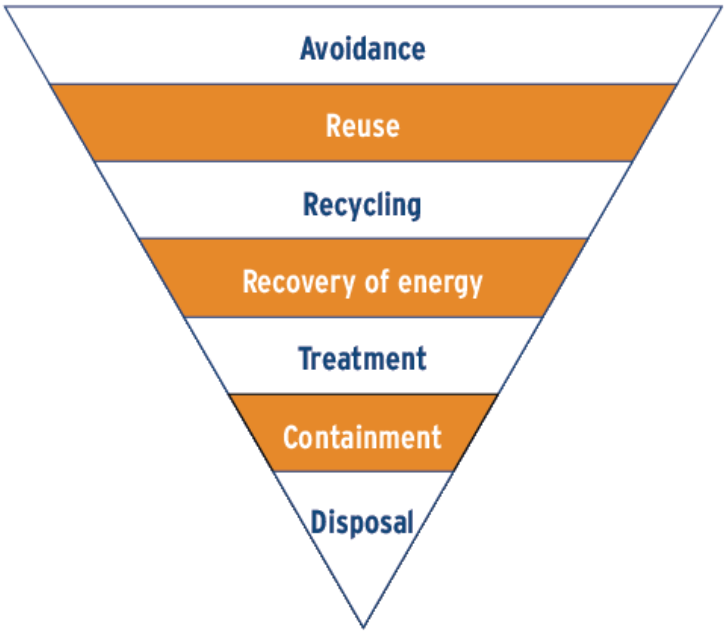
14.5 Vibration control – suggested measures

- Impact pile-driving conducted at distances greater than 50 metres from existing structures to avoid damage.
- Blasting to be a minimum of 100 metres people to minimize air vibration.

15 Waste Management

Use the following hierarchy for waste management, with avoidance being most preferred and disposal least preferred.

To identify opportunities for improving waste management it is necessary to consider all aspects of the project and the wastes it generates. Wherever possible, include performance measures and targets for avoidance, reuse and recycling options in site environmental management.



Waste management hierarchy

Effective waste management shows environmental responsibility and can result in huge cost savings. Avoidance is most cost effective and disposal is least.

15.1 Waste minimisation – suggested measures:

15.1.1 Avoidance and reduce

- Use recycled materials.
- Obtain construction materials, paints, lubricants and other liquids in reusable packaging or containers.
- Don't over order materials.
- Negotiate with suppliers to take back any materials that are not used.
- Use prefabricated materials.

15.1.2 Reuse

- Appropriate reuse of contaminated soil on site.
- Use subsoil to construct temporary noise barriers.

- Appropriate use of water out of sediment dams for dust suppression.
- Appropriate reuse of fill material.
- Clean topsoil may be retained at the end of earthworks. The top 150 mm contains valuable organic components to assist revegetation.
- Safety, survey and other equipment should be collected and reused on other sites or future stages.

15.1.3 Recycling

- Choose noise barriers and sediment controls made from recycled materials.
- Send waste concrete from demolition activities to a concrete recycler instead of landfill.
- Segregate and recycle solid wastes generated by construction activities, offices and mess-rooms.
- Collect lubricating oil from the construction vehicle fleet and arrange for collection by a recycler.
- Where possible select products for purchase that have been produced from recycled materials. For example recycled crushed concrete may be appropriate for use on subdivision sites as aggregate for road base.
- If trees need to be removed, mulch for use on site.

15.1.4 Recovery of energy

- Some waste oils that can't be recycled have high calorific value and can be collected by a licensed vehicle or taken to a licensed facility to be blended into fuel.

15.1.5 Treatment

- Waste that cannot be avoided, reused or recycled may need to be treated or stabilized before sending off site.

15.1.6 Containment

- Short term storage of used oils in a bunded area.
- Short term storage of other materials, including soils, until solutions become available.

15.1.7 Disposal

- Wastes that have no other option must be transferred to an appropriate landfill licenced to receive that waste (industrial waste, prescribed waste, including contaminated soils).
- Vehicles must be permitted for transporting prescribed industrial waste.

15.2 Clean fill soil

Clean fill is;

- Soil consisting of clay, silt, sand, gravel and rock of naturally occurring materials, and

- DOES NOT contain chemical substances in concentrations more than “fill material” as defined in EPA Victoria guideline Soil Hazard Categorisation and Management, table 2. see the following link; http://www.epa.vic.gov.au/waste/industrial-waste-guidelines.asp
- DOES NOT include any other materials such as concrete, brick, pipe, plastics, metal pieces wood or organic matter.
- An assessment of soil, including site history will determine whether the soil material has been contaminated as a result of industrial, commercial, construction or agricultural activities, or contaminated with manufactured chemicals.
- Soils that have elevated level of metals (such as arsenic) or other constituents, that can be demonstrated to be of natural origin, these soils may be classified as fill material. Approval from EPA is required for these cases.

When using clean fill:

- Assess the risks (air, land and water) at the receiving site (eg risk of dust and risk to surface water through erosion).
- Seek authorisation from local council to receive, and store, clean fill soil.
- EPA recommends fill material generators and receivers should collate the same information as a site receiving contaminated soils. This provides certainty and evidence that they are only receiving fill material.
- A range of reuse options may be available for soils containing contaminants in concentrations exceeding fill material criteria, especially for Category C contaminated soil, due to the relatively low level of risk posed by these soils, provided appropriate management controls are implemented.
- Exemptions may be granted by EPA where the proposal is for genuine substitution of another resource. Environmental management plans to prevent unacceptable risk of damage to the environment will be required as a condition of an exemption.

15.2.1 Clean Fill

This soil may be clean fill, because it is does not have any construction waste such as concrete or brick. However, soil tests may be required, to determine if there is dissolved metals, or chemical compounds that may be harmful to people or the environment.

15.2.2 Dumping

This soil is **NOT** clean fill. This soil may be **disposed** to a licensed land fill or **treated** to clean fill standard.

If this soil was disposed at a place other than a licenced land fill, then that action would be a dumping offence and subject to penalties.

Construction waste of concrete, bricks, pipe and organic matter must be removed for clean fill classification. Chemical testing may also be required.

15.3 Solid inert wastes

Solid inert waste found on construction sites usually consists of building rubble, but may also include demolition material, concrete, bricks, timber, plastic, glass, metals, bitumen and trees. Such wastes should be recycled, or disposed to a landfill licensed to take such wastes. Designate a stockpile area or use a skip to store solid waste until a sufficient amount has accumulated for removal.

15.4 Washings, residues, slurries and other water contaminated by wash up

Wash up materials including drilling tailings, concrete, paint and brick cutting slurry in a designated area.

Washings/ slurry from concrete trucks is frequently the key material that requires a disposal area on a civil construction site. Run-off contaminated with concrete is of environmental concern as it is alkaline. Designate an area on site for concrete trucks to be washed out with the following characteristics:

- The area should be located away from drainage lines, stormwater inlets, waterways, areas of significant flora and fauna and other sensitive areas identified on site.
- The area should be appropriately bunded to contain all contaminated water from washing up.
- Placing this area near the site exit will encourage drivers to use it due to accessibility (i.e. they must pass it on the way out). It may be necessary to notify the concrete supplier to inform his drivers of the presence of the wash out area. It is often impractical

to inform every driver that comes on site.

- It may be necessary to sign the area for easy identification by subcontractors.
- Small amounts of concrete washings/slurry may be placed on an impervious liner until the water evaporates. Concrete residue may then be disposed of as solid waste. (VSAP Building Construction Sites Project Group, 2003).

In the event that painting, brick cutting or other items require wash up, resulting in contaminated run-off, the designated area can also be utilised.

15.4.1 Concrete Washout Area

Concrete Washout Area, (EPA 2004,) This photo shows a pit surrounded by a sediment fence to contain wash. The residue can be collected for recycling.

15.5 Litter

Litter is often caused by thoughtlessness and the unavailability of suitable litter bins on the construction site.

To ensure that all litter is disposed of in a responsible manner, and is not released into the environment the following measures are suggested.

- Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter.
- Provide bins for construction workers and staff at locations where they consume food.
- Ensure that all bins and disposal facilities have correctly fitting secure lids to prevent material blowing away or being accidentally tipped out.
- Site inductions to emphasize the need to avoid littering.
- Reinforce the understanding that cigarette butts are litter and need to be disposed of correctly.
- Install fencing about the site to trap wind-blown litter.

15.6 Contaminated soils

Often construction sites were once old industrial sites (see 1.4.2). Uncovered land may be contaminated. When this occurs contaminated material or soil may need to be treated and reused or removed.

Contaminant types

Soil contaminants can include heavy metals, hydrocarbons, and various chemicals or asbestos that can be hazardous. The treatment method adopted will depend on the type and amount of contaminant. A comprehensive sampling and analysis program is essential to determine how to manage the contaminants. Sampling should also ascertain odour levels, (e.g. presence of methane if an old tip), groundwater levels and leachate quality.

Surrounding areas, that may be at risk of potential spread of contaminated material, should also be protected (e.g. water bodies, residents and adjacent land).

Remediation management

- The fundamental goal of contaminated site cleanup should be to render the site acceptable and safe for long-term use and to maximise its potential future uses.
- Whenever human health is at risk, either onsite or offsite, or the environment is at risk, a site should be cleaned up to the extent necessary to minimise such risks in both the short and long term.
- Soil treatment prior to reuse will require specialist advice and services from, environmental consultants and/or, laboratories (NATA accredited) and EPA Victoria.
- Contaminated site management strategies should protect all segments of the environment and avoid transferring contaminants from soil to air or water.
- The potential for contamination to harm the health and well-being of the community and its structures and service conduits must be considered. Some Australian cities and towns rely on groundwater for domestic use and particular care must be taken to protect groundwater.
- If there is no threat to human health or the environment, it may be appropriate to clean up the site less thoroughly, to contain the contaminants onsite or use planning controls to limit site use. Technical feasibility and the net social benefit of cleaning up a site need to be taken into account.

(ANZECC/NHMRC, 1992)

Guidelines and soil categorisation

For disposal, contaminated soils must be categorized as Category A, B or C. Category A is the highest contamination level and cannot go to landfill. To view EPA Victoria guidelines for;

- Contaminated soil.
- Soil Sampling.
- Soil Hazard Categorisation and Management.

- Direct and Secondary Beneficial Re-use.
- Permit for Transport of Industrial Waste.
- Asbestos Transport and Disposal.
- And other Prescribed Industrial Waste guidelines.

Go to the CCF Victoria Environment webpage. Go to the Contaminated Soil page and click on Industrial Waste Resource Guidelines

http://www.civilcontractors.com/victoria/environment/contaminatedsoil/

15.6.1 Former industrial sites where contamination is likely;

- Airports.
- Asbestos production/ disposal.
- Asphalt manufacturing.
- Battery manufacturing/recycling.
- Bitumen manufacturing.
- Breweries/ distilleries.
- Brickworks.
- Chemical manufacturing/ storage/ blending.
- Cement manufacture.
- Ceramic works.
- Coke works.
- Compost manufacturing.
- Concrete batching.
- Works depot.
- Defence works.
- Dry cleaning.
- Electrical/ electrical components manufacture.
- Electricity generation/ power station.
- Electroplating.
- Explosives industry.
- Fibreglass reinforced plastic manufacture.
- Foundry.
- Fuel storage depot.
- Gasworks.
- Glass manufacture.
- Iron & steel works.
- Landfill sites/ waste depots.
- Limeworks.
- Metal smelting/refining/finishing.
- Mining and extractive industries.
- Oil or gas production/refining.
- Pest control depots.
- Printing shops.
- Pulp or paper works.
- Railway yards.
- Shooting or gun clubs.
- Scrap metal recovery.
- Service stations/fuel storage.
- Sewage treatment plant.
- Spray painting.
- Tannery (and associated trades).
- Textile operations.
- Timber preserving/ treatment.
- Tyre manufacturing.
- Underground storage tanks.
- Utility depots.
- Waste treatment/ incineration/ disposal.
- Woolscouring.
- Chemical & Fuel storage.
- Underground tanks (if recently installed and no evidence of leaks).
- Market gardens.
- Waste disposal.
- Filling (imported soil).
- Other industrial activities (such as warehousing of chemicals that may be spilt during loading or unloading).

(DSE, 2005)

15.7 Offsite disposal of contaminated soil

15.7.1 Offsite disposal of contaminated soil – suggested measures

- Arrange for soil samples to be analysed prior to disposal by an environmental consultant or laboratory (NATA accredited). Testing should assess leachability and should be conducted for metals, chemicals, hydrocarbons and asbestos.
- Provide a summary report of the analysed soil to the receiving landfill 24hrs before delivery.
- Excavate material in a manner which avoids off-site environmental problems, to ensure that there is no off-site effect now or in the future. Take care handling prescribed wastes, so that they do not pose a health risk to workers.
- Transport the waste soil using an EPA Licenced Vehicle. Use the Prescribed Industrial Waste Data Base to find a licenced vehicle in your area http://www.civilcontractors.com/victoria/environment/wastemanagement/ .
- Dispose of contaminated material in the closest landfill licensed to take the type of contaminated material or wastes uncovered.

16 Air Quality

To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment.

16.1 Air quality - suggested measures

- Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications.
- For dust control measures refer to the dust section above.
- Smoke from internal combustion engines should not be visible for more than 10 seconds for all vehicles.

17 Storage of Chemicals and Fuels

Chemical spills on site have the potential to contaminate (pollute) land, surface water and groundwater. The pollution may be harmful to the health of human beings, harmful to flora and fauna and detrimental to beneficial use of land and waters. The environmental protection measures outlined in this section may be used to mitigate these effects.

17.1 Storage area

Chemicals and fuels should always be stored in an area where spills can be contained and safely removed without causing any environmental damage.

Chemicals and fuels should be located away from drainage lines, stormwater inlets, waterways, areas of significant flora and fauna and other sensitive areas. When designing chemical and fuel storage areas, the gradient of the site and the potential flow pathways to the sensitive areas should be taken into account. As an absolute minimum, chemicals and fuels should be stored at least 10 m away from any sensitive areas.

17.2 Bunding

Bunding provides a secondary containment measure in the event of a spill.

Bunded areas should have the following characteristics:

- Materials should be impervious to and compatible with the chemicals to be contained.
- The floor should be graded towards a sump to enable collection of spilt material.
- Incompatible chemicals should not be stored together in the same bunded area.
- The area should be covered where possible to minimize ingress of rainwater.
- Where the area is not covered the bund height should be greater than150 mm.
- The capacity of a bunded area containing tank/s should be sufficient to hold 100 per cent

of the capacity of the largest tank, plus 10 per cent of the capacity of the second largest tank.

- The capacity of a bunded area for refuelling should be 100 per cent of the largest compartment of any tank vehicle using the facility.
- Ramps or roll-over bunds should be used where vehicle access is required into the bunded area to maintain effective bund height.
- Run-off should be diverted away from the bunded area and any ponding in the bunded area should be regularly disposed. (EPA ,1992).

Earth bunds are often utilised due to their cost effectiveness and ease of construction. However, in the event of a spill the spilled liquids must be quickly cleaned up with absorbent materials to ensure the spilt material does not leach into the groundwater and contaminated soil within the bund must be disposed of or treated. Other bunding material (i.e. concrete, steel, rubber) may be used, dependant on type of stored liquids and site limitations.

Lightweight, portable bunds may be useful for multi-stage sites requiring an impervious bunded area. They can be easily moved to different locations as site works progress, without incurring costs of constructing permanent bunds. Portable bunds must be stored on level ground when not in use so as not to compromise the bund capacity.

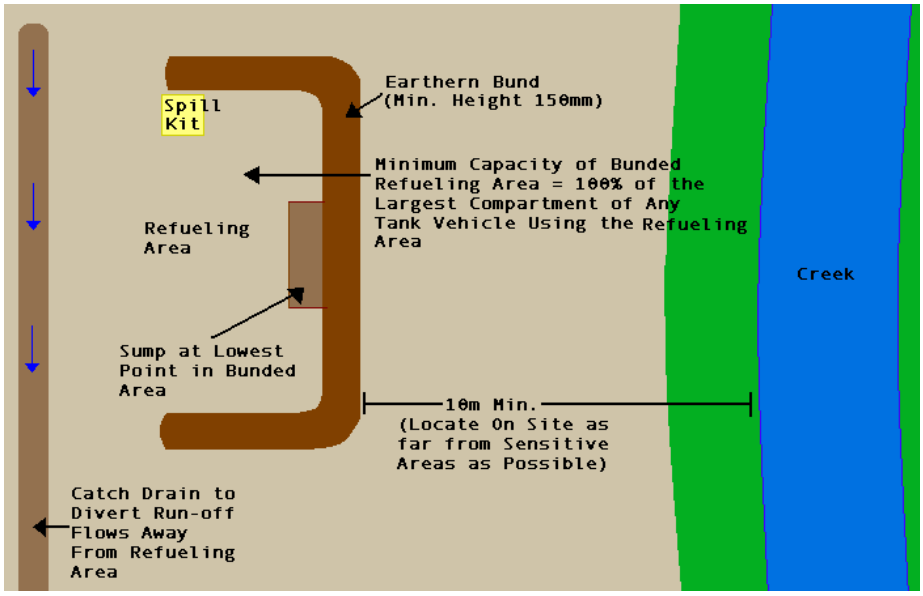
17.3 Impervious liners

Impervious liners for bunded areas ensure that spills are contained and do not contaminate underlying material (i.e. soil).

The selected liner material must be chemically resistant to the stored liquids.

17.4 Refuelling / Maintenance areas

17.4.1 Designated refuelling/ maintenance area



Designated refueling area, (EPA, 2004)

On sensitive sites it may be necessary to designate a specific refuelling/ maintenance area. The control measures outlined above for chemical storage relating to location, bunding and impervious liners may also be applied for designated refuelling/maintenance areas.

17.5 Mobile refuelling

It may not be practical for some sites to have a designated refuelling area. In these cases as a minimum ensure that:

- Refuelling does not take place near drainage lines, stormwater inlets, waterways, areas of significant flora and fauna and other sensitive areas identified on site.
- Portable bunds are used to contain any spills from transfer pumps, valves and hose connections.
- A suitable spill kit is kept on the fuel truck or the site spill kit is kept within 10m of refuelling activities.

17.6 Spill cleanup

- Clean up all spills immediately to ensure that:
  - the contamination is not spread around the site increasing volume of contaminated material; and
  - the spilt material does not infiltrate into the ground and contaminate the groundwater.

17.7 Spill kits

- Spill kits should be kept on sites where chemicals will be stored.
- The spill kit should be kept approximately 10 m away from the chemical storage area so that it is accessible in the event of a spill, but safely out of the range of spills.
- Common components of spill kits include; booms, pads, pillows, socks, rolls, floor sweeps, gloves and disposal bags. These items may be contained in wheelie bins, bags, buckets or drums.
- Different spill kits are designed to absorb different materials. Ensure that the spill kit selected for the site is designed to treat the types of chemicals that are stored on that site.
- If a fuel truck without a spill kit on board is periodically on site, the site spill kit should be kept within 10m of the fuel truck while it undertakes refuelling activities. As a general rule it is far easier to keep a spill kit on the fuel truck, than to transport the site spill kit around when a fuel truck is on site.

17.7.1 Training of staff in event of spill

A minimum of two people on site should be trained to act in the event of a spill and should be made familiar with:

- The types of chemicals stored on site and their appropriate methods for clean up if spilt.
- Location and content of the Material Safety Data Sheets (MSDS).
- Components and appropriate use of spill kits and clean up measures if a spill kit is not used.

- Whom to contact in the event of a spill which could not be contained and may cause pollution.
- Methods of disposal of spilt materials.
- Incident reporting.

17.8 Disposal of material affected by spills

Where possible collect and reuse spilt materials. Where this is not practical or if the material is contaminated, collect the spilt material, any material used to absorb the spill and any soil or other materials contaminated by the spill and dispose of these in accordance with the Waste Management section above.

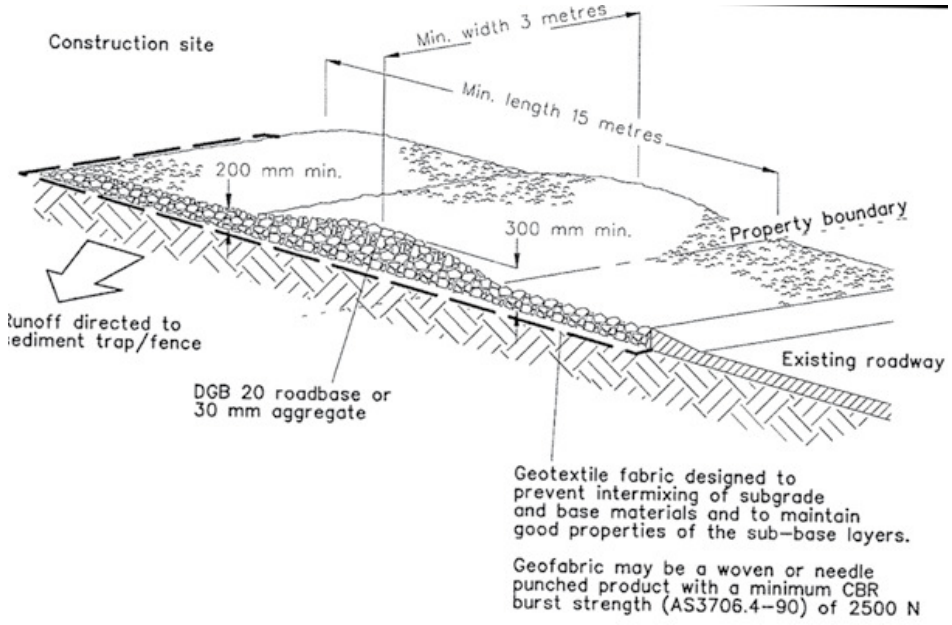
18 Road Cleaning

Vehicles moving on and off the site can deposit soil off the site on the roads.
Prevention of soil being deposited on roads is preferable to cleaning them afterwards.

18.1 Keeping roads clean - suggested measures

- Restrict the number of site access points.
- Restrict access on and off site particularly during wet conditions.
- Employ a paved parking area.
- Install wheel washes and rumble grids at all main road crossings. In wet weather it may be necessary to hose mud off vehicle wheels as they traverse the grid. Placing rumble grids under water will increase their performance efficiency. This can be achieved by excavating a shallow pit, placing the rumble grids in the pit, then filling the pit with water. Rumble grids should be followed by stabilised material, to ensure that vehicles do not pick up mud leaving the site. Remove sediment from the wheel wash as required.
- Exits should be paved with gravel. Top dress these paths as required see 18.1.1 below.
- Sweep roads at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site. Care should be taken to ensure that road sweeping does not give rise to dust problems. Where street sweepers are used to clean the road, ensure that the kerb and gutter, and stormwater inlets are also cleaned. Street sweepers often miss these areas.
- Install road sediment controls.
- Cover all loads of soil being taken off site for disposal.

18.1.1 Stabilised Access Point,



Stabilised Access Point, (ACT 2007)
A stabilised access point consists of a stabilised pad of aggregate underlain with geotextile fabric located at any point where traffic will be entering or leaving a construction site at a public road, street, open space or parking area. Limit to one entry/exit point where possible.

19 Protecting Infrastructure

In built-up areas, care needs to be taken in working near existing infrastructure services such as drainage and sewerage pipes.

It is important to ensure that any existing drainage or sewerage pipes that intersect the construction site or are adjacent to it are not overstressed or damaged by movement or placement of construction plant or materials, or construction activities.
Appropriate machinery must be used within concrete channels to avoid damage to structures.

20 Flora and Fauna

State and Federal legislation governs the management of threatened and protected flora, fauna and vegetation communities. Any works that impact upon these items may require permits or authority from DSE under the Flora and Fauna Guarantee Act (1988) or Wildlife Act (1975). Approval from the Federal Minister for Environment may also be required under the Environment Protection and Biodiversity Conservation Act (1999) (Australian Government 2010).

The removal of native vegetation needs to be avoided, minimised and offset (DNRE2002) as part of the design and construction process. A planning permit from local government may also be required before vegetation can be removed, lopped or destroyed. (DPCD 2008). The Roadside Handbook- An Environmental Guide to Roadside Construction and Maintenance (VicRoads 2006) is a useful reference tool for people undertaking works which impact upon Flora and Fauna.

20.1 Flora & Fauna Desktop Check

Civil contractors are often required to work alongside of native vegetation and habitat areas. These areas include trees of all sizes, shrubs, ground cover plants, grasses rocks and fallen timber.

To find out if a site has any threatened plants or animals contact, DSE Biodiversity Data Management Team on ph (03) 9637 8393 or email biodiversity.info@dse.vic.gov.au.

The desktop survey is only suitable for small sites. Larger construction projects will typically require a detailed flora & fauna survey conducted by qualified professional.

The minimum linear survey is 100m or for a radius, the minimum survey is 1km. For most cases you will have a response to your query within 24hrs. It is best to allow plenty of time before the project is due to start, just in case a special management plan, permits or approvals are required.

You will need to supply details of your site location as

- GPS - Eastings and Northings.
- VicRoads map reference.
- Melways map reference.

If your desktop search shows that there could be a threatened species, the CCF web page has a list of contact names and numbers you can call for a site inspection.

http://www.civilcontractors.com/victoria/environment/florafaunacheck/

An inspection will confirm whether or not there is a threatened or protected species in the proposed project area.

20.2 Flora - suggested management measures

- Where a flora & fauna survey has been conducted, follow any recommendations.
- Treat all vegetation as if it is native vegetation, particularly on roadsides and public land.
- Because many common plants are protected, it is reasonable to assume that any patch of native vegetation will include at least one protected species, and therefore a Flora & Fauna Guarantee permit is required from the DSE for any activity that results in the death, injury or disturbance of this plant on public land.
- Assess the project area for: presence of significant native;
    - Grasses.
    - Shrubs and trees (seek advice if required, see advice section below).
    - Habitat i.e. holes in trunks, and fallen timer.
    - Refer to flora and fauna information provided by the client, or
    - Obtain a site assessment by the state natural resources authority.
- Assess the project design for impact on vegetation and see where it may be possible to alter the design to save vegetation.
- Consideration should be given to the use of appropriate construction techniques and equipment to minimise the impact upon vegetation. This includes using Horizontal Direct Drilling under patches of vegetation.
- All vegetation outside of the works area needs to be protected during construction using parawebbing or similar.
- Trees should be protected according to Australian Standard AS 4970-2009 Protection of Trees on Development Sites.
- As a minimum for lone trees, mark a circle around the tree with a radius equivalent to the height of the tree, to prevent damage to tree root zone. The drip zone should be protected in all cases. The tree should also be marked using coloured flagging.
- Equipment or stockpiles should not occur within 2m of vegetation areas.
- Identify and mark areas for site access, parking and the storage of plant and equipment. This should be on previously cleared land and existing access tracks.

20.3 Tree pruning or removal

- Any pruning should be undertaken by a qualified person.
- Pruning must be done according to the Australian Standard AS4373-2007 Pruning of Amenity Trees.
- Prior to pruning or removal any hollows are to be inspected for the presence of fauna. If wildlife is located a suitably qualified person should be engaged to remove and relocate the animals.
- If removed trees cannot be used for habitat, then they should be used for milling timber or mulched and used on site.
- Mulched material should not to be spread over any existing vegetation.

20.4 Fauna Management

Fauna may be attracted into a works area, particularly in rural locations, due to the availability of water, shelter or food resources. It is important to ensure that areas are made as safe as possible for wildlife and that suitable inspection regimes are in place to ensure that wildlife are not injured during construction works.

- Areas containing native understorey should be checked for the presence of fauna prior to removal.
- If native fauna will be disturbed by the project seek expert advice from Specialist Flora & Fauna Consultants, the Department of Sustainability & Environment (number above). A management plan may be required in areas where a high level of interaction with wildlife can be anticipated.
- If night works require flood lights then a filter may be necessary to prevent disturbance to nocturnal animals.
- In areas containing rocks on the land surface or rock floaters in the soil as few rocks as possible should be removed or disturbed, in order to prevent habitat loss or weed invasion. Where rocks are moved they should be re-scattered over the site.
- Pits should have exclusion fencing (minimum standard of parawebbing) installed around them at night, to prevent wildlife falling in.
- All pits should have egress ramps installed to allow wildlife to escape.
- All pits should be inspected daily to ensure no injured wildlife is trapped in them.
- All pipes and underground structures should be capped at the end of each day to prevent wildlife entering.
- Over weekends or extended periods where no work is occurring all pits/ holes should be filled in to prevent wildlife falling in.
- Any water storages with steep or slippery sides should be inspected daily to ensure that no wildlife are trapped or drowned within them.

20.5 Injured fauna

Injured fauna should not be handled unless safe to do so. All native animals including snakes are protected. Stressed animals need rest, quiet, warmth, darkness, and minimal handling.

20.5.1 Injured fauna – suggested management

- Contact your local wildlife rescue service, (numbers listed below) and describe the situation. The carer will then offer advice on how to proceed.
- All wild animals should be treated with caution, especially when they are distressed and injured.
- Untrained people should only tend to those animals that are severely injured or unlikely to be able to care for themselves. Wild animals that may bite, or are otherwise dangerous (e.g. venomous snakes), should only be handled by trained wildlife carers or handlers. When approaching an injured animal move slowly and cautiously to prevent it doing further damage to itself.
- Wear gloves to prevent scratching or biting.
- **If the animal is small:**

  - Place it in a pillow case or cloth bag.
  - Place this in a box a little larger than the animal.
  - Place the box in a shady /cool place.
  - Contact a wildlife shelter number at the bottom of this sheet and arrangements will be made to collect the animal.
  - Do not try to feed or give the animal a drink – discuss this with the wildlife carer when contact has been made. The wildlife carer may wish to do this once an assessment of the animal has been made.
- **If the animal is large**:
  - Keep clear of the animal and attempt to leave it undisturbed (i.e. keep pets away and unnecessary vehicle traffic).
  - Note its location and apparent difficulty.
  - Contact a wildlife shelter number at the bottom of this sheet and describe the situation. The carer will then offer advice on how to proceed.

20.5.2 Contacts for sick or injured wild life

Help for Wildlife, 24 hr emergency service
0417 380 687
www.helpforwildlife.com

RSPCA, General enquiries
(03) 9224 2222,
or contact your local shelter
www.rspcavic.org

Wildlife Victoria, 24hr Hotline
13 000 94535 or 13000Wildlife
www.wildlifevictoria.org.au

WRIN Wildlife Rescue and Information Network
0419 356 433
www.wrin.asn.au

WRES Wildlife Rescue Emergency Service
0427 301 401
www.wres.org.au

BADGAR Emergency Wildlife and Rescue
1300 223427 or 1300BADGAR
www.wildlifeshelter.org.au

AWARE, 24 Hr Rescue Hotline for injured wildlife in the
Frankston to Melbourne region.
0411 986 719
www.awarewildlife.org.au

Healesville Sanctuary is accepting native wildlife for treatment.
5957 2829.

20.6 Rehabilitation & re-vegetation

- Identify the depth of topsoil. The top 150 mm (as a guide) contains the most organic component of the topsoil. Seek specialist advice.
- Stockpile topsoils for site rehabilitation/re-use.
- For turnaround points, site hut locations and parking areas, strip topsoil prior to using these areas.

- When works are complete, lightly rip striped areas, and replace topsoil and dress to allow native seeds to re-vegetate the area disturbed. Sites should be graded to return the original land profile.
- In vegetated areas or public land, logs and woody material should be spread out over the works area, to improve the appearance of the site and prevent vehicle access.
- For native re-vegetation, ensure plants are from the local area. Re-vegetation should be progressive.
- If temporary stabilisation is required, sterile grass can be used.

21 Cultural Heritage

Victoria has been inhabited by thousands of generations of Aboriginal people and for 200 years by non-indigenous people. Civil contracting works are sometimes adjacent to or impact on important Aboriginal cultural heritage places.

Generally the civil works client will arrange for a Cultural Heritage Management Plan where works impact on an Aboriginal site, or Aboriginal cultural heritage sensitivity. Go to the CCF Vic environment webpage and answer a brief questionnaire to see if your site requires a Cultural Heritage Management Plan.

http://www.civilcontractors.com/victoria/environment/culturalheritage/

For non-indigenous heritage questions, you can obtain free advice from heritage advisors employed by local councils throughout Victoria. Go to the CCF Vic environment webpage contact details of Heritage Advisors. When contacting council, ask for the planning department, as most heritage advisors are situated there.

http://www.civilcontractors.com/victoria/environment/culturalheritage/

21.1 Cultural heritage – suggested measures

- Check to see if the client has a Cultural Heritage Management Plan and follow specialist archeological advice.
- Determine if a Cultural Heritage Management Plan is required.
- If you identify something which you believe could be of Aboriginal Cultural Heritage value you must stop work in that area and contact your local council heritage advisor or the Department of Aboriginal Affairs Victoria.
- Look for items of cultural heritage value (see lists below).
- European heritage artifacts.
- European heritage (non-native) trees i.e. elms, and fruit trees.
- Define work and exclusion areas e.g.. fencing.
- All machinery to be kept out of areas that have been identified as environmentally or culturally significant.

21.1.1 Aboriginal heritage values include;

- Scarred trees.
- Flaked stone tool scatters.
- Grinding stones.
- Fresh water or marine shell middens (shell mounds in banks or exposed on the surface) showing wastes from aboriginal habitation.
- Earthen mounds (used by Aboriginal people as ovens or for house foundations).
- Aboriginal hearths and campsites and burial sites.
- Aboriginal quarries.
- Rock arrangements.

- Rock art.
- Stone fish traps.

21.1.2 Non indigenous values include;

- Old buildings and ruins.
- Buried building foundations and objects.
- Houses.
- Bridges.
- Stone walls.
- Fences.
- Some wooden structures like farm fences and old telegraph poles.
- Old farm sheds and yards.

22 Weeds & Pathogens

Weeds, pest animals and pathogens are major threats to native biodiversity because of their ability to change and destroy habitats and ecosystems. They are the number one cause of native animal extinctions in Australia, the second biggest threat to rivers streams and wetlands, and the third biggest threat to threatened ecosystems. (DSE web page)

Invasive species significantly impact many social and economic assets. They affect primary industries such as agriculture, forestry and fisheries, and they can impact recreation, tourism and cultural values such as sites of significance to indigenous people. Weeds alone cost the Victorian economy over $900 million each year. (DSE web page)

It is an offence under the *Catchment and Land Protection Act 1994*(CaLP) to transport or deposit onto land, noxious weeds or the seeds of a noxious weed. This applies to weeds in soil, sand, gravel, stone or vegetation removed from site whether it is known they are there or not. Contractors must insure they take all reasonable precautions to prevent weed spread when leaving worksites. Development and works involving civil construction can be a significant factor in the spread of invasive plants to new areas. Failure to comply with the CaLP Act can incur fines and implement counteractive measures such as increased costs to projects.

For further information on legislative requirements under the CaLP Act, please visit: http://www.dms.dpc.vic.gov.au/, or contact DPI on 136-186

22.1 Noxious Weed management – suggested measures

- Survey sites before commencement of works to identify noxious weeds.
- Map infested areas.
- Be trained in the identification of noxious weeds and how they spread.
- Establish and monitor entry and exit points, and wash down areas for weeds on vehicles and machinery.
- All plant and vehicles entering the site should be cleaned or washed prior to entry.
- All plant and vehicles exiting the site should be cleaned or washed before exit.
- Implement procedures to log where incoming plant or machinery have been prior to entering your site.
- Plan works to progress from clean areas to infested areas.
- Avoid driving through infested areas particularly at high risk times such as seeding.
- Obtain a permit from DPI (136 186) if planning to transport weed infested soil or material off site.
- Remove any noxious weeds before stockpiling soil or other materials.
- Seek a guarantee from supplier when receiving soil or other materials to the work site to confirm they are free of weeds.
- Incorporate weed hygiene declarations with products removed from site.
- Use a removable screen over light vehicle grills to prevent seeds lodging in internal parts such as the radiator.
- Turning points should be within the site works, or planned where no damage will be done to the natural vegetation.
- Contact DPI (136-186) for information on weeds and legal responsibilities.

22.1.1 Wash down and Machinery hygiene

- Use high pressure washer, air blast, vacuuming and physical removal.
- Cleaning site selection should be close to entry and exit points and clear of watercourses and drainage lines.
- Contaminants and waste are best destroyed at the site of incidence.
- Permits are required for off-site disposal of waste.
- Use machinery log books as best practice.

22.2 Pathogen management – suggested measures

- Survey sites before commencement of works to identify pathogens & the requirement for hygiene procedures.
- Public land managers should be consulted where works are on or adjacent to public land to discuss pathogen issues, particularly Phytophthora cinnamomi (DSE 2008).
- Establish and monitor entry and exit points for the work site, and wash down areas.
- All plant and vehicles entering the site should be washed & decontaminated prior to entry.
- All plant and vehicles exiting the site should be washed & decontaminated before exit.
- Shoes from all persons should be washed and decontaminated prior to entry and exit from the works area.
- Implement procedures to log where incoming plant or machinery has been prior to entering your site.
- Plan works to progress from clean areas to affected areas.
- Avoid driving through affected areas.
- Do not remove affected soil off site without prior treatment and permits.
- Do not remove vegetation off site without prior treatment and permits.
- Seek a guarantee from supplier when receiving soil or other materials to the work site.
- All control points should be located to prevent contaminated material washing into areas of native vegetation, sensitive agricultural areas or waterways.

23 Fire Management

The potential for a fire to start on a works area, particularly in rural areas can be fairly high. These can start from sparks from cutting equipment, driving and parking of vehicles in tall grass and numerous other reasons. Fire can be a problem not just to the safety of the people on site but to neighbours and in extreme circumstances to large areas.

On freehold land the Country Fire Authority Act 1958 and the Country Fire Authority Regulations 2004 apply. On public land the Forests Act (1958) and Forests Act (Fire Prevention) Regulation 2004 regulates fire activities.

For further information on legislative requirements for fire management, please visit: http://www.dms.dpc.vic.gov.au/

23.1 Fire Management- suggested measures

- All staff should be aware of the declared Fire Danger Period and their responsibilities under Section 50 (2) of the Country Fire Authority Act (1958).
- Monitoring of weather conditions should be done to avoid undertaking works during periods of high fire danger such windy or very hot days.
- Adequate fire suppression equipment should be on site as per the requirements of Regulation 109 of the Country Fire Authority Regulations 2004 and Regulations 16 and 17 of the Forests (Fire Prevention) Regulations 2004.
- Areas should be cleared around generators and areas where cutting equipment is used to comply with Regulation 110 of the Country Fire Authority Regulations 2004 and Regulation 18 of the Forests (Fire Prevention) Regulations 2004.
- Site induction procedures should include training in the use of fire suppression equipment.
- All fire suppression equipment should be inspected for serviceability of a daily basis.
- The contact numbers for the local fire authorities should be supplied to site supervisor.

24 Inspections, Monitoring and Auditing

The frequency of inspections depends on the risks posed to the environment by each construction activity or the nature of the site. Checks on significant environmental risks are needed to ensure that they are adequately managed and control systems are operating effectively.

Independent audits should be conducted on environmental performance and systems by experts in construction activities and environmental management. Different people can be used for each type of audit.

24.1 Inspections, monitoring and auditing - suggested measures

- Establish a baseline monitoring program before construction commences.
- Prepare a routine inspection, monitoring and auditing program, designed to match the environmental risks.
- Ensure that remedial action is taken promptly when monitoring, inspections or audit results reveal a problem in environment management.
- Ensure that all laboratory analysis is conducted by a NATA registered laboratory.
- Arrange for regular independent audits of environmental performance and the environmental management system.

24.1.1 Monitoring – suggested frequency

Installation	Frequency	Possible problems
Drainage	• At least once every two days in areas where earth-moving is occurring • Weekly elsewhere	• New drainage lines not controlled
Sediment controls, silt fences and traps	• Daily in dry weather • Within first two hours of a storm • Three times a day during prolonged rainfall	• Not controlled effectively
Haul roads	• At least daily	• Dust • Soil on paved roads
Cut-off and diversion Drains	• Weekly	• Water not diverted away from sensitive areas
In-stream weirs	• Weekly in dry weather 24 hours before • forecast rain	• Ineffective during low flow • Release of trapped sediment during storms
Stream crossings	• When in use, but no less than weekly	• Unstable • Releasing sediment and soil into stream

Installation	Frequency	Possible problems
Vegetated buffer zones	• Weekly	• Accidentally cleared
Retardation and settlement basins and artificial wetlands	• Weekly	• Sediments not effectively removed
Stockpiles and bare slopes	• Weekly	• Erosion
Cleared areas	• Daily during dry weather	• Dust
Vehicles and machinery	• Initially when vehicle or machinery is • introduced to the site and thereafter • monthly	• Noise pollution • Exhaust gases
Chemical storage areas	• Weekly	• Spills
Litter controls on and off-site	• Daily	• Litter on and off-site

25 Emergency Procedures

Procedures should be in place, and staff trained to manage emergencies, which could cause major environmental damage.
Adequate equipment, such as spill kits, should be kept on-site to deal with emergency spills.
EPA Victoria should be **contacted immediately an emergency occurs on** (03) 9695 2777.

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