



Erosion and Sediment Control Guidelines for Small Sites

Erosion and Sediment Control Guideline for Small Sites

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Why do small sites need erosion and sediment control?

The construction of buildings/houses on individual lots usually starts after the bulk earthworks for urban development have been completed. Ground disturbance for buildings is on a much smaller scale, but the cumulative impact from these small sites can be considerable: in some cases they may discharge as much sediment as the bulk earthworks phase. Because reticulated stormwater systems are usually installed and operational, they provide an efficient hydraulic conveyance for sediment-laden stormwater from the building site to the receiving environment.

This guide aims to provide simple, effective and realistic advice on how to adopt control methods to ensure the best site protection. By making a few simple changes to your site and daily practices, you will be contributing to a pollution free environment for us all, to enjoy both now and in the future.



The lack of effective controls on a site caused this discharge of sediment into the Cashmere Stream.

What are the benefits of good water and soil management on small sites?

Effective onsite management of soil erosion and water pollution provides many benefits, including:

- Reduced average construction time
- Reduced clean-up costs
- All-weather site access
- Better public image
- Improved wet-weather working conditions
- Improved drainage and reduced site wetness
- Fewer problems with mud and dust
- Reduced stockpile losses
- Better-looking and more marketable sites
- Fewer public complaints.

What are the effects of uncontrolled erosion on small sites?

The effects of uncontrolled erosion and sediment runoff from small sites can include:

- Damage to the building site and structural damage to retaining walls, building foundations, underground services and other structures
- Safety problems when soil, litter and debris are washed onto roads and intersections
- Blocked gutters and stormwater reticulation, soakage and treatment systems, creating flooding and increased council maintenance costs
- Loss of good topsoil
- Pollution of receiving waters resulting in loss of aquatic habitat and reduced biodiversity.

In addition to sediment, other waste from building sites is also transported via the stormwater system directly into rivers and streams from incorrect operation and/or clean-up of:

- Concreting
- Concrete or brick cutting
- Bricklaying
- Brick cleaning
- Plastering
- Tiling
- Painting.

Environmental Law

In New Zealand the Resource Management Act (1991) is the law that protects our environment. It clearly states that every person is responsible for ensuring that their activities and those of their employees do not contribute to pollution of our environment.

Specifically, it is illegal to allow any substance to enter water either directly, through the stormwater system or via the contamination of land without prior authorisation from Environment Canterbury.

Environment Canterbury is committed to caring for our environment and is responsible for both helping the residents of our region to prevent pollution and enforcing the Resource Management Act as necessary.

Breaches of the Resource Management Act 1991 may result in:

- fines under section 15 of the Resource Management Act 1991 (ranging from \$750 to \$1000)
- the prosecution of individuals and/or companies under the Resource Management Act (1991) or (fines of thousands of dollars or prison sentences for serious offences)

Building Act

Many District and City Councils are now requiring erosion and sediment control plans to be submitted as part of any building or resource consent process.

Failure to comply with these requirements may result in failed building inspections, which means time delays with the inspection process and additional costs as a result of follow-up visits from compliance officers and building inspectors. Ongoing non-compliance could result in enforcement action being taken by the District or City Council.

Sequence of work

Following the simple steps below will help developers, builders and tradesmen protect the environment as they do their work:

1. Take a smart approach to multi-lot developments for developers and builders (if applicable)
2. Pre-construction planning and site layout
3. Provide stabilised all-weather access
4. Control water at the top of the site
5. Control erosion of the site
6. Control sediment at the foot of the site
7. Put all stockpiles and building materials within the sediment control zone
8. Connect all downpipes as soon as possible
9. Manage litter and building wastes – especially concrete
10. Promptly stabilise service trenching
11. Maintain and carefully decommission control measures and stabilise the site.

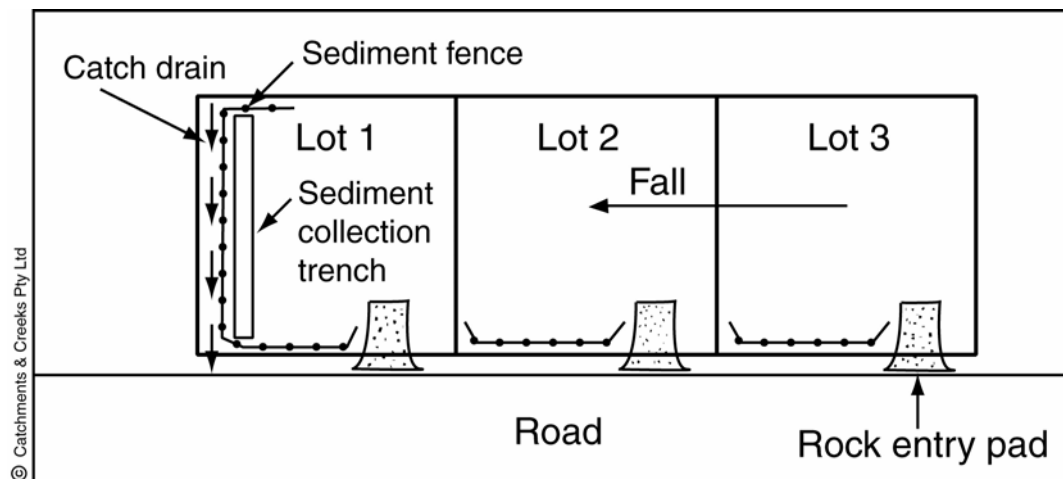
1. Take a smart approach to multi-lot developments for developers and builders

We suggest that developers plan and complete the construction of building platforms and any retaining walls on each lot before sale: this delivers economies of scale and allows use of the erosion and sediment control practices provided for the bulk earthworks phase. It also means that builders only have to disturb each site for footings and access, not major building excavations.

Where builders are managing more than one lot, think ahead about site layout. This will allow you to:

- Design the home to suit the land type: for example, use piers and footings or construct pole homes on steep slopes rather than building slab-on-ground
- Use combined erosion and sediment controls for all the lots, where they are together, to save on time and materials (see figure 1)
- Use signage to inform subcontractors of their presence and purpose.

Figure 1 **Muliti-lot approach**

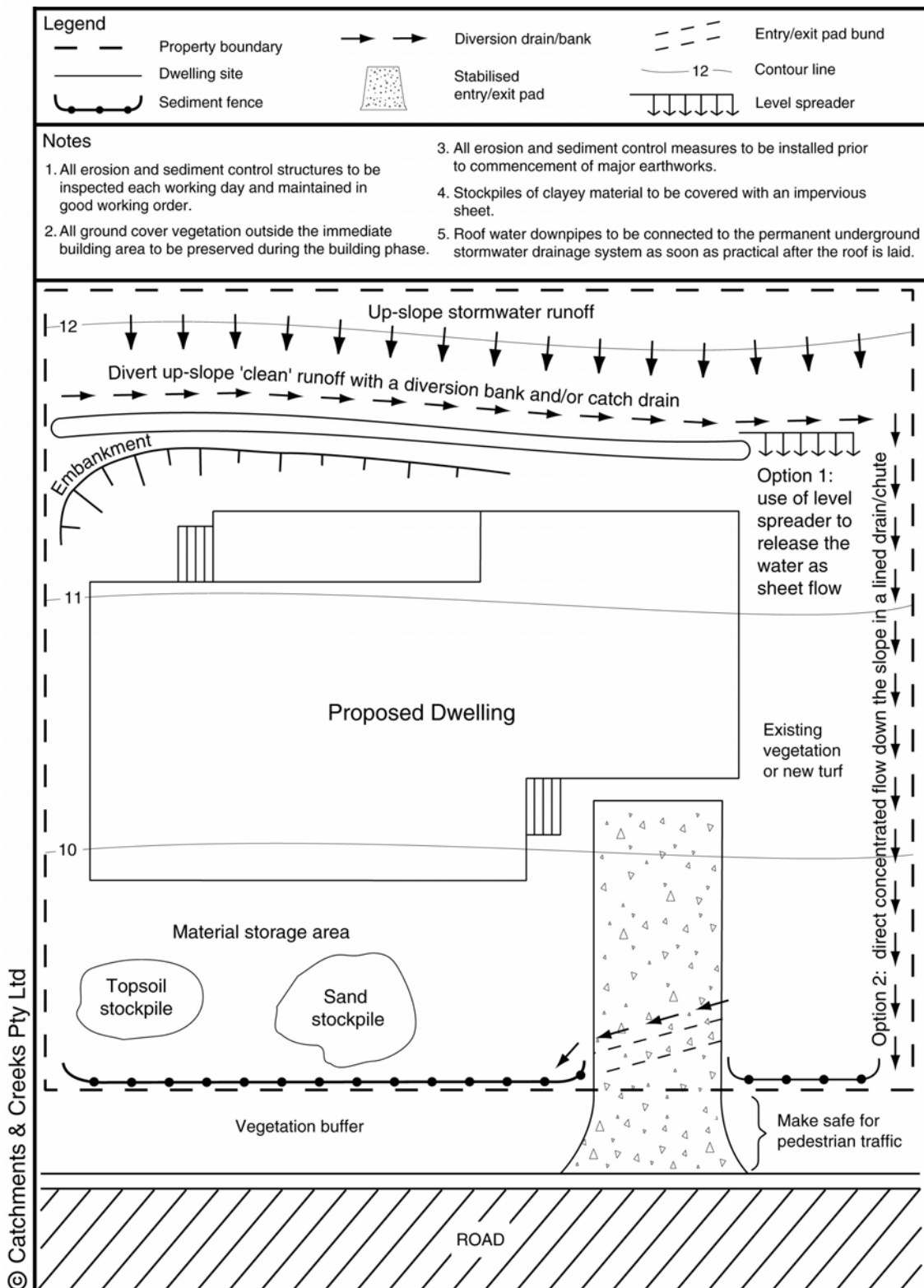


2. Pre-construction planning and site layout

When planning the site layout, think about building location and earthworks needed as this will minimise the number of erosion and sediment controls required on each lot and their interference with the building process. Simple measures could include:

- Minimise site re-contouring and keep earthworks to an absolute minimum: only start them immediately before you start building
- Maintain as much grass cover as possible and install temporary fences to define 'no go' areas that are not to be disturbed
- Direct stormwater flows around the building area and any exposed soils (see step 3)
- Avoid long, steep, unstable driveways; plan to stabilise them as soon as they are constructed and preferably before starting to build (see step 4)
- Allow room for sediment controls (see step 5)
- Do not use exposed aggregate concrete in areas where the wash-off cannot be adequately contained or removed: concrete is lethal to fish even in tiny concentrations (see step 9)
- Prepare an erosion and sediment control plan before starting any earth-disturbing activities (see the example in figure 2). This plan should define a sediment control zone beyond which no soil should be disturbed
- Include in the plan places where tool and paint washing, brick, tile or masonry cutting and water-cooling activities can be done where they will not cause runoff into stormwater systems: aim to contain all wastewater within the site boundaries by locating these tasks on a permeable surface or uphill of an infiltration or, where appropriate, a service trench
- Tell staff and subcontractors not to park on the footpath, grass verge or swale, where they will damage services and track dirt onto the road
- Make sure all subcontractors and tradesmen are fully aware of their requirements and individual responsibilities under this plan: if you document this, it will greatly reduce your liability in the event of any pollution complaints.

Figure 2 **Example erosion and sediment control plan for a small site**



3. Provide stabilised all-weather access

Local residents often complain about muddy roads when builders start work. Protect your site and stop this source by following the steps below:

- Restrict entry/exit to one stabilised location: this may not be where the driveway will ultimately be
- Wherever practical, extend the stabilised entry right up to the building
- Manage the entry/exit point so that sediment is not tracked offsite: use an aggregate, recycled concrete or rock apron placed over a needle-punched geotextile fabric membrane (see figure's 3 and 4).
- Where the entry/exit area slopes towards the road, install a diversion hump across the stabilised area to direct stormwater runoff to the side for treatment by a sediment fence or sandbag trap.

Figure 3 Typical stabilised all-weather site access

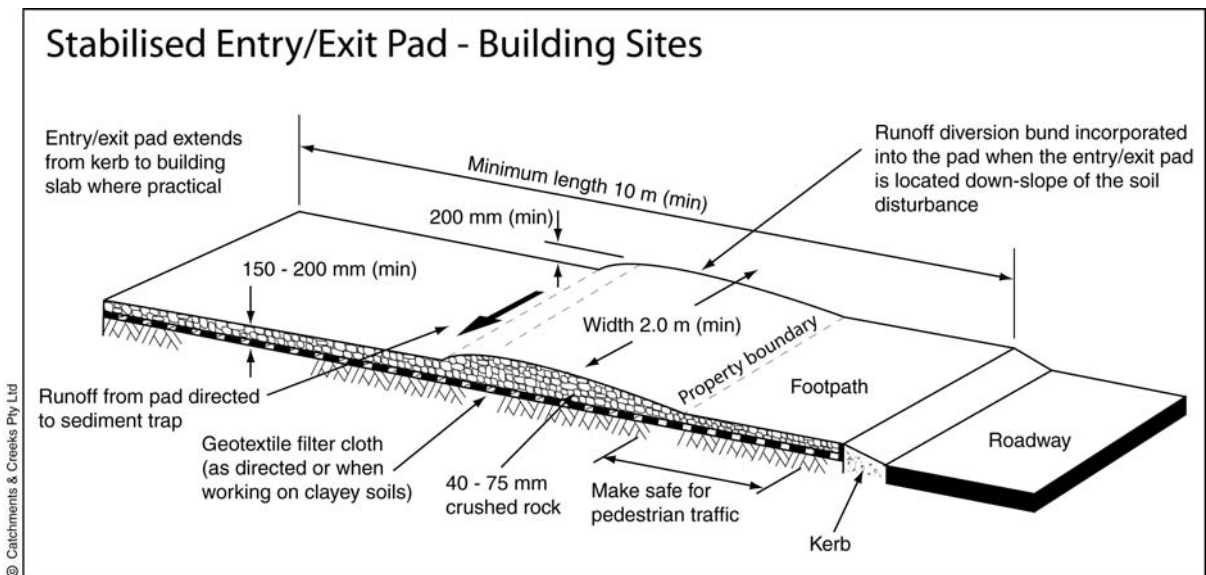
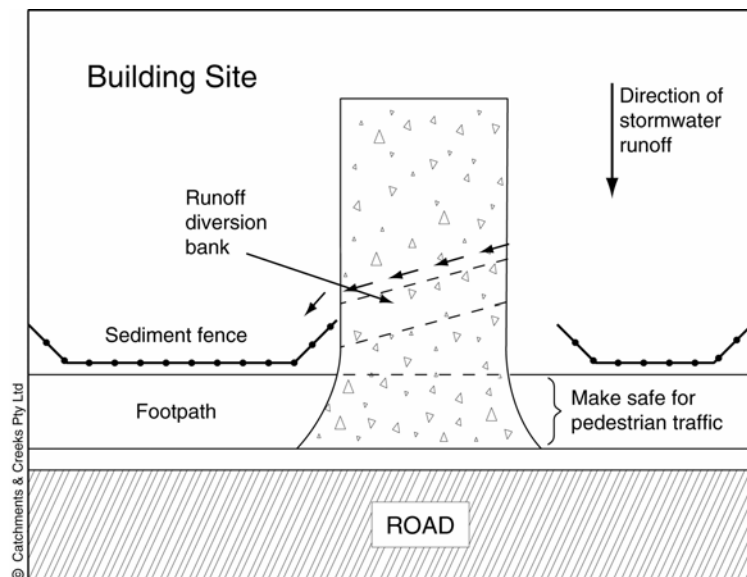


Figure 4 Typical stabilised all-weather site access – PLAN VIEW



4. Control water at the top of the site

Look at figure 6 for ideas on managing the fall of the land and stormwater runoff, to help you plan the layout of your site's erosion and sediment controls.

Keeping water out of your works is a cost-effective site-management tool. Consider the following points:

- Where practical, divert stormwater from above the site around the disturbed area (see figure 5 for a typical diversion channel)
- Steep diversion drains may require a temporary lining of geotextile fabric
- Discharge diverted stormwater onto stable areas; for example, well-vegetated lawn or berms
- Don't divert it onto neighbouring properties unless you have the landowner's written permission
- Direct water away from the site entry/exit point, to prevent it from eroding and thus becoming a source of sediment runoff.

Figure 5 Stormwater diversion channel

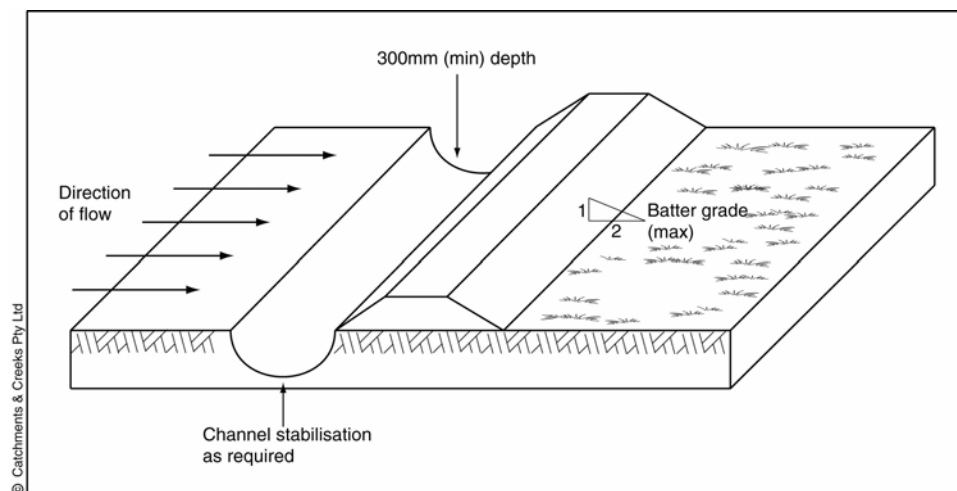
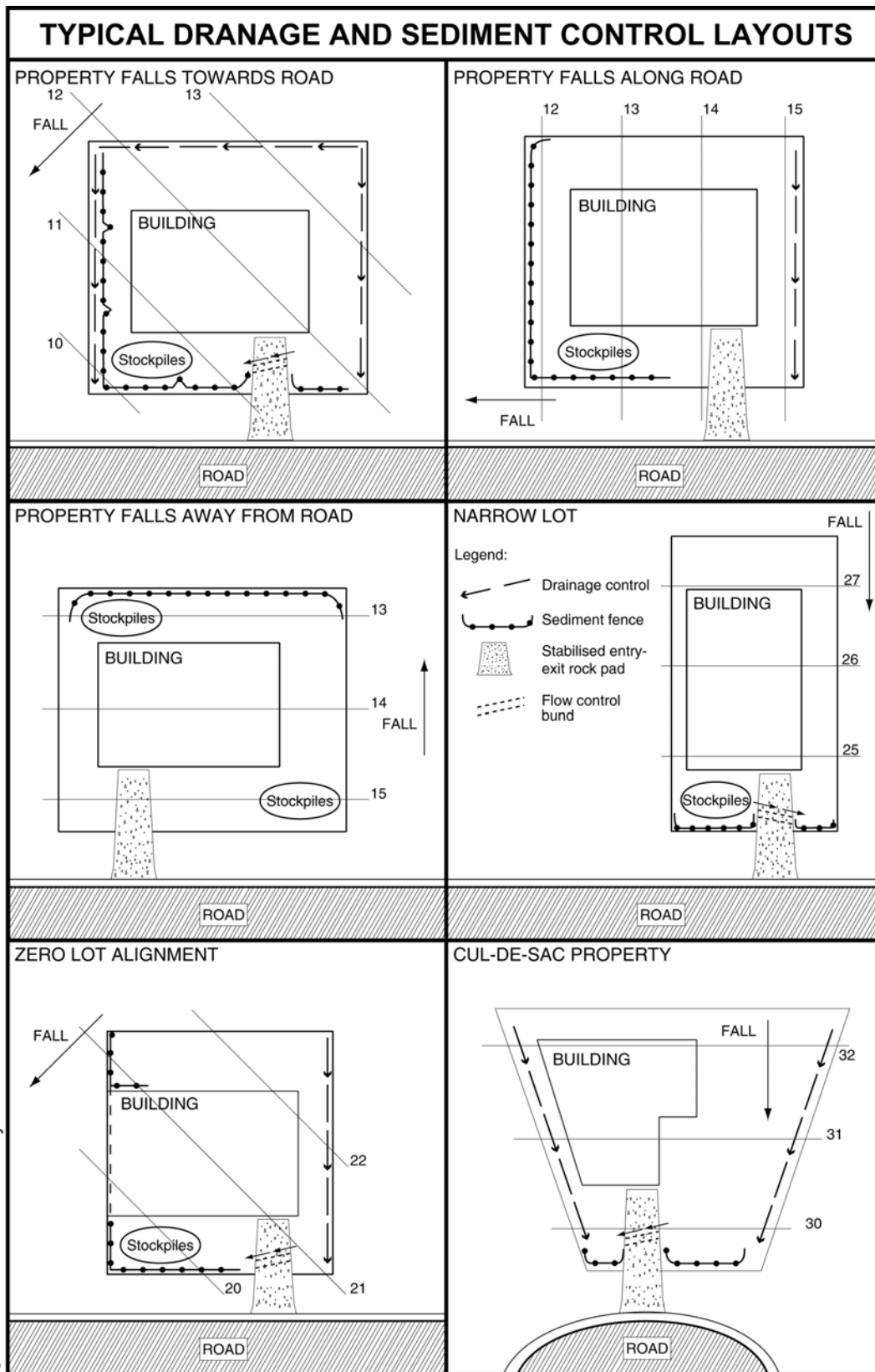


Figure 6 Typical erosion and sediment control layouts



5. Control erosion of the site

It is essential to minimise rates of soil loss from rain impact, shallow sheet flows and wind. Consider the following points:

- Minimise disturbance, earthworks should be limited to the minimum required and should only start immediately before building
- Where practical, maintain kerb vegetation in a healthy and uniform state during the building process (refer figure 7) to minimise erosion and to help filter any sediment
- On soils with a high erosion risk, and on steep sites when there is a delay in building works or site rehabilitation, erosion control blankets can be used to minimise soil erosion from the impacts of raindrops or overland flow (see figure 8)
- Vegetation promotion/suppression blankets are also suitable when revegetating slopes steeper than 4(H):1(V), unless well anchored turf is used
- All ground disturbed by the building activity should be quickly and progressively stabilised (for example, by revegetating) so that it can no longer act as a source of sediment. Turfing is the most effective form of site stabilisation. Grass seeding or hydro-seeding may also be used.

Figure 7 Maintained Grass Area to Reduce Erosion

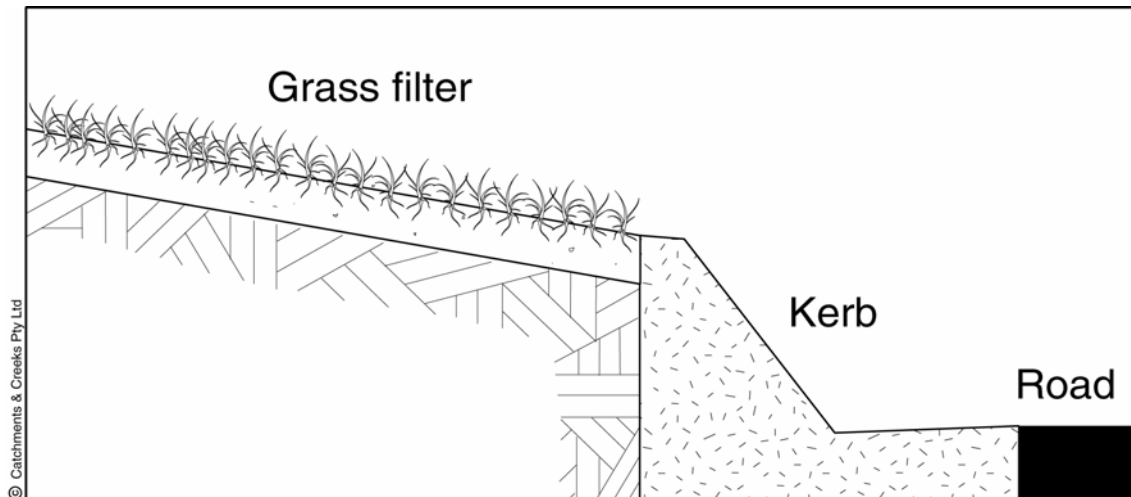
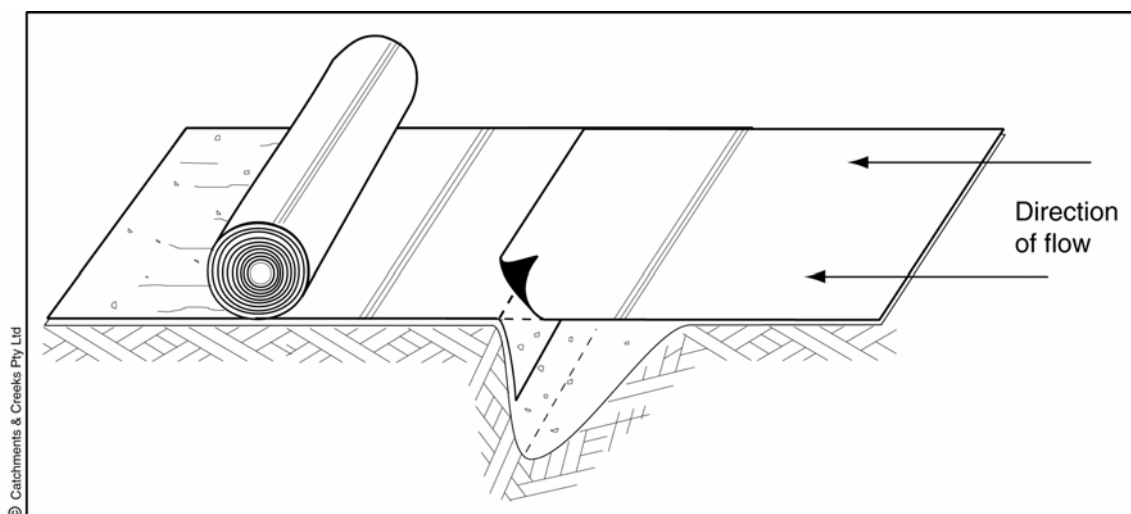


Figure 8 Erosion control blanket installation



6. Control sediment at the foot of the site

Follow the steps below to keep sediment on your site and stop overspill onto public areas:

- Retain any existing grass cover adjacent to the footpath or kerb and channel (as explained in section 5) and make sure vehicles don't drive over it
- Use sediment fences and decanting earth bunds to control and capture sediment in stormwater (For public safety and efficient sediment control, keep sediment fences within the property boundaries unless you have council approval to use public land for these.)

The most efficient sediment barrier for building sites is usually a specifically manufactured geotextile sediment fence. The use of filter cloth or shade cloth is not permitted. A properly constructed sediment fence may be all that is required for sediment control on a properly managed flat building site (refer figure 9).

Sediment fences

Sediment fences should be located downslope of the disturbance, and ideally along a line of constant land level to prevent concentration of stormwater runoff. Where this cannot be achieved, sections of sediment fence should have 'returns' directed up slope for 1-2 metres to control concentration of stormwater run-off.

In areas where it is impractical to bury the lower edge of the sediment fence, the lower 200 mm (min) portion of the fabric should be placed on the ground up slope of the fence and buried under a 100 mm (min) layer of coarse aggregate, 20-40 mm - refer figure 10).

Figure 9 **Sediment fence construction details**

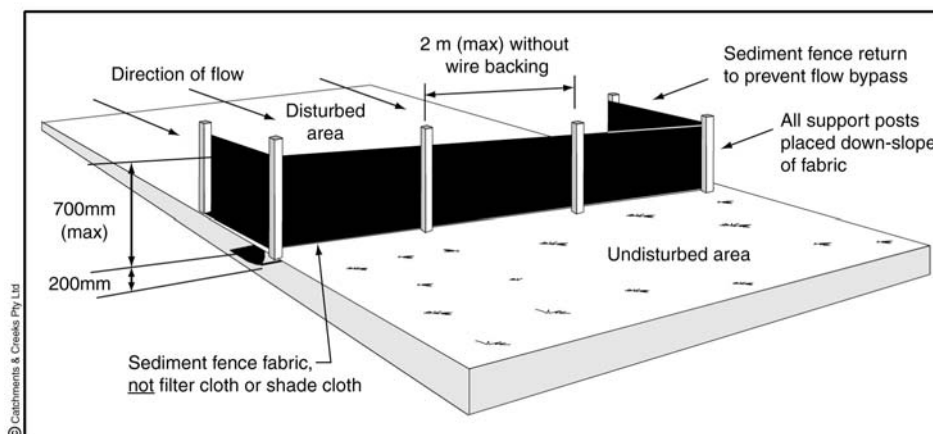
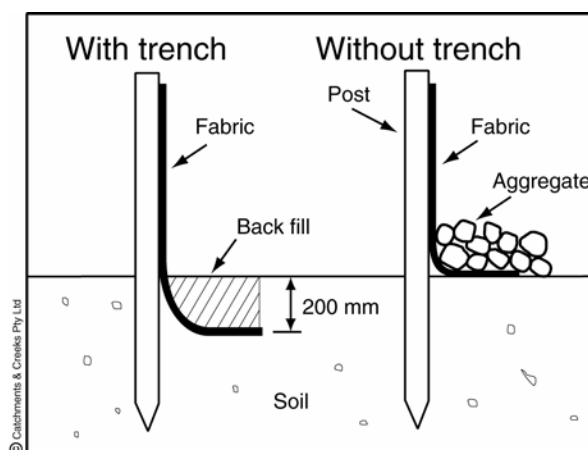


Figure 10 **Alternative sediment fence installations (with and without a trench)**

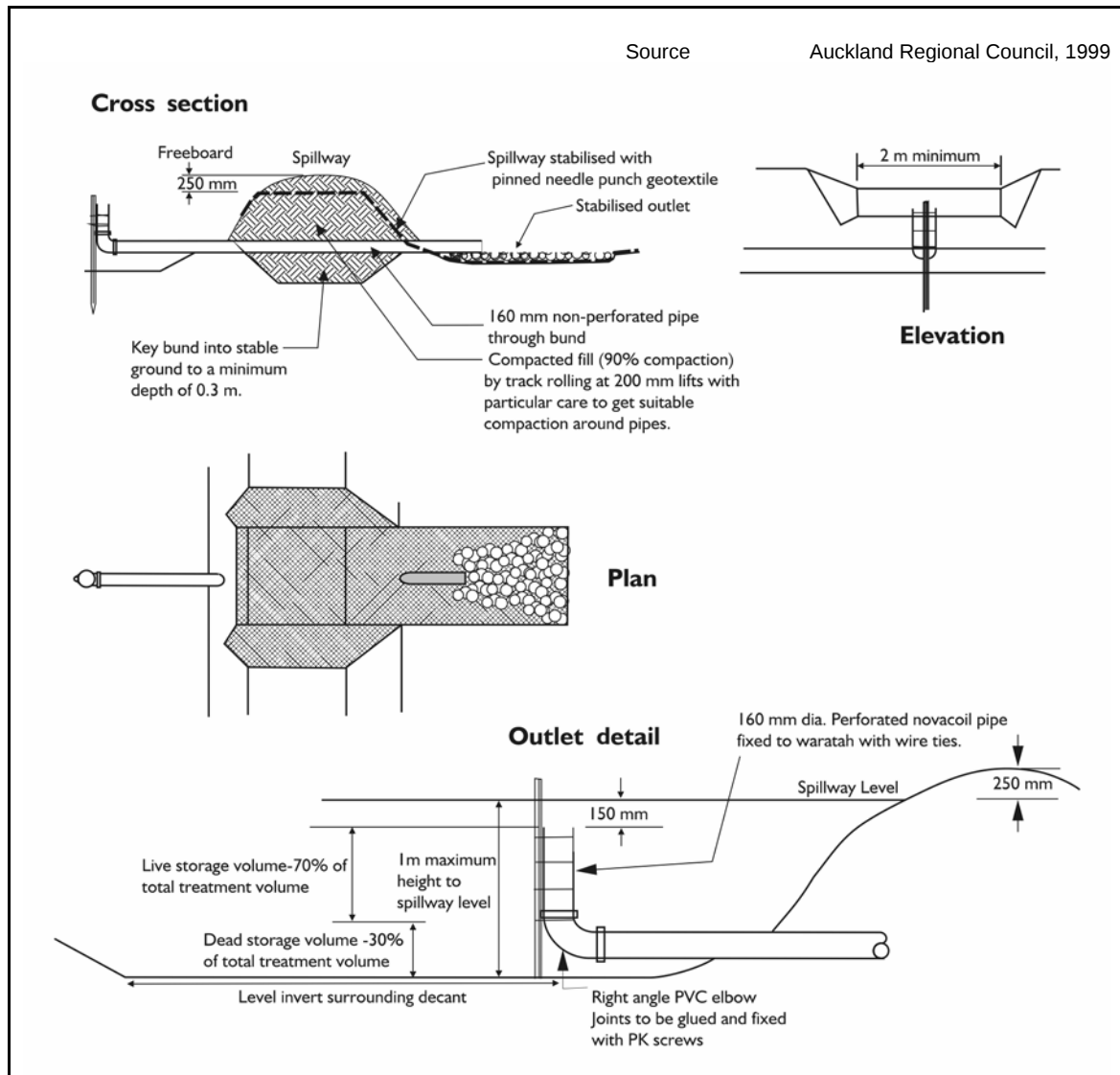


Decanting Earth Bunds (DEB)

DEBs capture slightly finer soil particles than sediment fences, earth bunds control and detain runoff, allowing sediment to settle out. However, they can be outflanked unless well constructed.

- Construct DEBs across slopes and near the edges of the site. The bund can be constructed using soils from the site if suitable (refer to figure 11 for construction details).
- Don't use perforated drainage pipe through the DEB embankment, discharge to bare land, or install them above unstable slopes as seepage may exacerbate land instability.

Figure 11 Decanting earth bund and snorkel upstand



Sump Inlet Protection

- If necessary place control measures around stormwater sump inlets (refer figure 12 and figure 13) to keep sediment out of the public stormwater network and receiving environment.

Figure 12 Flat site - sump inlet protection

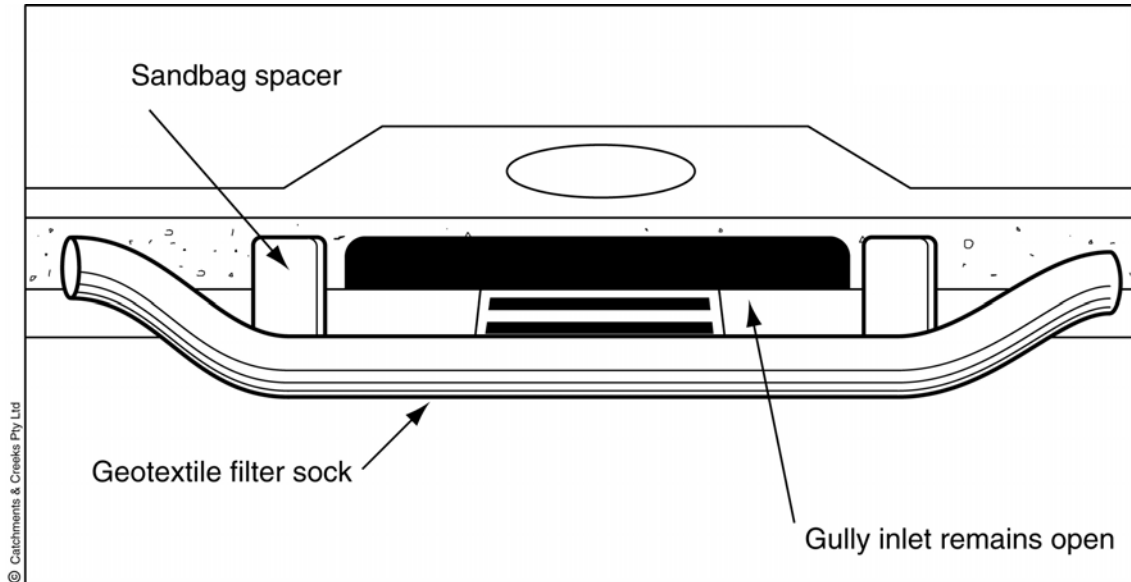
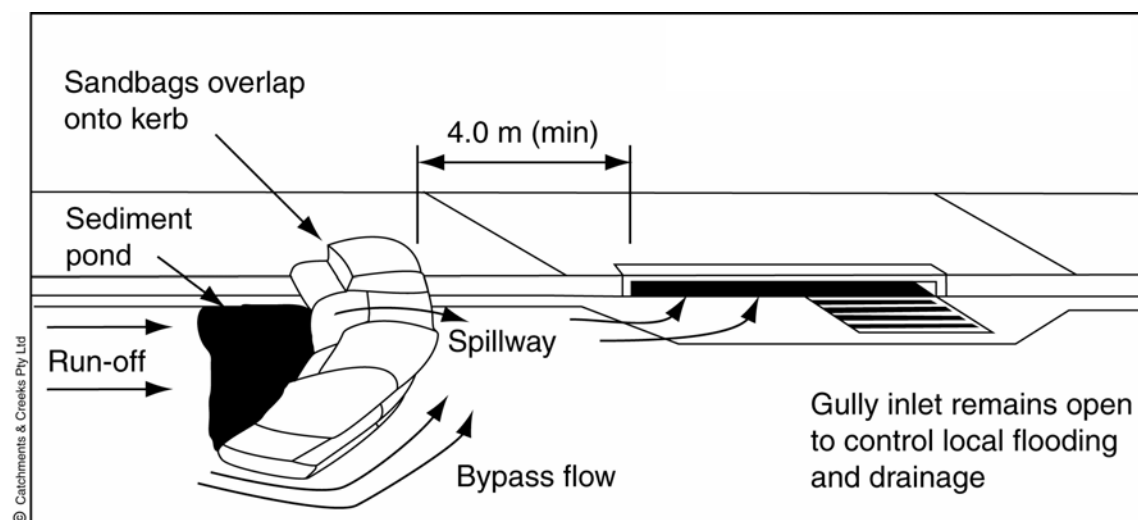


Figure 13 Hillside site - sump inlet protection

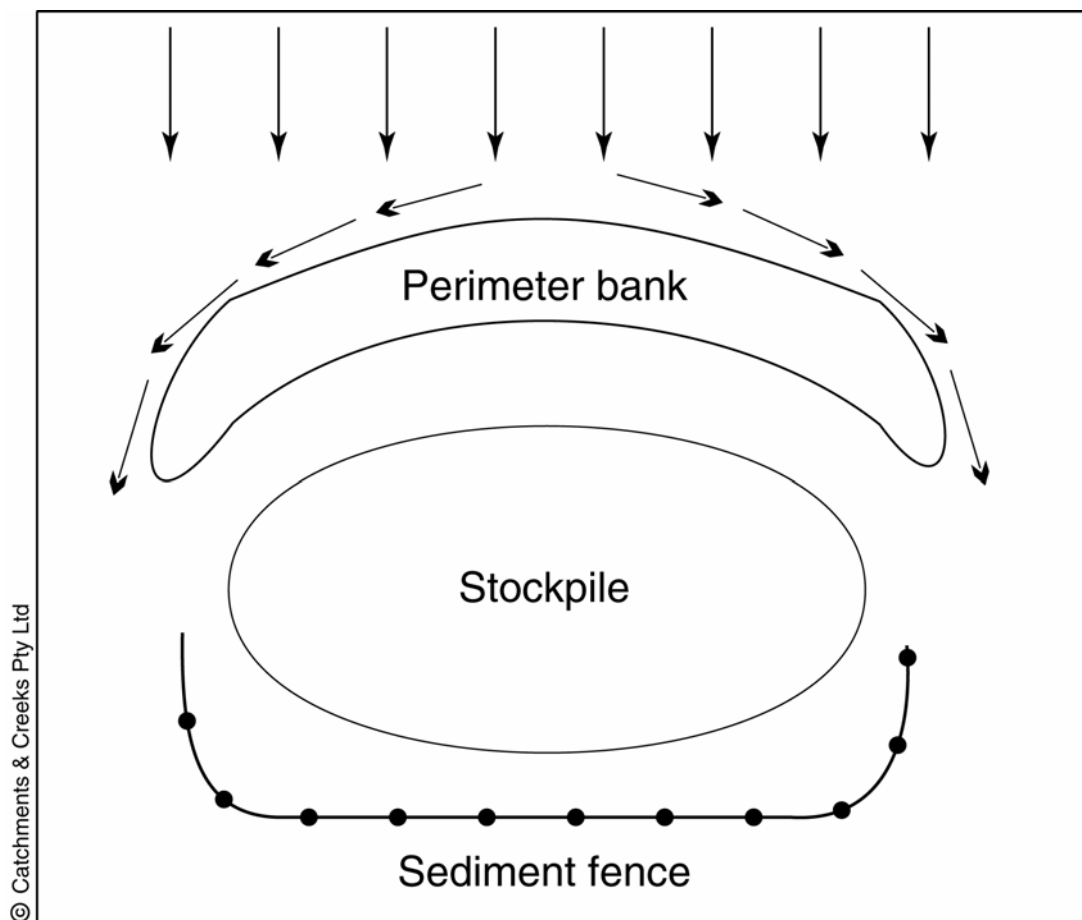


7. Stockpile and building waste sediment control

The sediment control zone should be incorporated into your erosion and sediment control plan or for specific stockpile sediment control (refer to figure 14). Follow the steps below to keep potential sources of sediment and other contaminants within your sediment control zone:

- Keep stockpiles and building materials off the footpath and out of road reserve (and definitely out of the roadside kerb and channel)
- Keep stockpiles and building materials out of any existing or proposed public reserve areas, in order to prevent filling of areas reserved for ponding and overland flow in storms or loss of infiltration capacity due to soil compaction
- Keep all stockpiles and building materials within a sediment control zone behind the sediment barrier
- Do not put stockpiles in any overland flow path or within 1m of a hazard area such as roadside water tables, stormwater inlets, paved footpaths or driveways
- Minimise soil loss, runoff and dust problems by covering stockpiles with waterproof covers such as geotextile fabric
- Do not stockpile excessive volumes of loose soil material onsite. Limit the amount to what is needed at any one time
- Remove surplus material from the site as soon as work is completed
- Advise all site workers, subcontractors and delivery drivers of their responsibilities for responsible placement and management of building materials and stockpiles and make them aware that they will have to pay for any damage they do to site controls.

Figure 14 Stockpile and building waste sediment control



8. Connect all downpipes early

Early connection of roof water to the stormwater system will reduce site wetness, erosion and sediment runoff. Experience shows this reduces downtime after storms and shortens the building construction period.

Take advantage of these benefits by:

- Installing temporary or permanent downpipes as soon as gutters are put up
- Connecting them into the stormwater system before putting the roof on.



Permanent downpipes installed and connected into the stormwater system prior to the roof cover installation.



Temporary downpipes connected into the stormwater system with stabilised all-weather access. However the sediment fence needs urgent maintenance.

9. Manage litter and building wastes – especially concrete

Follow the steps below to reduce unsightly litter and prevent pollutants getting into stormwater and water bodies:

- Store all hard waste in a way that prevents material loss caused by wind or water
- Store smaller materials such as litter in covered bins or mini-skips
- Retain waste and clean up from 'wet trades' on the site and contain it within the sediment control zone in an evaporation pit lined with black plastic or other approved storage container
- Never let liquid waste from 'wet trades' into the stormwater system
- Remove accidental spills of soil or other materials from the road, kerb and channel or any location outside the sediment control area:
 - I. Immediately if it's raining or likely to rain during the day
 - II. At least upon completion of the day's work (even if rainfall is unlikely during the night) using a broom and shovel instead of hosing to clean hard surfaces
- Following storms, inspect the road reserve and sediment barriers and clean them out without damaging them, so as to preserve the sediment retention capacity.



The site above shows sediment fencing along low side of site, with end returns to hold water and sediment. Building materials are stored within sediment control zone with a stabilised all-weather access and a turf filter strip behind kerb and channel.



This site is an example of excessive surplus material stockpiled onsite with a sand stockpile outside the sediment control zone, in kerb and channel. The sediment fence also requires urgent maintenance.

9. Concrete

Concrete is lethal to fish and other stream life, even in tiny concentrations. Follow the steps below to manage concrete washings, concrete cutting wastewater and runoff from exposed aggregate concrete surfaces.

Concrete washings and concrete cutting wastewater

Fully contain concrete waste washed from trucks and mixer units onsite and store where it cannot be washed from the site, harming the environment. If cooling water is needed or washing needs to be carried out onsite, ensure that there is no discharge into the environment by:

- Diverting all runoff to a grassed or unsealed area where it can soak into the ground (refer figure 15 for example)
- Blocking a receiving drain and pumping the wastewater to an area where it can evaporate or soak into the ground
- Washing the fines off freshly laid concrete onto grass at the side, not into the stormwater drainage system.

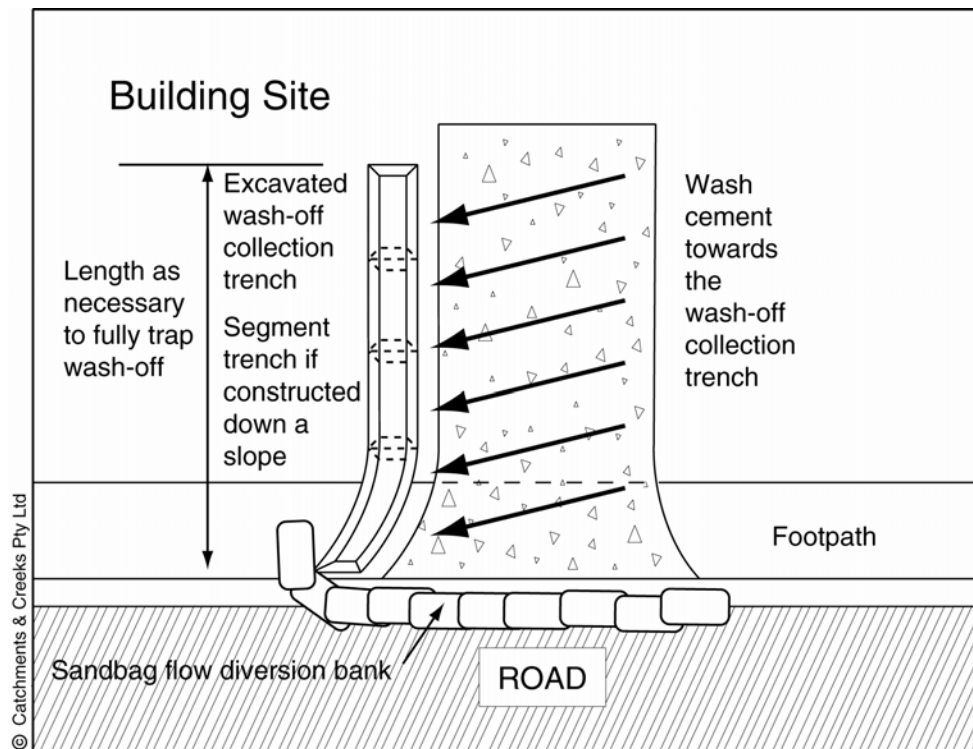
Exposed aggregate concrete surfaces

It is important to prepare exposed aggregate surfaces without allowing cement residue to flow into stormwater drains or waterways:

- Where practical, wash cement residue onto pervious surfaces or fully contain it within temporary sediment dams created from tightly stacked sandbags
- When suitably dry, shovel cement residue into a waste disposal bin
- Cement residue or wastewater runoff should never be washed into the roadside gutter.

This may make it impractical on some sites for exposed aggregate driveways to be constructed. In such cases, it is better to use an alternative driveway finish.

Figure 15 Managing concrete washdown runoff



10. Promptly stabilise service trenching

Prevent trenches from becoming a source of sediment by following the steps below:

- Where possible co-ordinate all the service connections to the building so they can use a single trench
- Avoid trenching in areas where water flow is likely to concentrate
- Alternatively, try to schedule work to periods when rainfall is lowest
- Trenching must not be open for any longer than three days
- Don't open trenches when there is a high risk of storms
- Put soil on the uphill side of the trench to divert water away from the trench line
- Pump water from trenches and excavations to a tank for appropriate offsite disposal or to a sediment retention facility. Keep the intake off the bottom to minimise pumping sediment
- Promptly backfill and compact the trench to a level at least 75–100mm above the adjoining ground level, to allow for some subsidence and prevent the trench becoming a water channel and eroding out
- Put a low soil bund along the uphill side of the trench to divert water out of the backfill (this can be flattened later)
- Immediately reinstate any sediment controls that may have been removed or damaged during trenching operations.

11. Maintain and carefully decommission control measures and stabilise the site

The site manager (owner, builder or builder's representative) must check the operation of all erosion, sediment and water management works on a daily basis and initiate immediate repair, maintenance or modification as required:

- Controls should be cleaned out if they become more than 20% full of sediment, and this sediment can be re-spread over the works area
- Remove all accidental spills of soil or other materials onto the road or gutter at the end of each day's work
- Sweep materials from the road, not washing them down the nearest stormwater inlet
- Hold subcontractors and delivery drivers responsible for any damage caused through their actions or negligence
- Decommission your controls with care – that way you can save money by reusing materials like silt fencing, waratahs and straw bales on the next job
- Revegetate or otherwise stabilise the site.

Acknowledgements

Environment Canterbury would also like to thank the Christchurch City Council for its contribution towards the development of this guideline.

If you require more detailed information about the principles of erosion and sediment control measures, or are undertaking earthworks for a large earthwork development please refer to the Erosion and Sediment Control Guideline – A better way of managing earthworks and the environment (CRC 2007).

This material has been sourced from the following publications:

Hawkesbury-Nepean Catchment Management Trust, 2000. *Guidelines for Erosion and Sediment Control on Building Sites* (Booklet)

Brisbane City Council, Undated. *Best practice for the control of stormwater pollution from building sites* (Brochure and Fact Sheets).

Canterbury Regional Council. 2007. *Erosion and Sediment Control Guideline – A better way of managing earthworks and the environment*, Environment Canterbury,
Auckland Regional Council, *Erosion and Sediment Control on Construction Sites – Site management for permitted activities*, undated