

Small Site Erosion and Sediment Control Guidelines



August 2023

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Introduction

The construction of buildings and houses on individual lots usually starts after the bulk earthworks for development have been completed. Ground disturbance for buildings on individual lots is relatively small scale, but the cumulative impact from multiple small sites can be considerable. In some cases, it may add up to as much sediment discharge as the earthworks phase of a major development. Additionally, because reticulated stormwater systems are usually installed and operational, there is a direct pathway for sediment laden stormwater and other contaminants from these building sites to enter the receiving environment, such as local rivers and streams and eventually the sea. Consequently, it is important for all individuals involved in site construction to do their part to reduce off-site sedimentation.

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 following some basic daily practices, you will be contributing to a better environmental outcome.

Benefits of adopting good water and soil management on small sites.

Effective onsite management of soil erosion and water can;

- reduce average construction time,
- reduce clean-up costs,
- enable all-weather site access,
- improve wet weather working conditions,
- improve drainage and reduce site wetness,
- result in fewer problems with mud and dust,
- reduced stockpile losses,
- create a better-looking and more marketable sites,
- avoid public complaints and/or
- avoid Council enforcement action.

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,
- road safety problems when soil, litter and debris are washed onto roads and intersections,
- blocked gutters and blockage of stormwater reticulation, soakage, and treatment systems, creating flooding and increased council maintenance costs,

- loss of good topsoil,
- pollution of local streams, rivers and beaches resulting in loss of aquatic habitat and reduced biodiversity, as well as affecting recreation, such as swimming and fishing and/or increased Health and Safety risks.

In addition to sediment, chemicals and waste materials from building sites can also be transported by the stormwater system directly into rivers and streams from incorrect operation or clean-up of:

- concreting,
- concrete or brick cutting,
- materials storage,
- bricklaying,
- brick cleaning,
- plastering,
- tiling,
- painting and/or
- the use of portable toilets.

Legal Framework.

The Resource Management Act (1991) is one of the main pieces of legislation that seeks to protect our environment. It clearly states that every person is responsible for ensuring that their activities do not contribute to pollution of our environment. This may include everyone from construction workers and managers on the site to companies and their directors. In Marlborough this law is administered by the Marlborough District Council. It is illegal to allow any substance to enter water either directly, through the stormwater system or through the contamination of land unless approved by the Marlborough District Council. Breaches of the Resource Management Act 1991 may result in formal directives or punitive action from the Council or Environment Court in the form of;

- Abatement Notices and Enforcement Orders which often result in work stoppages,
- infringement fines,
- and for serious offences, the prosecution of individuals and/or companies for serious offences.

In addition, as the Building Consent Authority, the Marlborough District Council enforces the Building Act 2004, along with the New Zealand Building Code. The Building Code (B1 and E1) requires site works (including earthworks), buildings and surface water to be managed to avoid damage or nuisance to people, other properties (including roads) and outfalls (including natural waterways, kerb and channel or soakage systems).

It is best practice to submit an Erosion and Sediment Control Plan (ESCP) as part of any building or resource consent application involving disturbance of soil or earthworks. Failure to comply with Council requirements may result in failed building inspections, which means time delays with the inspection process and additional costs because of follow-up visits from compliance officers and building inspectors. Ongoing non-compliance could result in enforcement action being taken by the Council.

Principles for small site erosion and sediment control.

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

- Pre-construction planning:
 - Evaluate the site layout and design.
 - Develop an ESCP.
- Make sure all sub-contractors understand the ESCP and their responsibilities.
- Install erosion and sediment controls before clearing the site and starting any building work.
- Check and maintain erosion and sediment controls throughout the build process, amending your ESCP as necessary to improve controls or adapt to site changes.
- Manage litter, chemicals and building wastes – especially concrete washings.
- Connect all downpipes to the stormwater network as soon as possible to minimize site runoff and protect onsite stormwater inlets from muddy surface water runoff.
- Stabilise the site and carefully decommission control measures as soon as possible.

Pre-Construction Planning.

Evaluate the site design and layout when planning the site layout including consideration of the need for earthworks and recontouring and the building type and location. Minimising earthworks will minimise the number of erosion and sediment controls required on each lot and their interference with the building process.

The detail and scope of the ESCP needs to be in keeping with the nature and scale of the development. If it is a relatively flat site with soil less prone to erosion, then the risk is lower and only a basic plan may be required. If it is a steep site or in an area with erosion prone soils a more detailed plan is required to ensure sediment is not transported off the site.

Key points to consider when developing an ESCP:

- Identify the site slope, runoff flow direction, erosion risk areas and low points.
- Identify pathways where sediment could be transported off your site, such as pipe reticulation, streams, and gullies, overland to neighbouring properties or to the footpath and road, or by wind if in an exposed area.
- Identify any features to be protected from construction traffic and activities, such as existing on-site infrastructure, including rain gardens.
- Identify existing vegetation that can be retained without being disturbed to act as a buffer and filter strip and use temporary fences to define 'no go' areas to protect any buffer.
- Determine the specific erosion and sediment controls needed and allow sufficient room for these so they can be maintained easily:
 - Control water at the top of the site and direct stormwater flows around the building area and any exposed soils. Where possible always keep water clean.

- Control erosion of the site, especially from steep areas or erodible soils.
- Provide for stabilised all-weather access and identify areas where you want to limit construction traffic.
- Control sediment movement at the boundaries and low points of the site.
- Identify wash down or trade activity zones within the sediment control area for onsite activities (e.g., equipment cleaning).
- Arrange all stockpiles and building material storage areas within the sediment control zone.
- Include signage to inform subcontractors of the presence and purpose of erosion and sediment controls. Make sure all subcontractors and tradesmen are fully aware of their requirements and individual responsibilities under the ESCP.
- Formalise an erosion and sediment control maintenance programme and nominate a specific individual responsible for checking and maintaining the controls. Maintenance of all controls is essential functionality. They should be inspected daily, and before and after each rainfall event. Where a problem is identified, repairs must be undertaken immediately.

In addition to the basic points above there are some site-specific activities which need special consideration:

- Long, steep, unstable driveways: plan to implement controls to reduce the velocity of stormwater during construction and stabilise as soon as possible, preferably before starting to build.
- Exposed aggregate concrete: consider this technique very carefully and avoid if possible as the wash-off is lethal to stream environments and fish even in tiny concentrations. Any discharge of this type to water or the stormwater system - which includes a roadside catchpit - would not be permitted by the Council and could result in enforcement action. All runoff should be collected and taken to an appropriate disposal facility.
- Stockpiling: keep topsoil stockpiles separate from sub soils and ensure both have controls placed around their perimeter. Where possible they should remain within the sediment control area. Aim to locate stockpiles away from any steep slopes, streams, or drainage flow paths. Consider temporarily stabilising the stockpiles by establishing grass cover or use artificial covering (e.g., geotextile cloth).
- Dewatering: if dewatering is likely to be required on site consider an off-the-shelf (proprietary) device, such as a dewatering bag or sock, particularly where there is limited land space available or soakage to land is insufficient. Dewatering activities should never be discharged directly to areas where runoff may enter streams, the stormwater reticulation, or the road network.
- Equipment washdown and spills: identify in the ESCP places (e.g., Trade Activity Zones) where activities such as tool and paint washdowns, brick, tile or masonry cutting and water-cooling activities can be done where they will not cause dirty water runoff to get into stormwater systems or contaminate groundwater. Always aim to contain all wash-down wastewater and waste materials within the site boundaries and dispose of dirty water and materials appropriately.
- Site Parking: restrict staff and subcontractors from parking on the footpath, grass verge or swale to limit damage to services and tracking dirt onto the road.

- Low impact stormwater systems: before beginning construction, identify any high-risk areas such as low impact stormwater systems (e.g., raingardens, swales, wetlands etc) and ensure these systems are protected from sedimentation during the site construction phase. These systems are typically designed for treating stormwater from fully stabilised areas and excessive sedimentation may require their repair or complete replacement. The asset owner (the subdivider or the Council) may seek compensation for damaged systems.
- Ensure all contractors understand the ESCP and their responsibilities. Also ensure all subcontractors and tradesmen are fully aware of their requirements and individual responsibilities under the ESCP.
- Include signage to inform subcontractors of the presence and purpose of erosion and sediment controls.
- 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.

Install Erosion and Sediment Controls.

Erosion Controls-

- Clean Water Diversion.
- Stabilised Construction Entrance.
- Temporary and permanent stabilisation.

Sediment Controls –

- Silt Fence.
- Decanting Earth Bund.
- Catchpit Protection.
- Dewatering systems.

Control Surface Drainage – Clean Water Diversion.

Keeping water out of your works is a cost-effective site-management tool. The best time to provide for adequate site drainage is before construction begins. With proper planning, most drainage problems can be avoided, and erosion and sedimentation minimised. If surface water can flow across the site and onto the area where construction will occur, then a clean water diversion should be used to divert this water around the build site. This reduces the potential for erosion and reduces the volume of water your sediment controls will need to treat.

Key design points:

- Size clean water diversion channels to the contributing catchment. Large channels require specific design.
- Consider lining the channel to keep the clean water clean - steep diversion drains may require a lining of geotextile fabric.

- Discharge diverted stormwater onto stable areas, for example, well-vegetated lawn or berms.
- Ensure diverted water does not cause a problem to neighbouring properties - 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 becoming a source of sediment runoff.

For surface water within the construction area, ensure that drainage is away from the proposed building structure. When the site is being graded it is important to avoid filling in existing drainage channels and roadside ditches. This could result in drainage problems onsite and damage to road surfaces.

Stabilised Construction Entrance.

Residents often complain about muddy roads when builders start work. Sediments on roads also enter the local stormwater pipe network affecting their function and requiring expensive maintenance.

Protect your site and stop these issues by-

- Restricting entry/exit to one stabilised location - this may not be where the final driveway will ultimately be.
- Wherever practical, extend the stabilised entry right up to the building footprint.
- 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.
- Where the entry/exit area slopes towards the road, install a small diversion bund across the stabilized area to direct stormwater runoff to the side for treatment by a sediment fence.
- If sediment does get tracked onto road and footpath areas, sweep these clear at the end of each working day and before rain. Place sediments back within the sediment control area. Do not use water to wash sediments away or into stormwater systems.

Silt Fence.

The most common perimeter control for small sites is a silt fence. Silt fences are a temporary barrier of woven geotextile fabric used to intercept runoff, reduce its velocity, and impound sediment laden runoff from small areas of disturbed soil. A silt fence should be used along the perimeter of the site's down slope sides to trap sediment but should only be used to intercept sheet flow. Do not use them as velocity checks in channels or place them where they will intercept concentrated flow. A properly constructed silt fence may be all that is required for sediment control on a properly managed flat building site.

The design of silt fences includes the following specifications:

- Ensure silt fence height is a minimum 400mm above ground level.

- Place supporting posts/waratahs for silt fences no more than 2 metres apart unless additional support is provided by tensioned wire (2.5mm HT) along the top of the silt fence. Ensure supporting posts/waratahs are embedded a minimum of 400 mm into the ground.
- Where a strong woven fabric is used in conjunction with a wire support, the distance between supporting posts can be extended up to 4 metres. Double the silt fence fabric over and fasten to the wire and posts with wire ties or cloth fastening clips at 150mm spacings.
- Always install silt fences along the contour. Where this is not possible or where there are long sections of silt fence, install short silt fence returns projecting upslope from the silt fence to minimise concentration of flows. Silt fence returns should be a minimum 2 metres in length, can incorporate a tie back and are generally constructed by continuing the silt fence around the return and doubling back, eliminating joins.
- Join lengths of silt fence by doubling over fabric ends around a wooden post or batten or by stapling the fabric ends to a batten and butting the two battens together.
- Install silt fence wings at either end of the silt fence projecting upslope to a sufficient height to prevent outflanking.
- Where impounded flow may overtop the silt fence, crossing natural depressions or low points, make provision for a riprap splash pad or other outlet protection device.
- Where water may pond regularly behind the silt fence, provide extra support for the silt fence with tie backs from the silt fence to a central stable point on the upward side. Extra support can also be provided by stringing wire between support stakes and connecting the filter fabric to this wire.
- The geotextile fabric cloth must be appropriate for purpose (including strength and opening size) and installed following the manufacturer's specifications.
- Keep silt fences within the property boundaries unless you have landowner approval (including Council approval for use of public land).

Decanting Earth Bund.

Decanting Earth Bunds (DEB) allow for the capture of slightly finer soil particles than sediment fences, as the earth bund controls and retains dirty water runoff, allowing detention time for sediment to settle out before the water is discharged from the site. 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 but must be well compacted and impermeable. Key the DEB into the existing ground to a minimum depth of 0.3 metres. An emergency spillway must be incorporated into the design and be covered with geo cloth or similar to minimise erosion. Use a T-Bar decant - a 100mm diameter PVC pipe, 0.5 metres long with 20 equally spaced holes of 10mm diameter to achieve a discharge rate of 3 litres/sec/ha of contributing catchment. A sealed PVC pipe is placed on top of the decant to provide buoyancy. Install a 150 mm diameter non-perforated outlet pipe through the bund. This is to discharge to a stable erosion-proofed area or stormwater system. Use a flexible thick rubber coupling to provide a connection between the decant arm and the discharge pipe. To provide sufficient flexibility where needed, install two couplings. Fasten the flexible coupling using strap clamps, glue, and screws. The decant is fastened to two waratahs by way of a nylon cord to the correct height. Do not discharge to bare land or install them above unstable slopes as seepage may exacerbate land instability. DEBs may be suitable for

contributing catchments of a maximum of 0.3ha. Best Practice design for small sites should use 2m³ of volume per 100m² of contributing catchment.

Stormwater Catchpit Protection.

As a last line of defence, place control measures around stormwater sump and catchpit inlets to keep sediment out of the stormwater network and receiving environment. It is not necessary to use catchpit protection if the construction site is fully under control, but it may be required if there are continuing compliance problems or there are unique aspects to the site being developed that would warrant its use. Catchpit inlet protection is provided by the placement of a barrier across or around a catchpit to intercept and filter sediment-laden runoff before it enters a reticulated stormwater system.

Barriers can include:

- Geotextile and aggregate
- Straw bales or mulch socks
- Sandbags
- Geotextile filter socks.

Check and maintain erosion and sediment controls and review your ESCP.

Maintain all erosion and sediment control practices until construction is completed and the site is permanently stabilised.

During construction, ensure the following is done;

- inspect the controls daily (or at least twice weekly) and after each storm, making any needed repairs immediately,
- at the end of each workday, sweep or scrape up any soil tracked onto roads, do not use water to wash sediments away or into stormwater systems,
- clean up the site after every storm event. If your controls are not keeping up and sediment is getting on to roads or into stormwater you will need to review your ESCP and may need to look at enhancing your controls. If you are unsure how to resolve ongoing sedimentation issues from your site, contact the Council immediately and ask for advice on how to ensure you are meeting your responsibilities.

Dewatering.

Dewatering may be required where groundwater levels are very close to the surface and underground works are required or when rainfall fills up excavated areas. Sediment laden water from dewatered areas should never be discharged directly to drains, waterways, roads, stormwater catchpits or areas where it may flow into these. Such practice could attract Council enforcement action. Sediment laden water should be retained onsite to allow for the settling of sediment and treated through an appropriate control.

Options include;

- sediment retention pond if space is available,
- decanting Earth Bund,
- portable settlement tank (e.g., a modified skip bin),
- filtering through an off-the-shelf (proprietary) dewatering device, such as a dewatering bag or sock.

Design considerations include:

- Always try to minimise the volume of water that requires dewatering, such as limiting the area of excavation, covering small excavations during rain and providing clean water diversions above excavations.
- If pumping, where possible take from the surface of the water and remove slurry to an appropriate location.
- In some circumstances settling may be aided by the addition of flocculants however this requires strict management.

Temporary Stabilisation.

Temporary stabilisation should be used on sites or parts of sites, such as stockpiles or steep slopes, that may remain unworked for periods of time during the construction phase. This is particularly important for sites with high erosion risk, such as steep sites and areas with readily erodible soils.

Temporary stabilisation can include:

- Grass seeding or hydroseeding.
- Mulching with straw or other appropriate material.
- Geotextile fabrics.

Connect downpipes early and protect onsite stormwater inlets.

Early connection of roof water to the stormwater system will reduce site wetness, erosion, and sediment runoff. 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.
- Connect downpipes into the stormwater system before putting the roof on.
- Ensure downpipe stormwater inlets are protected at ground level from sediment laden surface water.

Manage litter, chemicals and building wastes.

Non-sediment contaminants consist of chemicals and materials used on site that may directly or indirectly discharge into receiving environments from site activities. Some non-sediment contaminants can have significant adverse impacts on stream and marine ecosystems, causing death or longer-term health problems in aquatic species. Some also pose a risk to human health leading to bans on fishing, shellfish gathering and recreation. While the volumes discharged from a single site may seem small, within a catchment these discharges can accumulate to cause serious issues. Make sure your site doesn't add to these problems.

Non-sediment contaminants include;

- adhesives and paint asphalt paving,
- cleaners,
- concrete and exposed aggregate,
- sanitary waste,
- vehicle and equipment use and maintenance,
- treated wood,
- nutrients (vegetation, soils, fertilisers).

Options for disposing of non-sediment contaminants are;

- General sediments, brick, tile, and concrete wash down dirty water should be allowed to discharge to the ground so long as not near water.
- Paint and oily dirty wash down water should be disposed of to sewer (inside sinks or outside gully traps that take inside drainage and toilet waste, not those that take roof downpipes).
- Or if possible and depending on the toxicity of the waste, the contaminants should be labelled and sent to the Council refuse station with other wastes.
- If in doubt as to which method of disposal is appropriate contact Council for advice.
- In addition, follow the steps below to reduce litter and prevent pollutants getting into stormwater and water bodies:
- Follow manufacturers' instructions for use and storage of materials.
- Store all waste in a way that prevents material loss caused by wind or water and store away from vehicular traffic, waterways, or storm drains.
- Store smaller materials, such as litter, in covered bins or mini skips. Make it easy for staff to appropriately dispose of wastes by placing waste and recycling facilities in accessible areas.
- Retain waste and clean up from 'wet trades' on the site and contain it within the sediment control zone. Never let liquid waste from 'wet trades' into the stormwater system.
- Immediately contain and remove accidental spills, particularly from the road, kerb and channel or any location outside the sediment control area. Use a broom and shovel instead of hosing down surfaces.
- Following storms, inspect the road reserve and sediment controls and clean them out without damaging them, so as to preserve the sediment retention capacity.

- If hazardous materials are stored on site, volumes should be minimised. Chemicals should be kept in their original labelled containers and where possible, stored in secondary containments (e.g., a bunded area of impervious material) and under cover. Material safety data sheets should be kept onsite, and the site should have an emergency spill kit suitable to the materials being used and stored.

Stabilise the site.

Immediately after all outside construction activities have been completed, stabilise remaining exposed soils with turf, grass seed or mulch.

- Topsoiling and grassing.
- Redistribute stockpiled subsoil to rough grade.
- Spread the stockpiled topsoil to a depth of 100 – 150 mm.
- Provide fertiliser as needed and sow or turf the area.
- Mulch.
- Ensure mulch is free of any noxious weeds.
- Readily decomposable mulches, such as straw, are only suitable for temporary stabilisation.
- Do not use woodchips around watercourses or where water can pond as it tends to float away causing blockage issues downstream. Prevent any further vehicle movement onto stabilised areas to avoid compaction of soil, as this may hinder future plant growth and rainfall infiltration. Keep sediment controls – in particular, boundary controls such as silt fences in place until all exposed areas are permanently stabilised.

Criteria for achieving stabilisation.

- Sown grass – short term when at least 80% coverage of healthy 100mm tall grass; long term when self-sustaining on an annual basis.
- Turf – short term immediately when laid correctly; long term when firmly rooted, 80% coverage and self-sustaining.
- Straw mulch – short term immediately when 30mm laid, no long term or permanent stabilisation.
- Bark mulch, aggregate or pebbles – short term immediately when no soil is exposed; long term when coverage sufficient to maintain underlying soils.

Decommission Control Measures.

Once the site is fully stabilised, remove any remaining temporary erosion and sediment control practices, such as:

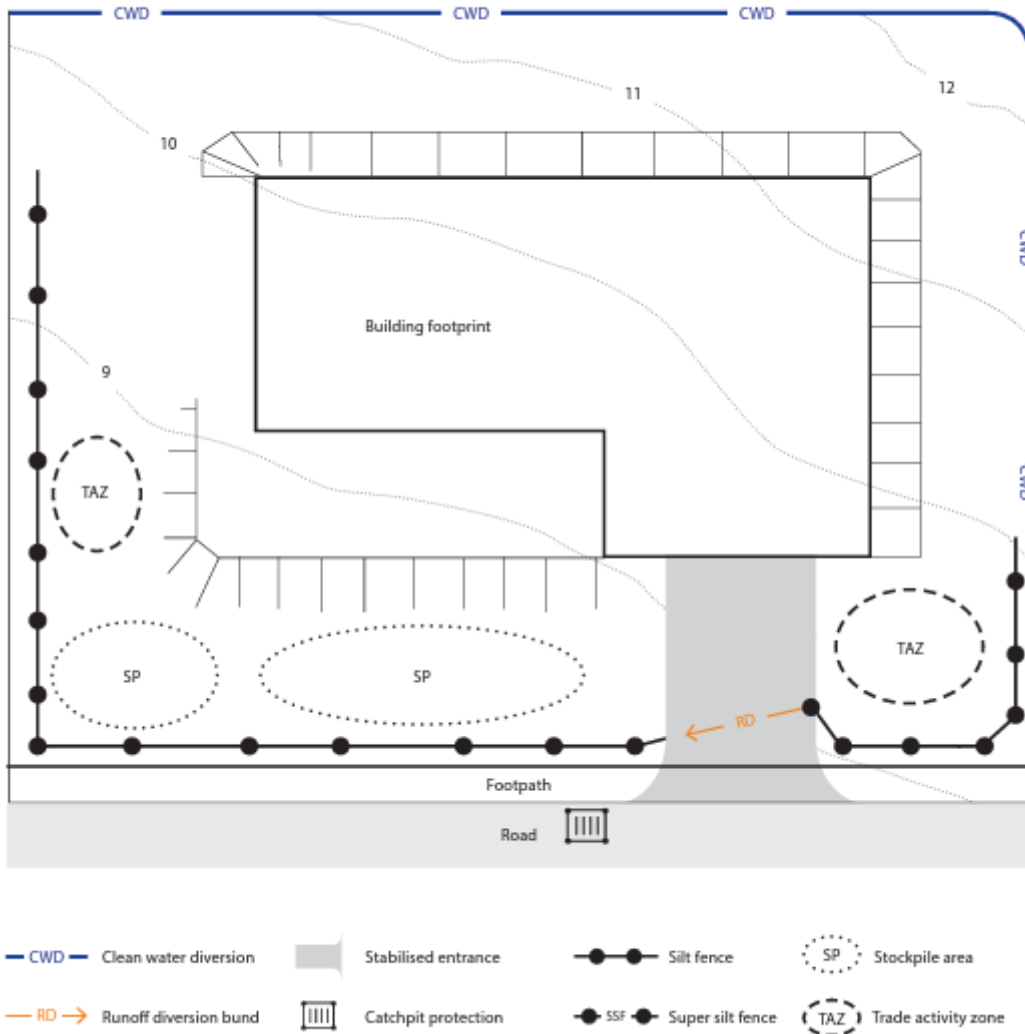
- Storm drain inlet protection.
- Silt fences.
- Clean water diversions.

- Decanting earth bunds.

Removal of these practices should ensure that any sediment trapped within them is disposed of appropriately and does not discharge into the waterways or stormwater networks. Any disturbed areas left by the controls should be appropriately stabilised.

Small Site Basic Erosion and Sediment Control Plan

SAMPLE TEMPLATE FOR AN EROSION AND SEDIMENT CONTROL PLAN



The ESCP involves:

- A clean water diversion around the upslope side of the site to minimise runoff.
- A perimeter silt fence on the down slope side to intercept any sediment laden runoff - which also helps define the site boundaries.
- A stabilised accessway - including a dirty water diversion bund across the entrance way to redirect any runoff into areas bounded by silt fence.
- Designated areas within the silt fenced areas for storage of materials and stockpiles.

- Designated areas for trade activities to occur such as waste management and washing down of equipment.
- Protection of the roadside stormwater catchpit adjoining the site down slope from the accessway.

Further information and advice

It is important to recognise that every building site is unique and poses its own restraints, potential erosion hazards and sediment transport pathways.

In some cases, additional or modified erosion and sediment controls may be necessary if your site is;

- adjacent to a stream, river, or wetland,
- has steep slopes,
- is in an area with erosion prone soils,
- receives large amounts of runoff from adjacent areas,
- or disturbs a large proportion of the site making fitting in standard controls difficult.

For further information and advice on site specific issues please contact the duty planner at Council.