

## **APPENDIX B**

# **EROSION & SEDIMENT CONTROL**



# EROSION & SEDIMENTATION CONTROL

## 1. INTRODUCTION

Works shall be carried out in accordance with this document relating to the design, construction and maintenance of erosion and sediment control structures. Such structures may be either temporary or permanent.

The contractor shall carry out all works with an approach that is well planned and which minimises the likelihood of erosion and sediment affecting downstream lands, watercourses, wetlands or water bodies.

Developers are reminded of their obligations under the Environmental Planning & Assessment Act, the Protection of the Environment Operations Act and regulations and ordinances under those Acts, and the Local Government Act.

It is the responsibility of the developer, and/or representative, to be fully informed of their obligations with respect to legislative requirements. Neglect of these requirements may result in the issue of infringement notices, attracting appropriate fines.

The following guidelines should be understood in their context with the overriding parent publication "Managing Urban Stormwater – Soils & Construction", the "*Blue Book*"

## 2. SOIL EROSION & SEDIMENT LOSS

Soil erosion and sediment loss can either result from disturbance to land by the subdivision construction processes or development.

Soil disturbance is an integral part of development, however it is essential that construction activities limit exposure to erosion. This may be achieved by:-

- Limiting the area of site disturbance.
- Isolating catchment areas of the site so that clean (upstream) water is not directed through the works area.
- Retain and stockpile topsoil for reuse and revegetation.
- Control runoff and sediment movement at point source by the implementation of protection measures.
- Progressively vegetate disturbed areas as the work proceeds to minimise area of exposure.
- Provide large sediment capture systems where appropriate sized to the contributing catchment.
- Filtering/polishing of the trapped water prior to release to receiving watercourses/drainage system.



### **3. EROSION & SEDIMENT CONTROL PLAN**

Designers and consultants must be familiar with the principles and objectives of soil erosion and sediment control prior to the preparation of such plans.

No works shall commence on the site until the erosion and sediment control plan has been approved by the Engineer or Accredited Certifier. The design plan shall in all cases be site specific and not a generalisation of soil erosion and sediment control philosophies.

The erosion and sediment control plan shall include, but not be limited to, the following:-

- Existing site catchment topographic details and contours of natural surface and regrade areas.
- Lot layout, sewer, water, roads and areas of disturbance.
- Nominated and fenced "NO-GO" areas to retain existing vegetative cover.
- Site works staging where appropriate and location of critical vegetation areas & watercourses
- Location of soil stockpiles, sediment control fences and other sediment control works.
- All hydrological information and calculations relative to sediment traps and basin designs.
- Type and location of 'clean water' diversion works.

Council must be provided with at least two days notice, prior to the commencement of construction.

The contractor shall strictly follow the works and recommendations contained within the soil erosion and sediment control plan and must discuss and gain approval for any possible changes for improvement.

### **4. MAINTENANCE**

Transportation of materials to and from the site shall not cause deposition of material onto surrounding roads. Any inadvertent deposition shall be immediately removed from the road.

The contractor shall maintain all erosion control devices such that runoff from all disturbed areas shall be free from sediments and pollutants.

### **5. TEMPORARY MINOR EROSION & SEDIMENT CONTROLS**

#### **5.1. GENERAL**

Such barriers, traps and point source control measures shall generally cater for catchments of less than 0.5 hectares. They shall be used on the downstream side of disturbed areas or around drainage pits below water outlet sites, and around culvert inlets and outlets.



## 5.2. HAY BALE BARRIERS

Hay bales should be installed on a similar basis to Silt Fences.

## 5.3. SILT FENCES

Silt fences shall be employed to filter runoff leaving the site, to trap sediment. They are normally placed on the contour with slight convex to the contour to form a pond for water collection. Each fence should be no longer than 20 metres, should be overlapping, and they should not capture large or concentrated flows.

Areas below silt fences should be undisturbed or revegetated. They should also have a stable outlet condition. Silt fences shall receive regular maintenance. The base of silt fences should be buried to prevent stormwater flows passing beneath the fence.

## 5.4. STORMWATER PIT & INLET TRAPS

Such sediment traps shall be used to protect constructed inlet pits, stormwater piping, culvert inlets and outlets etc. They can either be built from hay bales, silt fence or silt fence 'sausages', gravel filled or rock filled wire baskets. The choice of material depends upon the catchment area, type of material and the structure type shall be protected. These traps must be regularly maintained.

## 5.5. BUFFER ZONES

Buffer zones are corridors of existing vegetation intervening between the area of works and necessary areas of stormwater, gullies, creeks, Hunter River and the like. The vegetation filters impede solids and reduce nutrient levels in runoff. Wetlands, streams, rivers and remnant bushland on Council reserves and public land shall be protected by buffers. Buffer zone performance increases as catchment area and slope gradient decreases. 35 metre wide buffer zones generally provide adequate protection.

### BATTER SLOPES

SLOPE (%)	BUFFER LENGTH (M)
2	15
4	20
6	30
8	40
10	50
12	60
14	70



Such areas are required to be fenced where shown on the approved engineering plans as directed by the Engineer. Such fencing must be plainly visible to all machine operators.

Buffer zones and “no access” vegetation areas may sometimes be utilised as minor filter systems for small catchments. Council may also require binding upstream of buffer zones to divert surface waters and/or stilling ponds to slow water and stop weed invasion into bushland areas, particularly adjoining sensitive environmental sites or wetlands.

#### **5.6. DIVERSION BANKS & DRAINS**

Runoff from natural areas and disturbed areas shall be controlled by the construction where appropriate of diversion drains. These may be in the form of earth or lined drains/banks, hay bales, sandbags or pipelines. They may require progressive implementation and frequent alteration as works proceed. Diversion drains shall be provided along haul roads and access tracks where such roads are considered to constitute an erosion hazard.

#### **5.7. LEVEL SPREADERS**

These are generally used at the outlet to diversion drains and have a level cross section to convert concentrated flows into non-erosive sheet flows. They may only be used to dissipate flows from small catchments.

#### **5.8. SHAKE DOWN AREAS/ACCESS TO SITES**

Shake down areas shall be provided to vibrate loose material adhering to the wheels and bodies of vehicles and plant. They shall be provided at the entry/exit to construction sites and are to reduce the tracking of sediments onto roadways from sites. They can be provided by a bed of large aggregate or cattle grid or similar.

### **6. PERMANENT OR SEMI-PERMANENT CONTROLS**

These are control devices that intercept sediment from catchments generally greater than 0.5ha and mainly at the outlet or discharge point of the site. They should not be considered for use in isolation of the temporary or point source measures. There are generally two types:-

- The dry basin.
- The wet basin (wetland).

Basin designs must meet the following:-

- Volume/capacity of the trap shall be at least 250m<sup>3</sup>/ha of the site for the undisturbed area of the contributing catchment, dependent on soil types.



The capacity shall be measured below the invert of the lowest incoming flow into the trap. A secondary or emerging stabilised spillway shall be provided to prevent overtopping the structure. The basin shall have a 0.3 metre freeboard at the spillway.

The basin internal batter slopes shall be no steeper than 6h:1v in accordance with safety requirements of Australian Rainfall and Runoff. External batter slopes shall be no steeper than 2h:1v.

An all weather access shall be provided to the basin to allow access for maintenance in all conditions.

The basin shall have an arbitrary length to width ratio of 3:1 to encourage sediment settlement and longer distance travel.

Depending on the type of basin, discharge from the basin shall usually be via a perforated riser outlet encapsulated within a filter medium adequately joined to a pipe extending through the embankment to outlet to an approved area.

## **7. CHANNEL STABILISATION**

Channels should be stabilised where high flows or velocities may cause erosion and scouring of the channel. Techniques employed depend upon the velocity of the flow and materials. Materials for stabilisation should be chosen accordingly. Such materials comprise:-

- Jute mesh.
- Reinforced turfing.
- Revetment mattress
- Geotextile or plastic lining.
- Stone pitching concrete or rip rap.

## **8. INSTALLATION OF SERVICES**

It is the responsibility of the contractor and developer to install the necessary structures to services, which require protection. Such protection shall include the following:-

- Minimise the time any trench is open.
- Protect all road drainage pits and inlets.
- Progressively backfill all other service authority trenches.
- Revegetate specific areas, i.e. turf strip or grass seed and mulch.
- Place backfill on side of trench away from road.
- Surplus material removed immediately to stockpile.



- Protect stockpiles with silt control.
- Divert runoff away from trenches.

### 8.1. WIND EROSION

The developer shall comply with statutory controls.

An exposed site that is susceptible to wind generated dust particles, shall be progressively vegetated and watered. Where vegetation is not yet possible, dust suppression by constant watering shall be provided.

Mulching should be provided to minimise wind erosion. In some cases the provision of wind-breaks may be necessary in highly exposed or sensitive areas. These requirements will be considered on merits.

### 8.2. SOIL STOCKPILES

Soil stockpiles shall be located as shown on the approved plans and shall:-

- Be located outside of watercourses or flow paths.
- Be no higher than 3.0 metres, (however 1.0 metre is preferable)
- Slopes shall not exceed 2:1.
- Revegetated with a seed mix of oats, ryecorn or Japanese millet or similar.
- Provision of soil erosion protective measures shall be placed around the stockpile.

## 9. PROGRESSIVE REVEGETATION

- All disturbed areas should be revegetated immediately after construction with the provision of topsoil, grass seeding or turf, or a combination of each.
- Footpaths shall be topsoiled following provision of all services and a turf strip placed behind the kerb.
- Staging of works shall allow for the progressive revegetation of disturbed areas to minimise potential for erosion.
- All large disturbed areas (such as within lots) must be scarified to a depth of 75mm and topsoiled to a minimum depth of 50mm. Should the Engineer or Accredited Certifier deem that the topsoil stockpiled is unsuitable for use, then he/she will direct that the contractor import suitable topsoil for the works.
- Hydromulching of all disturbed areas is recognised as an effective and speedy method of achieving revegetation and will be considered by the Engineer or Accredited Certifier as an acceptable practice where appropriate. Hydromulching shall be provided in accordance with the experienced and accredited supplier's specifications.





## 10. HAY MULCHING

### 10.1. SURFACE PREPARATION

Surface preparation shall comprise topsoil over the area scarified to achieve a 50mm depth massed into a scarified 75mm subgrade. Seed and fertiliser to be sown at specified rates. Hay shall be applied must be free from thistle or other woody species of acceptable quality and not rain affected.

Hay shall be applied at the rate of 5 tonne/ha evenly spread over the soil surface. The hay shall be tacked with amnionic bitumen emulsion at the rate of 2,500 litres/ha.

The following is a recommended seed mix:-

- Spring/Summer
  - 12 kilograms per hectare of Japanese millet.
  - 8 kilograms per hectare of Perennial rye grass.
  - 3 kilograms per hectare of Red Clover.
  - 3 kilograms per hectare of White Clover.
  - 5 kilograms per hectare of Hulled Couch.
  
- Autumn/Winter
  - 15 kilograms per hectare of Oats or Black Winder rye corn.
  - 10 kilograms per hectare of Wimmera rye grass.
  - 5 kilograms per hectare of Red Clover.
  - 5 kilograms per hectare of White Clover.
  - 5 kilograms per hectare of Couch

The above seed mixtures are appropriate for urban areas only. Where any "bush" areas or reserves shall be seeded with native species these will be determined by Council.

"Rhodes Grass" sown at 3kg/ha may be included in harsh environments, e.g. quarry sites or similar.

### 10.2. FERTILISER

Fertiliser at the rate of 250kg/ha should be provided where approved.



### 10.3. WATERING

The developer is responsible for the adequate watering of all revegetated areas and turf to ensure its natural regrowth from the time of planting through to issue of the subdivision certificate, although, if within a reasonable time beyond that date it is determined by Council that the works have failed to provide the intended result, the developer shall make good the defect.

Upon completion of construction works and full revegetation temporary sediment control structures shall be removed and those areas once containing the structures shall be revegetated and made good.

Mowing of revegetated areas and turf strips adjacent to kerb and gutter and pathways etc. shall be carried out to maintain the subdivision/development works in a tidy and presentable state.

