Overall Site Management

Planning Erosion and Sediment Control Measures

Overall site management relates to the planning and implementation of the earthworks project so that erosion and sediment control is effectively integrated into the works.

Ensure all stages are planned before beginning works on site. Where erosion and sediment control measures have been well designed and are incorporated into contract documents, contractors are able to price and get paid for implementation and maintenance of the control works. This is preferable to having unspecified erosion and sediment control as a lump sum, where the resultant control measures will generally involve minimal controls such as one sediment control pond at the lowest point of the earthworks site.

It is desirable to have one person dedicated to be responsible for the erosion and sediment control measures on the site. This person needs to have access to materials, machinery and labour, so that they can respond to problems quickly. Ideally, this person should oversee the construction of all erosion and sediment controls, as well as be responsible for the monitoring and maintenance.

Overall site management covers matters such as:

- Programming of the project,
- Specifying and scheduling of erosion and sediment control measures in contract documents,
- Timing of specific "hot spot" works,
- Limiting exposed or disturbed areas though forward planning of operations, staging of works, progressive stabilisation etc.
- Ensuring work methodologies are followed to minimise erosion and sediment problems (e.g. keeping machines out of watercourses),
- Scheduling when erosion and sediment controls are constructed in relation to the bulk earthworks,
- Setting out responsibilities for erosion and sediment control construction standards, inspection and maintenance,
- Covering contingency measures such as end-of day protection works, close-up prior to public holidays, weather watch, storm damage assessment and response.

Erosion Control

Erosion control can be broken into two main elements:

- Runoff control
- Surface stabilisation

Erosion control relies on avoiding erosion as early as possible, before soil particles become dislodged and mobilised. Erosion control techniques that are implemented effectively can result in very high levels of control. Surprisingly, most of the erosion control techniques are relatively low-tech and simple to implement. However, they often require a high degree of attention to detail to be effective. Erosion control measures target splash erosion, sheet-flow erosion, and rill erosion.

Runoff Control

One of the most important and effective methods of control on earthwork sites is to ensure that there is control of stormwater runoff both on site as well from above the site.

There are some key principles relating to control of stormwater runoff for earthworks sites.

- Clean stormwater should be separated from dirty (sediment contaminated) stormwater at all times.
- All sediment contaminated stormwater should flow through some form of sediment treatment system prior to discharge off site or into a reticulated stormwater system.
- To ensure that on-site velocities are kept low, runoff channels controlling stormwater flow off disturbed areas should be constructed on grades that are as flat as possible.
- Where channel slopes exceed 2% grade, channels should be stabilised to control erosive velocities (e.g. line with geosynthetic fabric, use check dams etc).

There are three key elements to effective erosion and sediment control on-site.

Erosion control should be implemented as a primary measure to ensure that sediment control is effective.
Clean runoff should be separated from sediment laden runoff, and have a separate flow path around the disturbed site.

All sediment laden runoff should pass through a sediment treatment system prior to discharge offsite.

Runoff control channels should be of sufficient capacity to carry 20% AEP (annual exceedance probability event) flows.

Surface Stabilisation

Surface stabilisation can be temporary or permanent. Temporary stabilisation includes such practices as mulching or using erosion control blankets. Permanent stabilisation includes such practices as grassing. However, it may also include other methods such as application of aggregate. Normally, topsoiling is not considered to be surface stabilisation. However, it is an integral part of revegetation when the works are to final trim.

Studies have shown that sediment reductions (using temporary straw mulching) when placed directly on disturbed land can reduce sediment discharge from that land by up to 90%. This effectiveness applies only for sheet flow conditions. If concentrated flow crosses a disturbed area, straw mulching will not limit the concentrated flow, and other methods such as erosion control blankets or check dams are then required.

Sediment Control

The primary purpose of sediment control systems is to retain sediment on site and therefore minimise off site sedimentation. However, sediment control systems are also able to able to carry out a number of other functions that can help improve the effectiveness of overall erosion and sediment control on an earthworks site. Sediment control systems are able to carry out one or more of the following:

- Retain sediment on site and minimise sedimentation off site;
- Provide a degree of storage volume for stormwater prior to discharging off site;
- Reduce the velocity of stormwater runoff from the activity site to allow sediment to settle out;
- Discharge stormwater at a controlled rate.

Sediment control systems include practices such as ediment retention ponds, sediment retention bunds, silt fences, hay bales, and stormwater inlet controls. Most sediment control systems rely on detaining stormwater for a long enough period to retain sediment that has had the opportunity to settle out.

Do not rely on sediment controls alone. While they can be very efficient, their effectiveness relies on the amount of sediment being generated on-site. Ultimately, effective sediment control relies on good erosion controls on site, matched with efficient sediment controls.

- Sites with steeper slopes have a potential to generate more sediment;
- Sediments from soils with higher fractions of fine silts and clays are more difficult to control;
- Attention to detail and strict maintenance of sediment control systems can improve their effectiveness;
- Sediment retention fences should only be used to control sediment wash from sheet flow. Sediment retention ponds should be used to control runoff from channels or flow paths.
- Storage volume is important. Sediment ponds with larger storage volumes are likely to be more effective than smaller ponds, however, it is considered that ponds exceeding 5% (by volume) of contributing catchment pose a higher risk upon the downstream environment.
- Select the most appropriate type of sediment control system to match the particular site requirements.

The sediment retention pond design adopted by Environment Bay of Plenty is based on a design storm of 50% AEP (2 year) 12 hour duration. The basis for this design storm is using Bay of Plenty based rainfall figures and is also similar to the theoretical 2–3 year dominant flow (channel forming) flood.