

4 Erosion and Sediment Control Principles

There are a number of erosion and sediment control principles that need to be adhered to. Fundamentally, they can be summed up as:

- Minimise the area of disturbed land (*i.e.* minimise erosion).
- Treat all runoff from earthwork operations before it is discharged so that sediment is retained on site (*i.e.* maximise sediment retention).
- Erosion and sediment control measures are sized for the total contributing catchment, not just the ‘worked’ area. When a work site is partially stabilised, such as stacked logs and slash on a landing, check that the unstabilised part such as the processing area remains fully controlled by sediment control measures unless it discharges to a different outlet.
- Optimise the location of any infrastructure to ensure the layout will: minimise and simplify any construction; avoid unnecessary stream crossings; and provide the simplest harvest solution which helps reduce the environmental risk.
- Time any operations to minimise any risk. Consider not only the construction of any infrastructure but also the harvesting to ensure the work is completed in an appropriate season or the work is phased to ensure risk areas are completed in the best weather window.

In giving effect to these principles, the forester needs to consider forward planning, erosion and sediment control measures and practices, and monitoring and maintenance. Each of these are briefly discussed in the following sections.

4.1 Forward Planning

Forward planning is essential to achieve good erosion and sediment control outcomes and should form part of the harvest plan (see Section 5). Consideration of how erosion and sediment controls will be achieved during each phase of the operation should form part of the planning for any harvesting operation, and be specifically defined in the harvest plan. Although the exact location of control measures may be difficult to detail in advance, it is essential that provision for erosion and sediment control measures be included for all earthwork/disturbed areas.

This guideline contains a range of erosion and sediment control measures that will help minimise sediment derived from forestry operations. These measures are covered in detail in Sections 6 and 7 with summaries outlined in the Operators Field Guide. It is important to emphasise that erosion and sediment controls need to be installed before the ground is disturbed, regularly maintained during their use, and only removed once that disturbed area is stabilised.

Forest operations are often split into several distinct operations:

1. Planning (salvage, construction, harvest, distribution). May require preparation of resource consent applications;
2. Salvage of road lines;
3. Construction of roads and landings;
4. Harvesting operations (including construction of haul tracks and temporary crossings);
5. Post harvest rehabilitation.

It is typical to have many operations occurring at the same time which can be spread out over lengthy time frames, and therefore it is important to ensure the integration between all four stages. The planning stage is where the erosion and sediment control measures for each subsequent phase are determined. As well as which measures will be installed where, the harvest plan should clearly identify who is responsible for the implementation of those measures as well as their maintenance. When and how any constructed measure is to be decommissioned should also be set out in the harvest plan. Clear lines of responsibility, a “sense of ownership” will ensure the measures are correctly implemented and the outcomes achieved.

4.2 Erosion Control

Erosion control acts by minimising erosion. This reduces and may eliminate the need to rely on sediment control measures to ensure that any operation causes minimal sediment generation. Erosion control should be the first consideration for any disturbed area as it enables the sediment control measures to operate more effectively. Moreover, good erosion control strategies will have the added advantage of reducing the installation costs of some forms of sediment control and will reduce or minimise the maintenance of structural controls.

The erosion control measures discussed in this guideline consist of planning, runoff control measures and stabilisation, and are expanded upon in Section 6 of this guideline.

4.3 Sediment Control

Sediment control focuses on providing impoundment and/or filtration of sediment-laden flows before discharging the treated flows to the receiving environment. The effectiveness of sediment control measures relies on suitable sizing and construction. Removal of sediment from sediment-laden flows via standing vegetation is generally limited due to the often fine-grained nature and consequent mobility of the soils, and by the lack of close ground cover (a dense grass cover is required). Sediment control measures will not retain all of the sediment generated unless there is no discharge from the measure.

Mulching of Landing Batters has been used to Protect the Surface from Erosion Although Slash or Hay Could have been Used



Sediment control measures are discussed in Section 7 of this guideline.

4.4 Monitoring and Maintenance

The monitoring and maintenance of erosion and sediment control measures, especially recently constructed devices, is essential for these controls to continually

be effective. The controls on new earthwork areas (e.g. landings and roads) should be checked prior to any forecast rain and following any heavy rainfall events to ensure they are open and working. Once it is confirmed that a structure is working as designed, the need for subsequent checks can be determined on a case-by-case basis. Any maintenance works identified, such as the removal of accumulated sediment, additional armouring of eroding water tables, or the reapplication of grass seed for example, should be undertaken as soon as possible.

Consideration also needs to be given to post harvesting monitoring and maintenance requirements. Control measures should be checked when operations are complete and replaced, reinstalled, disestablished or maintained to a standard that provides for an appropriate level of erosion and sediment control as the site becomes stabilised. Generally when operations are complete, permanent stabilisation lessens the need for on-going maintenance.

It is important to note that the responsibility for maintenance of these controls does not rest with the Hawke's Bay Regional Council. Accordingly, it is expected that the consent holder and/or operator or other authorised personnel will develop a maintenance schedule to ensure that the above factors are met.

5 Harvest Plans and Earthwork Activities

Harvest management plans, often simply called a harvest plan, are primarily designed to set out how an area is to be harvested. Often incorporated within the harvest plan are the earthwork plans defining the construction of the roads, landings and tracks necessary to support the harvesting operation. This part of the harvest plan should outline the strategies and treatment measures required to minimise the generation and discharge of sediment. In preparing the harvest plan, the Planner should identify all the activities that have the potential to generate sediment and create adverse effects, and combine best management practices for these activities with appropriate erosion and sediment control measures.

In the planning of earthworking and harvesting in forestry operations, the harvest plans should identify the following aspects:

- The boundaries/areas covered by the operation.
- Topographical features and/or contours.
- The existing and proposed roading network (and proposed final surface eg metal or clay).
- Watercourses, stream crossings and their locations.
- Earthworks activities, including landings, roads and tracks, and their extent and location.
- Streamside/riparian/wetland management areas and protection measures.
- Other features that need to be considered (archaeological sites, reserves, public roads, electricity pylons, etc).
- Harvesting methods (ground-based or cable, haul directions, processing areas, the type and tower height of haulers and therefore their ability to lift trees over streams etc). The focus of this is to minimise soil disturbance and any adverse effect on riparian areas.
- The types and locations of erosion and sediment control measures. This should address all the design issues including any required calculations.
- How the erosion and sediment control measures will be maintained (timing, access, sediment storage areas etc).
- Methodology for cleaning debris from perennial streams. The harvest plan should be designed to minimise trees being felled across streams because of the disturbance created by the activity. Manual stream cleaning is also a difficult and time consuming operation.
- Post harvesting management including stabilisation of bare earthworked areas, landings management and maintenance of control measures.
- Personnel responsible for the installation and maintenance of the erosion and sediment control measures.

Note: The information outlined above will need to accompany any earthworks or streamworks resource consent application submitted to the Hawke's Bay Regional Council.