ENVIRONMENT SOUTHLAND

A guide to sediment trap construction

A nicely planted sediment trap

New Zealand has a significant erosion challenge, with more than 200 million tonnes of soil lost from the land to the sea each year. Some of this is natural but the majority is the result of human development and land use.

Sediment is the name used for soil particles that are moved by water. Sediment coming from developed land is often rich in nutrients and contaminants. It is estimated that 84 million tonnes of sediment is lost from pasture each year.

We can reduce soil loss with careful land management and by installing sediment traps temporarily when soil materials are vulnerable to erosion from activities like earth works, cultivation or when stock is on a winter crop. Temporary sediment traps consist of synthetic filter materials or wide vegetation buffers. Permanent sediment traps are specifically designed ponds or wetlands built into the landscape.

Sediment traps can be built wherever sediment is generated – beside roads, quarries, yards, eroding areas and in small waterways and drains. They intercept material moving in drains, critical source areas, tiles and small waterways.

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Key design features of permanent sediment traps

The goal of installing a trap is to capture sediment-laden water and slow down the water's movement long enough for the sediment or suspended material to drop out. Heavy, coarse material will drop quickly, while the finer material that holds most of the nutrients will take longer.

A sediment trap can be created by digging out a hollow in a waterway, critical source area or tile system, but the best way is to build a bund. This could be made from sandbags or wood but most are made from soil and clay materials using a digger. The bund will need to be keyed in to prevent leaks underneath and compressed to withstand water pressure. Check with us before starting any works, as a resource consent may be required.

Location

An important element to a cost effective and efficient sediment trap is choosing the best location - designing it to suit the situation and ensuring it is accessible for maintenance and removal of sediment to be put back on the paddock.

Shape

A sediment trap needs to be oblong or rectangle with a width to length ratio from 1:5 to 1:10. This will slow the water speed down to less than 0.5 metres per second, allowing suspended material to drop to the bottom.

Depth

The depth needs to be from 0.5 to 2 metres depending on water volume and sediment quantity. Deeper traps provide longer retention time allowing fine sediment to fall to the bottom and sediment build-up will be slower, meaning it will require less maintenance. In many locations water will only be in the sediment trap for a short time after rain events, so you'll be able to easily see when this needs to be removed.

Size

This is dictated by site and water volumes to be treated. It can often be better to create a number of smaller traps closer to sediment sources like roading or eroding gully heads, and place bigger ones in critical source areas or small catchments that will transport a lot of water. NIWA recommends a sediment trap size of 1- 5% of the catchment (100 – 500m^2 per ha) to achieve sediment loss reductions from 50 – 90% and 25 – 50% for phosphorus.

Multiple cells

A sediment trap with connected multiple cells is often more effective than one cell because flows are slowed down and moved to different sides of each cell to create back eddies where sediment is collected.

Choosing the right number of cells for your property depends on what you want to achieve. One cell will capture heavy material, two or three cells will capture finer materials and other cells can be added to also strip nutrients. Each cell can be individually designed to do a specific job and fit within the site.

Exiting water flow

Pipes are ideal for moving water to multiple cells but not the exit outfall. This is best done with an open earth channel at the end of the earth bund to direct water away from the base of the bund and provide fish passage. If scouring is a problem, it can be rock lined but thick grass is the best. The exiting water can be directed back into a waterway, tile and drain or through riparian vegetation.

Planting

Planting is not vital for sediment capture but it does help, and it also removes nutrients and increases biodiversity. Stock exclusion fencing is recommended to protect plants and the bund. *Carex secta* is excellent around the waterline to reduce wind erosion, and flax, cabbage trees and toitoi are robust and fast growing.

Note: Waterfowl will sometimes feed in the sediment trap causing fine sediment to move around. This is not a problem as most will resettle, and their bacteria is less of a human health issue than bacteria from stock.

Refer to the Southland Water and Land Plan, 59A and 60 for rules on sediment trap construction.

More information

You'll find helpful information on sediment traps on the NIWA, DairyNZ and Beef + Lamb websites:

- www.niwa.co.nz
- www.dairynz.co.nz
- www.beeflambnz.com

Further assistance

For advice and designs to suit your specific needs, call 0800 76 88 45 to arrange a free visit by Environment Southland's land sustainability team.

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