

Sustainable drainage management

Best management practice

By Henry R Hudson



5 Filter strip

Complexity			Environmental value			Cost		
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High

Definition & purpose

A strip of grass or other leafy vegetation along a waterway margin that intercepts sediment, organics, nutrients, pesticides, and other contaminants from shallow surface flow.

Location

Situated between cropland, grazing land, or disturbed land, and waterways; (2) as part of a riparian buffer system; (3) as part of a two stage floodway; or (4) as part of a waste management system to treat contaminated runoff or waste water:

- Where there is sheet or uniform shallow flow (avoid concentrated flow).
- Where conservation practices on the contributing area reduce soil losses and sources of contaminants to acceptable levels. Filter strips are not a substitute for good land management.
- Generally on slopes less than 10%, when they can be grown on the approximate contour .



This drain was filled with sediment washed from the cultivated field. The filter strip should be about 5 m wide.

Work window

- If birds are nesting, avoid mowing or grazing.
- Do not disturb the channel margins if there is whitebait (Inanga) spawning (spawning occurs above normal water level on spring tide flooded channel margins during late summer and autumn, mainly February to April).

Treatment objectives

1. Maintain a continuous grass cover (10 to 20 cm high; 70% + density).
2. There should be no stock tracks or visible signs of erosion.
3. Sediment should be trapped in the first 1 to 2 m of grass and should not enter the waterway.
4. Sediment associated nutrient reductions of 50 to 90% are achievable with trapping occurring in the first 3 to 4m.
5. To control soluble contaminants such as nitrates, filter strips should be combined with extensive shrub-forest buffers or runoff should be routed through constructed wetlands.

Before you start

- Consider fencing off the drain and/or planting streamside vegetation in association with the filter strip. (See Streamside planting guide, www.nzwerf.org.nz).
- Consult with District/Regional Council staff – they will provide advice and there may be assistance with fencing and planting.

Procedures

Establish a dense cover that is perennial, resistant to flood and drought, and able to keep growing after some flooding. Vegetation should be dense, rather than clumped (e.g. flows can bypass tussocks).

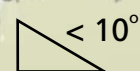
The width of the filter strip is highly dependent on the amount of soil erosion and land slope. Soil erosion is largely determined by land management practices.

Filter strips >30 m are needed in most cases with erodible soils and poor upland management. With good land management practices a filter strip a few metres wide is satisfactory in most circumstances with dispersed flow (Table1).

Filter strips rely on infiltration for reducing contaminants. Exclude livestock and vehicles from the filter strip during wet periods.

If the grass is buried or eroded frequently, increase the width of the strip; prevent concentrated flow in the filter strip; and look at ways to reduce erosion and runoff from the contributing area.

Runoff must be shallow, uniform, and slow. If flow is converging in a topographic depression or along a track, other controls are required (e.g., grassed waterway; runoff control basin).



Inspect and repair filters after storm events. After more extreme events, fill small channels, remove excessive sediment and re-seed and/or mulch the disturbed areas.

Graze, mow or harvest to maintain 10 to 20 cm high grass and encourage dense growth. No soil should be visible between the grass stems - runoff can bypass patches. Control weeds with grazing, selective chemical control and/or mechanical removal.

Soil loss (t/ha/y)	Filter strip slope (%) - filter width (m)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2	2
5	2	2	2	2	3	3	3	4	4	4
10	2	2	4	5	6	6	7	7	7	7
20	3	9	11	12	12	13	13	13	13	14
30	9	15	17	18	19	19	19	20	20	20
40	15	21	23	24	25	25	26	26	26	26
50	22	28	30	>30						
60	28	>30								
70	>30									

Table 1. Relationship between soil loss, slope and filter strip width for dispersed flow (Karssies & Prosser 1999)



Additional reading

Karssies, L.E.; Prosser, I.P. 1999. *Guidelines for riparian filter strips for Queensland irrigators*. CSIRO Technical Report 32/99. 39 pages.