

# Sustainable drainage management

## Best management practice

By Henry R Hudson



## 4 Coarse sediment trap

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

### Definition & purpose

Sediment traps are relatively wide, short and deep excavations in the stream bed. Trapped sediment does not progress downstream where deposition would reduce channel capacity. The trap itself has to be excavated when it fills up (after major storms) rather than a much greater length of the stream. Sediment traps confine sediment deposition to a small reach of channel and reduce excavation costs. They are used as the upstream control in sediment detention wetlands for fine sediment trapping.

### Location

- A long relatively straight channel reach with good access, room to operate an excavator, room to stockpile or dispose of sand and gravel, and suitable ground conditions are required.
- Sediment traps should not cause channel instability and endanger infrastructure (e.g. bridges), and public health and safety.
- A convenient location to trap and excavate bed material.
- Upstream of reaches where habitat is degraded because of excessive sediment deposition (e.g. sand covering riffles; loss of pools and riffles).

### Work window

- If birds are nesting along the channel margin, avoid excavation in that area.
- Do not disturb the bed and banks during trout spawning (riffles in gravel beds in May, June and July).

### Treatment objectives

1. Maintain downstream channel capacity by trapping sand and gravel at a convenient location before it moves downstream.
2. Confine channel excavation to a short reach of channel.
3. The bed and banks are stable (i.e. no channel erosion caused by the trap).
4. After a period of adjustment downstream habitat should improve.
5. Sediment traps should be well signposted and secured from inadvertent access (e.g. the access track to the trap is gated and locked).

### Before you start

- Consult with experts at the regional or district council regarding the location and design of in-channel sediment traps, paying particular attention to channel stability and public health and safety.
- Develop a construction, operational and maintenance plan, and obtain the necessary resource consent and access agreements.

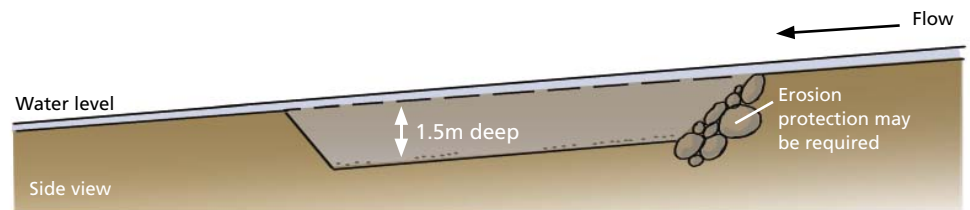
## Procedures

These procedures are not a substitute for expert advice on the particular conditions prevailing at the site. Get expert advice on the design requirements (e.g. the river engineers at the Regional Council); and review the more detailed design guidelines.

### Construction:

Excavate a pit in the channel. As a rule of thumb make the pit 1.5 times wider than the channel; with a length from 4 to 10 times the width; about 1.5 m deeper than the average bed level. For a 5 m wide channel, the trap width is 7.5 m, and the trap length 30 m to 75 m long.

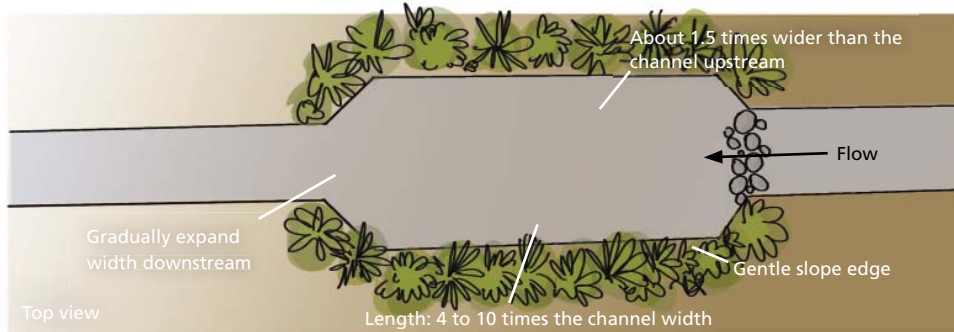
Excavation would preferably be undertaken with a dragline or hydraulic excavator from the bank.



The upstream edge of the pit probably has to be stabilised with rock to prevent erosion. (If the bed erodes the trap will fill up with this material). Make sure that fish passage can still occur.

The cross section of the trap should be uniform, to limit flow separation, and gradually get wider downstream. Channel side slopes should be 1 vertical: 3 horizontal, or more gentle if possible.

Suitable vegetation should be planted to stabilise the banks and berms, and provide food and habitat for fish and wildlife.



### Maintenance:

- Regular inspections should be carried out to determine when the trap should be re-excavated; and after floods to detect problems (e.g. scour; bank failure).
- Bank vegetation should be maintained in good condition.

### Sediment removal and stockpiles:

- Excavate the trap when it is filled, otherwise there will be no more trapping.
- Follow the guidelines for channel excavations to remove material.

### Decommissioning:

- In many cases a trap can be de-commissioned simply by not removing sediment. The bed will build up, and the edges will infill as vegetation encroaches and traps more sediment. The channel will eventually be indistinguishable from the adjacent channel.
- Once stockpiles have been removed, the site should be levelled and re-vegetated. Unless agreements have been made to retain access tracks, tracks should be covered in soil and re-vegetated.

## Additional reading

Hudson, H.R. 2002. *Development of an in-channel coarse sediment trap best management practice*. Environmental Management Associates Report 2002-10 for Ministry of Agriculture and Forestry Project FRM 500.