

Erosion and Sediment Control Measures

2.5 Flumes



Flumes help to protect *fill* from erosion by conveying stormwater to more stable ground. They can also be used to safely convey *run-off* from the top to the base of a *batter* slope and prevent soil erosion from concentrated stormwater discharges onto exposed soil.

Flumes can also be used to direct water through additional *sediment* and stormwater control measures such as *slash* and *sediment* traps.

Flumes are often made of half round sections of flexible corrugated materials. *Culvert* sock *flumes* are enclosed fabric sock *flumes* – these can also be used where standard *fluming* would not work effectively.



This guide is provided as a reference document and does not constitute a statutory obligation under the Resource Management Act 1991 or the National Environmental Standards for Plantation Forestry.

Please refer to the 'how to use' section of the introduction at <http://docs.nzfoa.org.nz/forest-practice-guides/> for advice on how to use this guide.

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A Where and when to use

1. Use *flumes* (if necessary), in conjunction with *cut-outs* or *culverts*, to divert water:
 - a. Onto stable ground.
 - b. Away from *fill* slopes that could erode if water was directly discharged onto them and cause adverse environmental effects.
 - c. Into *sediment* and stormwater control measures such as *slash*, *sediment* traps and *sediment* detention ponds, where necessary.

B Where not to use

Not applicable to this FPG.

C Design

1. Use flexible *flume* materials. They are less prone to failure, bend to follow the terrain and decrease the water speed (corrugated iron should not be used).
2. Consider using flexible, full round *flumes* for very windy sites as they can better withstand windy conditions compared to ½ round *flumes*.

D Construction

Plastic pipe flumes

1. Construct the *flume* inlet to not be bypassed by stormwater flow – *flume* inlets are a common failure point.
2. Ensure the *flume* is anchored and well supported to avoid displacement or separation from the *culvert* outlet.
3. Ensure the *flume* is located at a suitable site to construct additional *sediment* retaining controls, if necessary.
4. Consider using technique to slow and disperse concentrated water.

Culvert sock flumes

5. Secure the sock to the *culvert* so that water does not undercut or rip off the sock.
6. Ensure the sock has a minimum slope of 5%. This will stop the sock from infilling with *sediment*.
7. Anchor the sock eyelet and attach it to the ground for its entire length to avoid twisting. Twisting can lead to the sock malfunctioning and the weight of *sediment* and water can pull it off the *culvert*.
8. Consider installing socks upside down, with tie-down points tied up to the holes in steel Y-posts (waratahs), to stop potential rolling in strong wind locations if other installation methods have failed.
9. Where the sock discharges to unstable ground, consider *slash*, rock or half pipe energy dissipation at the sock outlet to reduce the velocity and energy of the discharge.
10. Ensure the sock is located at a suitable site to construct additional *sediment* retaining controls, if necessary.
11. If using an entrance structure, it should be at least twice the height of the *flume* or pipe diameter as measured from the invert.



Flume Baffle.

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E Maintenance

1. Prepare a routine maintenance plan including heavy rainfall response measures.
2. *Flumes* need regular maintenance, especially on new construction.
3. Check *flumes* for functionality after a heavy rain event.
4. Check that the *fluming* has sufficient capacity to control stormwater *run-off*. If not, add additional controls.

F Other methods

1. Complementary structures include *berms*, *water table drains* and *cut-outs*.

National Environmental Standards for Plantation Forestry

Relevant regulations for *sedimentation* are 26, 27, 31, 33, 56.

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Example



Full round flexible *flume* best used in exposed, windy locations.

Contact











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Other Practice Guides in this series

-  2.1 Water Tables
-  2.2 Cut-outs
-  2.3 Berms
-  2.4 Road Drainage (Stormwater) Culverts
-  **2.5 Flumes**
-  2.6 Sediment Traps and Soak Holes
-  2.7 Silt Fences
-  2.8 Sediment Retention Ponds

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