

## Erosion and Sediment Control Measures

### 2.3 Berms



*Berms* are low embankments typically on the outside edge of a road or *landing*. They are constructed to channel stormwater to *culverts* or outlets and act as additional erosion and *sediment* control measures.

*Berms* are part of a family of stormwater control measures that can increase the life of a road or *landing* and associated *fill* slopes, by reducing erosion.



Low compacted berm.

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.

Version 2.0, January 2020

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#### A Where and when to use

1. Use *berms* to direct stormwater:
  - a. Away from erosion prone *fill* slopes and old slip faces.
  - b. Onto stable ground (this may be via additional stormwater control measures such as *cut-outs* or *flumes*).
  - c. To stormwater and *sediment* control measures including *sediment* traps, or *sediment* retention ponds, where necessary.

#### B Where not to use

1. Most roads do not require *berms*, especially roads constructed through rock or stable material.

#### C Design

1. Plan *berm* location as part of the overall road or *landing* engineering design. If they are added as an afterthought, they may narrow the carriageway or result in over-steepening the *fill* face.

#### D Construction

1. Use appropriate equipment. An excavator can *compact* and shape the *berm*.
2. Construct *berms* at the same time as the road/*landing*.
3. Ensure the outside edge of the road has been *compacted* and the *fill* slope has not been over-steepened. *Fills* that are too steep are more prone to failure if the soil's natural angle of repose has been exceeded. Adding a *berm* will increase the load on the outside road edge and may create an additional risk in highly erodible soils (exceed shear strength).
4. Oversow or hydro-seed *berms* to protect them in sensitive areas, if necessary, to minimise erosion.

#### E Maintenance

1. Prepare a routine maintenance plan including heavy rainfall response measures.
2. Check *berms* are still functioning after a heavy rain event.
3. Do not dump spoil (e.g. road bank slump material) on top of an existing *berm* during maintenance. This can overload the outside edge and cause *fill* failure.
4. If machinery has been driven/sited on the *berm*, repair the damage as soon as practicable.
5. Where practicable, avoid spraying vegetation on the *berm* when pre-plant desiccation spraying.

#### F Other methods

1. Other construction practices such as water bars or broad-based rolling dips can effectively drain water from the cut slope on the inside of the road to the outside edge. These require the right soil type and careful construction to work effectively and are generally more suited to low-volume roads.

#### National Environmental Standards for Plantation Forestry

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

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#### Examples

Well-compacted berms were used to protect a large *fill* slope by directing stormwater away from the more vulnerable earthworks.



Un-compacted berm.



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*Berm with hydro-seeding.*



This *berm* is too large for the slope and road verge. Material is spilling from it.



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#### 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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