Flow Control Berms

DRAINAGE CONTROL TECHNIQUE

Low Gradient	✓	Velocity Control		Short Term	✓
Steep Gradient		Channel Lining		Medium-Long Term	✓
Outlet Control		Soil Treatment		Permanent	[1]

[1] It is common practice for the berms to be retained on-site and allowed to integrate into the general topography. Over time the height and hydraulic impact of the berms diminishes until their existence completely disappears.

Symbol → CB →

Photo 1 – Flow diversion berm used to minimise road runoff flowing down a steep, unstable section of the embankment

Photo 2 – Sandbag flow diversion berm used to minimise surface flow over a recently seeded embankment

Key Principles

1. Key design parameters are the effective flow capacity of the structure, and the scour resistance of the berm.
2. Key operational features are the height and alignment of the berms such that water flow is directed to the appropriate location in a non-erosive manner.

Design Information

The recommended dimensional requirements of flow control berms are outlined in Table 1.

Table 1 – Recommended dimensional requirements of flow control berms

Parameter	Topsoil berms	Compost berms [1]	Sandbag berms
Height (min)	300mm (450mm)	300mm (450mm)	N/A
Top width (min)	100mm (100mm)	100mm (100mm)	N/A
Base width (min)	600mm (900mm)	600mm (900mm)	N/A
Side slope (max)	1:1 (H:V)	1:1 (H:V)	N/A
Hydraulic freeboard	100mm	100mm	50mm

[1] Values in brackets apply to berms placed across land slopes steeper than 4:1 (H:V).

The fact sheets prepared for *Flow Diversion Banks* provide guidance on estimating the hydraulic capacity of flow control berms.

Description

Flow control berms typically consist of minor earth, compost or sandbag embankment placed in a manner to collect and divert minor flows.

Purpose

Flow control berms are used as temporary drainage systems to:

- divert up-slope runoff around a stockpile or soil disturbance;
- divert stormwater away from an unstable slope;
- direct minor flows to the inlet of a drainage *Chute*.

Limitations

Allowable catchment area is usually very limited due to the very limited flow capacity of a berm. Formally design *Flow Diversion Banks* are normally required to manage runoff from large catchment.

Catchment area is limited by the allowable flow capacity of the berm and the allowable flow velocity of the surface material.

Not used on slopes steeper than 10% (10:1).

Advantages

Quick to establish or re-establish if disturbed.

Generally inexpensive to construct and remove.

Allows for the management of stormwater flow without the need to excavate a drainage channel. This can be a significant advantage in areas that have highly erosive or dispersive subsoils.

Disadvantages

Can cause sediment problems and flow concentration if overtopped during a severe storm.

Can restrict the movement of equipment around the site.

Can be highly susceptible to damage by construction equipment.

Common Problems

Damaged by construction traffic.

Scour along the base of the embankment caused by excessive flow velocity or an unstable outlet.

Overtopping flows caused by the deposition of sediment up-slope of the bank.

Special Requirements

All flow control berms must have a stable outlet.

Earth berms should not be constructed of unstable, non-cohesive, or dispersive soil.

Location

When flow control berms are required and their locations are not shown on the approved plans, their location on the ground should be determined after taking into consideration the following:

- the berm must discharge to a stabilised outlet;
- the berm should drain to a sediment trap if the diverted water is expected to be contaminated with sediment;
- stormwater must not be unnaturally diverted or concentrated onto an adjacent property.

Site Inspection

Check for slumps, wheel track damage, or loss of freeboard.

Check for excessive sediment deposition.

Check for erosion along the berm.

Installation

1. Refer to approved plans for location, extent, and construction details. If there are questions or problems with the location, extent, or method of installation, contact the engineer or responsible on-site officer for assistance.
2. Clear the location for the berm, clearing only the area that is needed to provide access for personnel and equipment.
3. Remove roots, stumps, and other debris and dispose of them properly.
4. Form the berm from the material, and to the dimension specified in the approved plans.
5. If formed from sandbags, then ensure the bags are tightly packed such that water leakage through the bags is minimised.
6. Check the alignment of the berm to ensure positive drainage in the desired direction.
7. Ensure the berm discharges to a stable outlet.
8. Ensure the berm does not discharge to an unstable fill slope.

Maintenance

1. Inspect flow control berms at least weekly and after runoff-producing rainfall.
2. Inspect the berm for any slumps, wheel track damage or loss of freeboard. Make repairs as necessary.
3. Check that fill material or sediment has not partially blocked the drainage path up-slope of the embankment. Where necessary, remove any deposited material to allow free drainage.
4. Dispose of any collected sediment or fill in a manner that will not create an erosion or pollution hazard.
5. Repair any places in the berm that are weakened or in risk of failure.

Removal

1. When the soil disturbance above the bank is finished and the area is stabilised, the flow control berm should be removed, unless it is to remain as a permanent drainage feature.
2. Dispose of any sediment or earth in a manner that will not create an erosion or pollution hazard.
3. Grade the area and smooth it out in preparation for stabilisation.
4. Stabilise the area by grassing or as specified in the approved plan.