

# Drainage Control – General

## DRAINAGE CONTROL TECHNIQUES

The temporary drainage control measures placed on construction sites to appropriately manage stormwater runoff are traditionally considered part of the overall *erosion control* process. However, not all aspects of *drainage control* relate solely to the erosion control process. Some drainage control measures function to reduce soil erosion, while others benefit the sediment control process as outlined in Table 1.

**Table 1 – Application of drainage control measures**

Aspects applicable to erosion control	Aspects applicable to sediment control
<ul style="list-style-type: none"><li>• Diversion of up-slope stormwater runoff around soil disturbances.</li><li>• Division of a site into manageable drainage areas.</li><li>• Management of sheet runoff to minimise the risk of rill erosion down long slopes.</li><li>• Control of flow velocity and soil erosion within drainage channels and <i>Chutes</i>.</li></ul>	<ul style="list-style-type: none"><li>• Diverting up-slope runoff around excavations (benefits sediment control through a reduction in the volume of water required to be de-watered from the pit).</li><li>• Diversion of 'clean' water around sediment traps, thus improving their sediment-trapping efficiency and reducing the size of major sediment traps, such as <i>Sediment Basins</i>.</li></ul>

The proper management of stormwater runoff during the construction phase is critical to the implementation of effective erosion and sediment control. The importance of stormwater management generally increases with increasing rainfall intensity.

The stormwater drainage requirements of a site need to be appropriately incorporated into all stages of construction. Failure to recognise the requirements of such things as the diversion of up-slope 'clean' water, or the efficient delivery of sediment-laden water to sediment traps, can severely limit the overall efficiency of an erosion and sediment control program.

The effective management of stormwater within building and construction sites lies in the appropriate control of runoff velocity, volume and location. This usually requires the establishment of *temporary* drainage control measures, separate to the site's permanent drainage system. The temporary nature of these drainage controls often means that they are designed to a lower drainage standard compared to the permanent drainage system; however, the need for appropriate hydrologic and hydraulic design is just as important.

The primary function of these drainage control measures is to:

- minimise the risk of rill and gully erosion;
- minimise the risk of hydraulic damage to the adopted erosion and sediment control measures;
- control the velocity, volume and location of water flow through the site; and
- appropriately manage the movement of 'clean' and 'dirty' water through the site.

The principles of best practice (2008) construction site drainage control are outlined below.

1. The permanent and temporary drainage requirements of a site need to be appropriately considered during development of the Erosion and Sediment Control Plan.
2. Flow velocities need to be limited to the maximum allowable velocity for each individual drainage system.
3. All drainage channels, temporary or permanent, need to be constructed and maintained with sufficient gradient and surface conditions to maintain their required hydraulic capacity.
4. Wherever reasonable and practicable, up-slope stormwater runoff, whether 'dirty' or 'clean', needs to be diverted around soil disturbances and unstable slopes in a manner that minimises soil erosion, and the saturation of soils within active work areas.

5. To the maximum degree reasonable and practicable, 'clean' water needs to be diverted around sediment traps in a manner that maximises the sediment trapping efficiency of the sediment trap.
6. On disturbances exceeding 1500m<sup>2</sup>, Construction Drainage Plans need to be prepared for each stage of earth works.
7. The construction schedule and ESC installation sequence should allow for the installation of the temporary drainage system, and preferably the permanent stormwater drainage system, as soon as practicable.
8. Long slopes of disturbed or otherwise unstable soil should be divided into small, manageable drainage areas to prevent, or at least minimise, rill erosion.
9. In regions containing dispersive soils, construction details of drainage systems and bank stabilisation works need to demonstrate how these soils are to be stabilised and/or buried under a layer of non-dispersive soil.
10. Appropriate outlet scour protection needs to be placed on all stormwater outlets, *Chutes*, spillways and *Slope Drains* to dissipate flow energy and minimise the risk of soil erosion.
11. Building and construction sites need to employ appropriate short-term drainage control measures to deal with impending storms.
12. Clean, sealed surfaces, such as roofs, should be connected to the permanent underground drainage system (if available) as soon as they are constructed.
13. Adequate drainage controls need to be applied to all permanent and temporary, unsealed roads and tracks to minimise environmental harm caused by runoff from such surfaces.
14. Disturbances to natural watercourses and riparian zones need to be minimised wherever possible, and all temporary watercourse crossings need to employ appropriate drainage, erosion, and sediment controls to minimise sediment inflow into the stream.
15. All drainage systems, whether temporary or permanent, need to be designed to the appropriate drainage standard.

Drainage control techniques include, but are limited to, the following:

- Catch Drains
- Chutes
- Diversion Channels
- Flow Diversion Banks
- Level Spreaders
- Outlet Structures
- Check Dams
- Slope Drains
- Temporary Watercourse Crossings

The design of these drainage control measures are supported by technical guidelines on various chute and channel linings including:

- Cellular Confinement Systems
- Erosion Control Mats
- Geosynthetic Linings
- Grass Linings
- Hard Armouring
- Rock Linings
- Rock Mattresses
- Turf reinforcement Mats

For specific information on the above erosion control techniques, refer to the relevant fact sheets.