

## Guidelines for controlled activities

# Outlet structures

This guideline relates to the design of stormwater outlets and spillways from infrastructure (including roads, buildings, constructed basins/wetlands, swales or other drainage works) into a watercourse or waterfront land.

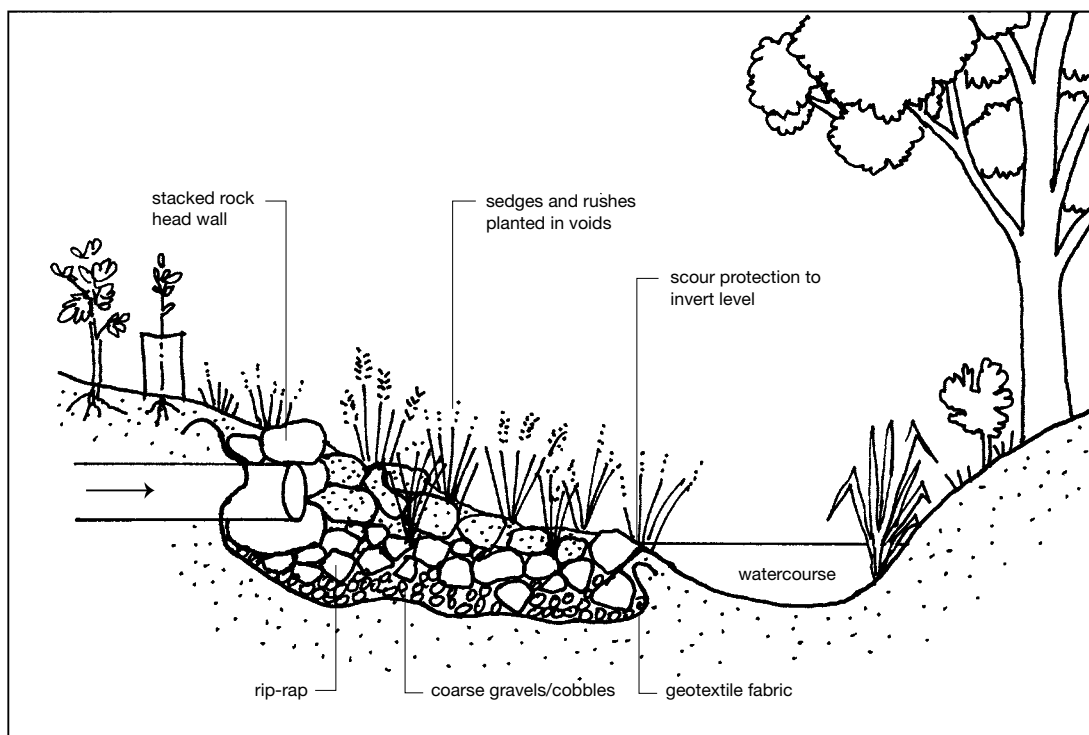
Controlled activities carried out in, on or under waterfront land are now regulated by the *Water Management Act 2000* (WMA). The Department of Water and Energy is required to assess the impact of a controlled activity to ensure that minimal harm will be done to any waterfront land, ie the bed and a distance inland of 40 metres from a river, lake or estuary.

This means that a controlled activity approval must be obtained from the Department prior to carrying out a controlled activity.

The design and construction of stormwater outlets should aim to be 'natural', yet provide a stable transition from a constructed drainage system to a natural flow regime (see Figure 1). The design and construction footprint and extent of disturbances within the riparian corridor should be minimised while still achieving the intended discharge function (refer to the Department's *Guidelines for controlled activities – Riparian corridors*).

All ancillary drainage infrastructure, such as oil/grease interceptors, sediment & litter traps, constructed wetlands and detention basins, should be located outside the riparian corridor. Run-off should be of appropriate water quality and quantity before discharging into a riparian corridor or watercourse. Appropriate rehabilitation of disturbed areas following the installation of outlet structures should adequately restore the integrity of the riparian corridor.

Figure 1. 'Natural' outlet structure.



The design and construction of outlet structures should consider, but not be limited to, the following design principles.

- Define the infrastructure route and identify the specific point of discharge. Ideally select a route along an existing cleared or disturbed area that avoids trees (preferably beyond their drip line).
- Choose a stable section of the stream for the discharge point, preferably mid-way between bends. Alternatively, if appropriate, incorporate outlet discharge points into disturbed/eroded areas which are to be stabilised or rehabilitated.
- Minimise construction footprint and ensure that disturbance to soil and vegetation within the riparian corridor is kept to the minimum extent required.
- Assess changes to the hydrology of the receiving watercourse to demonstrate that there is no detrimental impact on discharge volumes and channel velocities. Discharge velocities and flow rates should mimic 'natural' flows and not initiate erosion.
- Discharge from an outlet should not cause bed or bank instability.
- Protect the bed of the watercourse below the outlet, if not bedrock, or if bed scour is likely. Consider bank material and outlet 'jet' effect and protect the opposite streambank if required.
- Point outlet structure and direct discharge downstream.
- The outlet should not protrude beyond the streambank but tie-in with the adjoining bank alignment.
- Calculate tractive stresses generated from outlet discharges and from bank full discharges to determine rock size requirements for the structure.
- Rock rip-rap is the preferred material to provide a 'natural' outlet. Rip-rap should extend for the full extent of the design scour apron and adjoining flanks/streambank. Rip-rap should be appropriately keyed in and cut-off trenches provided.
- Rip-rap should consist of durable, angular run-of-quarry rock placed over a bedding layer of angular cobbles over geotextile. Where possible, incorporate vegetation, eg. sedges and rushes, into scour management (Figure 1).
- Grade the scour apron to the bed level of the watercourse, or just below any permanent water created by any stable feature, eg. a rock bar, within the watercourse.
- Stabilise and rehabilitate all disturbed areas including topsoiling, revegetation/regeneration, mulching, weed control and maintenance.

Figure 2. Rip-rap outlet structure with vegetation growing in voids between rocks.



When seeking approval to construct outlet structures, information detailing the above is required for the Department to assess the works.

Additional information will generally also be required and may include but not be limited to:

- detailed design drawings of outlet structures
- cross-sections and long-section of the stream
- hydrology report detailing pre and post construction hydrology of the channel
- a Vegetation Management Plan (VMP) prepared in accordance with the Department's *Guidelines for controlled activities – Vegetation Management Plans*
- a Site Management Plan incorporating the schedule, sequence and duration of works, erosion and sediment controls, etc.
- costing of all works (ie. materials, labour) and stages of works (eg. outlet structure installation, rehabilitation).

### Further information

If you require more information about controlled activity approvals please contact your local Departmental office or visit our website [www.dwe.nsw.gov.au](http://www.dwe.nsw.gov.au)

### Important notes

DWE has prepared these guidelines in good faith. In the case of any inconsistency between the guidelines and the controlled activity approval or legislation, the controlled activity approval or legislation will prevail to the extent of that inconsistency.

Nothing in these guidelines is taken to authorise a controlled activity. These guidelines are designed to provide information to assist in the design of any development or work that constitutes a controlled activity and the preparation of an application for a controlled activity approval. Users are advised to seek professional advice and to refer to the legislation and any relevant approvals, as necessary, before taking action in relation to any matters covered by the guidelines.

### Disclaimer

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