

SCOUR PROTECTION

WHAT IS THIS?

Scouring is the erosion of soil by water, usually caused when fast-moving water removes sediment from around unprotected pipe and channel outfalls, or along unprotected open drainage channels. Rocks, matting, vegetation, or standing water can be used to prevent scouring by slowing down and breaking up concentrated flows, protecting and extending the life of existing controls and infrastructure. Consider what type of scour protection is appropriate for the gradients of your site and the expected runoff velocities, noting that fibre rolls, sandbags, and rock check dams are only appropriate for low velocities.




WHAT DO I NEED TO DO?

Before starting site works:

Protect temporary pipe outfalls: Temporary outfalls should be located in areas where there is a low potential for soil erosion (e.g. areas of naturally occurring rock). If this is not possible, create a hard rock scour protector below the outfall point (Figure 4). In instances where the temporary outfall feeds into a natural waterway, use natural rock and vegetation to prevent scouring. If the outfall will be the permanent stormwater connection, or will become public infrastructure, the location and design must be approved during the planning permit process, and/or be approved under a permit to construct public infrastructure.

Check dams: These are semi-pervious temporary dams typically created using loose or bagged rock, fibre rolls, or sandbags, that are placed in series along unlined, open drainage channels to 'check' (slow) the flow of water. Check dams are only suitable for small catchments (less than 4 hectares) and gently sloping channels with a grade of less than 10:1 (Horizontal:Vertical). For steeper slopes or larger catchments, use drainage controls lined with matting or rock (see Lined drainage channels section below). Drainage channels with check dams are for temporary use to protect a work site and must be removed at the completion of the development.

REMEMBER:

-  DO NOT place check dams in channels that are already stabilised with vegetation.
-  DO NOT construct check dams using sediment fences or straw bales; use secured fibre rolls, sandbags, or preferably, rocks.
-  DO NOT construct check dams where dispersive soil is present (see page 36).

Lined drainage channels: Drainage channels which are steeper than 10:1 (H:V), below larger catchments, and with the potential for high flow velocities must be protected with natural or geotextile material, reinforced turf or rock. These drainage channels must be designed for the specified range in flow velocities and shear stress. Generally, rock is used for higher flow velocities and where good vegetation cover cannot be expected. When using matting, consider the longevity of the material in its application. For example, jute and coir mats have a lower allowable velocity limit compared to synthetic products, but synthetics can result in environmental pollution as they break down into microplastics. See the Drainage Control Factsheet series (IECA Book 4 Design Factsheets, 2010) for more detail.

Installing the controls:

Protect temporary pipe outfalls:

- Excavate the outlet pad footprint so that when the rock is placed in the excavated pit the top of the rocks will be level with the surrounding ground.
- Line the excavated pit with geotextile filter cloth, preferably using a single sheet or overlap by 300mm and ensure the filter cloth is protected from perforation or tearing during installation.
- Ensure that the rock used for scour protection is appropriately sized for the depth and flow rate as per Outlet Structures factsheet (IECA Book 4 Design Factsheets, 2010).
- Ensure there are at least two layers of rocks, and position larger rocks to ensure that the upper surface is not above the bottom of the pipe.

Note: If low water flow has been determined for the outfall (velocities not exceeding 1.5metres/second), 75mm rock may be used and stabilised with native grasses.

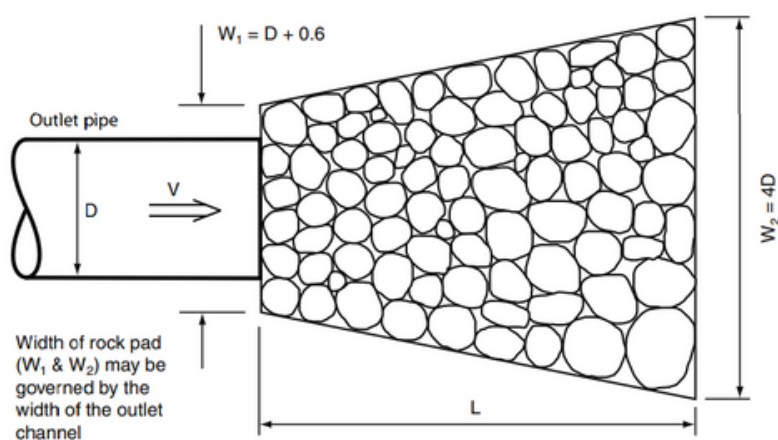


Figure 4: Plan view diagram indicating the dimensions and construction details of a recessed rock pad, which would act as protection against scour at a pipe outfall. *Figure from Catchments and Creeks Pty Ltd.*

Check dams: The number and frequency of check dams is based on the catchment size and slope of the drainage channel. General installation principles:

- Excavate a shallow (200mm) trench perpendicular to the drainage channel and prior to any channel curve.
- Place rocks or bags in the excavated trench and build up the dam wall. Check dams can be constructed with clean rocks or aggregate (washed sand/gravel) placed in geofabric sandbags for easy deconstruction.
- Ensure that the height of each dam 'spillway' is a minimum of 150mm below the outer wing points (Figure 5) with the spillway centred and built as wide and level as practical.
- Check dams rely on water overtopping the upstream dam onto standing water that pools and backs-up due to the height of the downstream dam. Space individual check dams so the downstream toe of the upstream dam is level with the spillway of the next downstream dam (Figure 5). Otherwise extend the downstream toe of each check dam to prevent scour and ensure regular maintenance checks are carried out.
- Ensure the outer edges of the check dam are continued up the slope to prevent flows scouring around the sides, which is the most common cause of check dam failure.

Note: If bagging rocks for building check dams, use geofabric bags or purpose-built netting rather than hessian bags, as hessian rots and breaks down, contributing to pollutant loads. Retrieve and dispose of bags or nets appropriately at the end of their use.

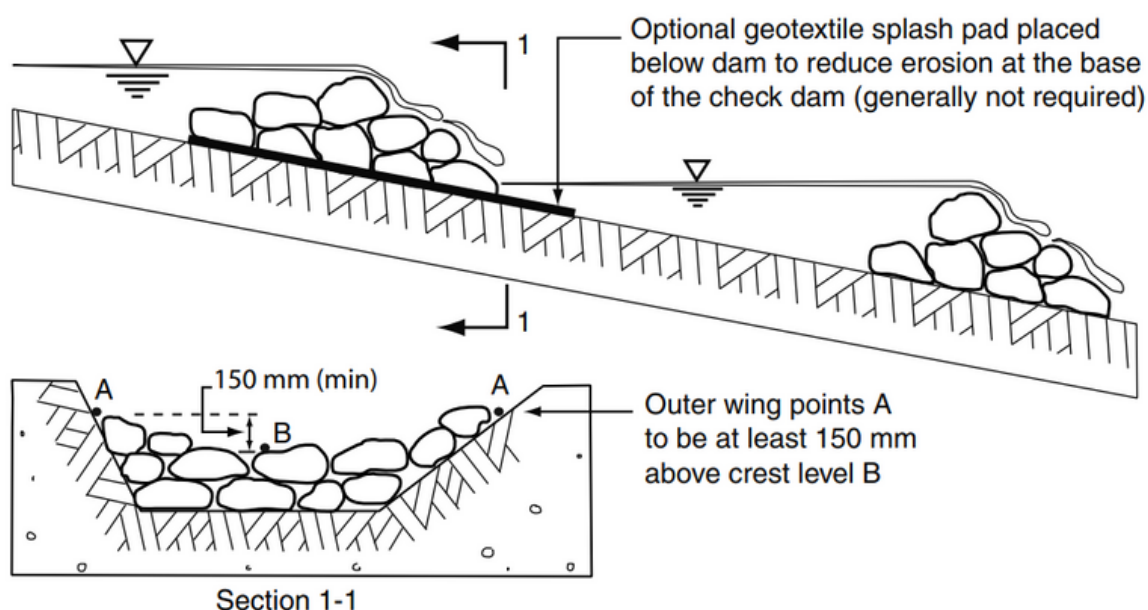


Figure 5: Cross-section and plan diagrams indicating the dimensions and construction details of a temporary check dam, shown in profile. *Figure from Catchments and Creeks Pty Ltd.*

Lined drainage channels - erosion mats: Drainage channels can be lined with synthetic or natural-fibre erosion mats - read the product installation manual and/or check with the manufacturer regarding appropriate application prior to installation. General installation principles:

- Remove surface irregularities to avoid puncturing.
- Anchor the upslope edge of each mat by backfilling within a 300mm deep by 150mm wide anchor trench (wire staples/pins can supplement).
- Overlap downslope mats with upslope mats by at least 300mm.
- Get good and consistent contact with the ground surface using 100mm wide by 150mm penetration length U-shaped, 8 to 11 gauge wire staples.
- For more information, see *Meshes, mats and blankets* section, page 44.

Lined drainage channels - rock: Rock lined drainage channels need to be installed according to approved plans, which must specify the location, extent, and rock size to be used for the expected flow velocity. General installation principles:

- Channel must be over-cut to a depth equal to the specified depth of rock placement so the finished rock surface will be level with the surrounding land.
- Base of the excavated channel must be lined with robust geotextile or equivalent.
- Armour rock must be placed so that it forms a dense, well-graded mass with minimum voids.

Maintaining the controls:

Inspect these scour protection controls prior to forecast rain, daily during extended periods of rain, and after significant runoff producing rain. For erosion mats, inspect for damage and if water is undermining the fabric, replace as necessary. For check dams and rock lined drainage channels, replace any displaced rock with rock of a significantly (minimum 110%) larger size than the displaced rock. Check dams require regular maintenance as accumulated sediment needs to be removed to prevent it becoming resuspended in the next rain event.

Drainage channels with check dams are for temporary use to protect a work site and must be removed at the completion of the development. Immediately after construction appropriately stabilise all disturbed areas.