

Check Dam Sediment Traps

SEDIMENT CONTROL TECHNIQUE

Type 1 System		Sheet Flow		Sandy Soils	✓
Type 2 System		Concentrated Flow	✓	Clayey Soils	✓
Type 3 System	[1]	Supplementary Trap	✓	Dispersive Soils	

[1] Generally considered a 'supplementary' sediment trap that should not be used as a site's primary sediment trap; however, substantial check dam sediment traps can be constructed (e.g. Photo 2).



Photo 1 – Sandbag check dam sediment traps



Photo 2 – Rock check dam sediment traps

Key Principles

1. Check dams are primarily used as drainage control devices for the control of flow velocity; however, most check dams will also collect small quantities of sediment.
2. The sediment trapping ability of check dams can be improved by excavating a sediment collection pit up-slope of the dams.
3. The critical design parameter is the total surface area of ponding up-slope of the dams.
4. The critical operational issues relate to the frequency of sediment removal from the traps. If the check dams are being used as sediment traps, then they must be de-silted on a regular basis.

Design Information

This fact sheet specifically addresses the design of check dam sediment traps. For guidance on the design of flow control check dams, refer to the separate drainage control fact sheet on Check Dams.

Check dams can be constructed from rock, sandbags, plastic grids (*Triangular Ditch Checks*), or compost-filled *Filter Socks*. Compost-filled socks provide the added advantage of being able to adsorb some dissolved and fine particulate matter. Straw/hay bales must **not** be used.

As a rock check dam increases in size (say, height > 500mm) it begins to function as a *Rock Filter Dam*, in which case the design rules specified for *Rock Filter Dams* applies.

If used for velocity control, check dams should be spaced down the drain such that the **toe** of the check dam is level with the **crest** of the immediate downstream check dam.

If used primarily as a sediment trap, the check dams should be installed such that the total surface area of ponding (Figure 1) upstream of the check dams is maximised.

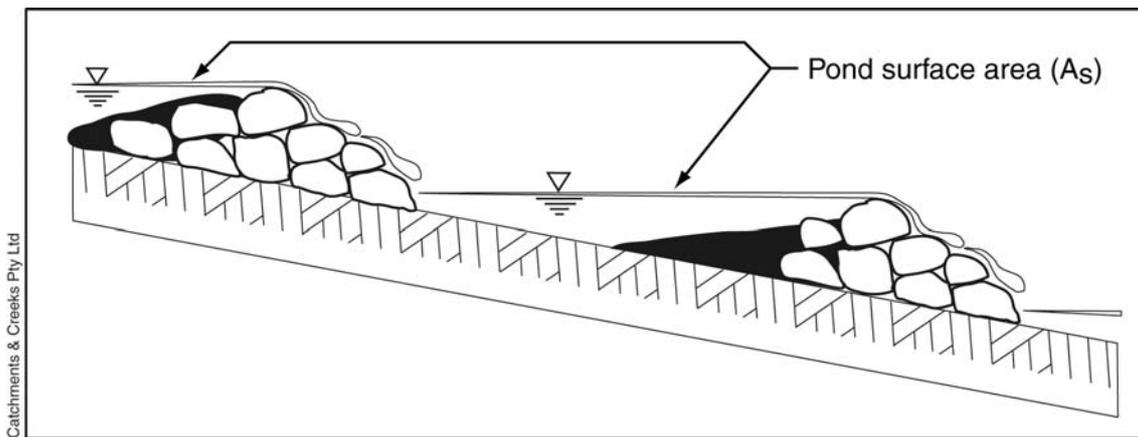


Figure 1 – Check dam sediment trap

Maximum allowable channel gradient is 10% (1 in 10).

Maximum recommended crest height of around 500mm. Check dams with a height exceeding 500mm should be checked for hydraulic stability.

The crest invert should be at least 150mm lower than outer edges (Figure 2). This is to reduce the potential for water to bypass around the edge of the check dam, and to allow the concentration of flow in the centre of the channel.

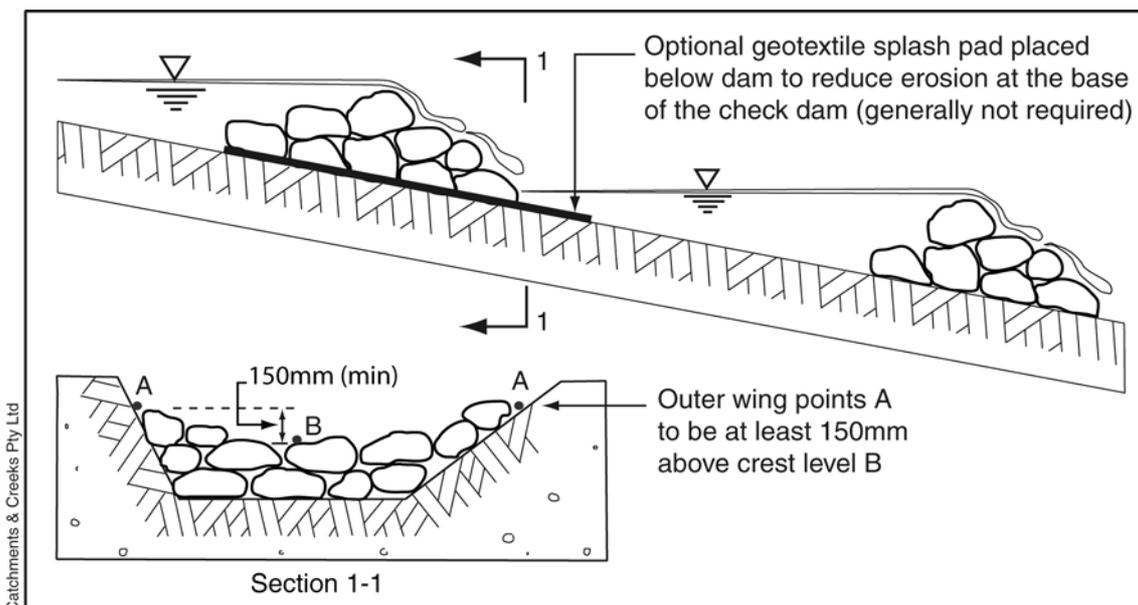


Figure 2 – Profile of rock check dam

The crest of the check dam should be curved (vertically) such that flow first spills over the centre of the dam. Ideally, the crest of each dam should be at least 150mm lower than the bank elevation at the outer edges of the structure.

The purpose of a curved crest profile is to:

- minimise the quantity of water bypassing around the edge of the check dam; and
- to concentrate flow into the centre of the channel.

Use of a flat crest profile can cause erosion (rilling) down the banks of the drain.

Maximum bank slope of rock face is 2:1 (H:V). For check dams higher than 0.5m the slope of the downstream face may need to be significantly flatter than a 2:1 slope.

If a check dam is likely to significantly choke a drainage channel causing water to overtop the channel, and if such overtopping is likely to cause drainage or erosion problems, then the hydraulic capacity of the check dam and channel should be checked. Refer to guidelines provided within the fact sheets for drainage control *Check Dams* for advice.

(a) Rock size (rock check dams):

Typical rock size of 150 to 350mm.

(b) Compost-filled socks:

Typical sock diameter of 200 to 250mm.

Placed in a U-shape pointing downstream and embedded at least 100mm into the soil or otherwise anchored to prevent water passing under the socks. The larger socks generally have the ability to seal well on solid and earth surfaces without additional anchorage.

The crest of the sock **must** be at least 100mm lower than the lowest ground level immediately adjacent to the ends of the sock.

(c) Erosion control at toe of check dams:

Erosion downstream of each check dam will be minimised if the dams are correctly spaced such that the crest of each dam is level with the toe of the nearest upstream dam.

Where necessary, the risk of erosion at the toe of each check dam may be reduced by forming each check dam on a sheet of geotextile fabric (e.g. filter cloth or woven fabric) that extends downstream of the dam a distance at least equal to the height of the dam (Figure 1).

(d) Optimisation of sediment trapping performance:

Sediment collection may be optimised by:

- excavating a sediment collection pit up-slope of the dam (Figure 3); however, always check potential safety issues;
- using compost-filled filter socks in place of rock or sandbags.
- placing a layer of clean aggregate on the up-slope face of the dam (minor improvement in performance);
- placing a layer of filter cloth on the upstream face of the check dam.

Also refer to the sediment control fact sheet for *Rock Filter Dams* for the design of Type 2 sediment traps.

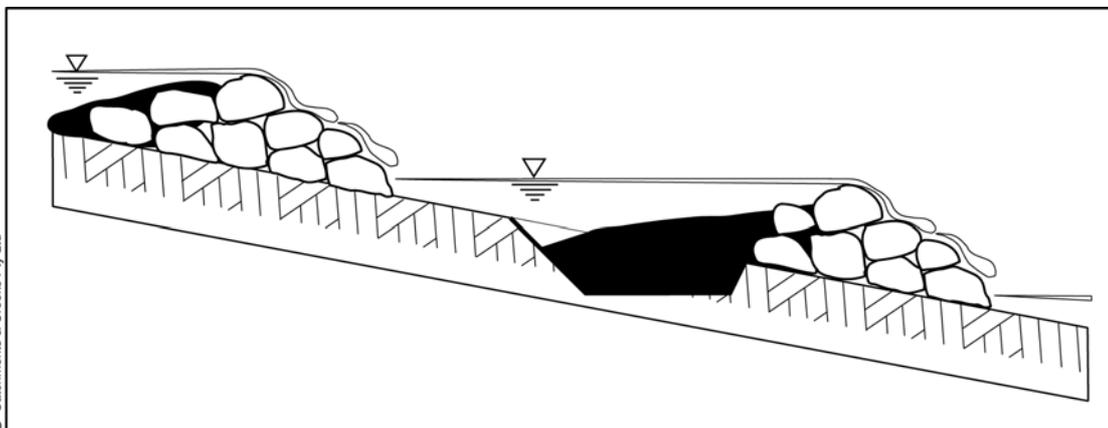


Figure 3 – Check dam sediment trap with optional sediment collection pit

Warning:

Check dams should **not** be used to control erosion within drains formed from dispersive soil. In circumstance where it is unavoidable, then the exposed dispersive soil should be covered with non-dispersive soil, and stabilised with an appropriate channel liner. Refer to guidelines provided within the fact sheets for drainage control *Check Dams* for further advice.

Description

Check dam sediment traps can be constructed from either semipervious or impervious materials typically rock, sandbags, or compost-filled filter socks.

Check dams should not be constructed from straw bales.

Purpose

Check dams are primarily used for drainage control purposes to control invert erosion within minor drainage channels.

However, check dam can also be used as minor sediment traps to supplement a site's sediment control system.

Limitations

Check dam sediment traps have relatively low sediment trapping efficiency and are generally only suitable for the capture of coarse sediment.

Limited to drain slopes less than 10%.

Not suitable for use in watercourses.

Should not be placed directly on dispersive soils, or within drains cut into dispersive soils.

Advantages

Quick and inexpensive to install and maintain.

Compost-filled filter socks can adsorb limited quantities of dissolved and fine particulate matter from that portion of the water passing through the socks.

Disadvantages

Can cause damage to grass cutting equipment if the rocks are not removed from the drainage channel after vegetation establishment.

Problems often occur when rock check dams are specified in shallow drains (<500mm deep). In such cases, the dams can significantly reduce the flow capacity of the drain.

Special Requirements

Installation of an excavated sediment collection pit can reduce maintenance.

Public safety issues must be addressed.

Care must be taken to prevent failure caused by water undermining or bypassing the dams.

Straw bales must **not** be used to form the dams.

Common Problems

Hydraulic problems often occur when rock check dams are specified in shallow drains.

Sediment not removed from the check dams on a regular basis (only required when the check dams are specifically used as sediment traps).

Site Inspection

Ensure the sediment traps are appropriate for the type of channel.

Ensure the crest is below the height of the outer wings of each dam.

Ensure the dams are appropriately spaced.

Check for potential safety risks.

Check if the sediment traps need de-silting.

Materials

- Rock: 150 to 300mm equivalent diameter, hard, erosion resistant rock.
- Sandbags: geotextile bags (woven synthetic, or non-woven biodegradable) filled with clean coarse sand, clean aggregate, or compost.

Installation (Rock Check Dam)

1. Refer to approved plans for location and installation details. If there are questions or problems with the location or method of installation contact the engineer or responsible on-site officer for assistance.
2. Prior to placement of the sediment trap, ensure the drainage channel is deep enough to prevent water being unsafely diverted out of the drain once the check dams are installed.
3. Locate each check dam sediment trap as directed within the approved plans, or otherwise at such a spacing to achieve the required sediment trapping outcomes.
4. If the check dams are also being used to control erosion within the drainage channel, then locate each successive check dam such that the crest of the immediate downstream dam is level with the channel invert at the immediate upstream check dam.
5. Construct each check dam to the dimensions and profile shown within the approved plan.
6. Where specified, the check dams must be constructed on a sheet of geotextile fabric used as a downstream splash pad.
7. Each check dam must be extended up the channel bank (where practicable) to an elevation at least 150mm above the crest level of the dam.

Installation (Compost-filled socks)

1. Refer to approved plans for location and installation details. If there are questions or problems with the location or method of installation contact the engineer or responsible on-site officer for assistance.
2. Prior to placement of the sediment trap, ensure the drainage channel is deep enough to prevent water being unsafely diverted out of the drain once the check dams are installed.
3. Locate each sock as directed within the approved plans, or otherwise at such a spacing to achieve the required sediment trapping outcomes.
4. Place each sock to the lines and profile shown in the approved plan or as directed by the site supervisor.

5. Ensure each sock extends up the channel banks (where practical) to a level at least 100mm above the crest level of the check dam.

Maintenance

1. Inspect each check dam and the drainage channel at least weekly and after runoff-producing rainfall.
2. Correct all damage immediately. If significant erosion occurs between any of the check dams, then check the spacing of the dams and where necessary install intermediate check dams or a suitable channel liner.
3. Check for displacement of the check dams.
4. Check for soil scour around the ends of each check dam. If such erosion is occurring, consider extending the width of the check dam to avoid such problems.
5. If severe soil erosion occurs either under or around the check dams, then seek expert advice on an alternative treatment measure.
6. De-silt sediment trap if the sediment level exceeds 1/3 the crest height.
7. Dispose of collected sediment in a suitable manner that will not cause an erosion or pollution hazard.

Removal

1. When construction work within the drainage area above the check dams has been completed and disturbed areas sufficiently stabilised to restrain erosion, the dams must be removed, unless the sediment traps are to remain as a permanent feature.
2. Remove collected sediment and dispose of in a suitable manner that will not cause an erosion or pollution hazard.
3. Remove and appropriately dispose of all materials including any geotextile fabric.
4. Stabilise the disturbed channel with a lining of fabric and rock, or establish vegetation as appropriate.