Excavated Sediment Traps

SEDIMENT CONTROL TECHNIQUE

Type 1 System		Sheet Flow		Sandy Soils	✓
Type 2 System	[1]	Concentrated Flow	✓	Clayey Soils	[3]
Type 3 System	[2]	Supplementary Trap	✓	Dispersive Soils	[4]

[1] Excavated sediment traps can be incorporated into *Rock Filter Dams* to form a Type 2 trap.

[2] Excavated sediment traps can be incorporated into various Type 3 systems to form a Type 3 trap.

[3] Limited control over fine sediments unless the settling pond has a substantial surface area.

[4] Excavated sediment trap should not be used in dispersive soils areas without expert advice.

Symbol

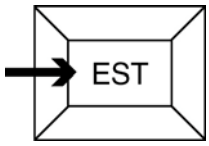

Photo 1 – Permanent excavated sediment trap on a stormwater outlet

Photo 2 – Temporary excavated sediment trap up-slope of a *Rock Check Dam*

Key Principles

1. The key design features are the surface area (A_s) of the excavated pond, and the distance of separation (L_1) of the settling pond from any source of highly concentrated flow such as a stormwater pipe. This separation helps to minimise the effects of outlet 'jetting', reduces sediment re-suspension, and reduces scour damage to the excavated pit.
2. Sediment collection is primarily achieved through gravity-induced 'sedimentation'; however, the process can be improved by the attachment of an outlet system such as a *Filter Tube Dam* (Figure 3) or *Rock Filter Dam* (Figure 4) to the pit.
3. The key operation issues include the appropriate management of all safety issues associated with the excavated pit and the resulting ponded water; and the regular de-silting of the sediment trap to minimise the risk of sediment re-suspension by subsequent storms.

Design Information

Excavated sediment traps are the most basic of sediment traps, and are often referred to simply as 'sediment traps'. Their size and efficiency can vary from the smallest 'supplementary' sediment trap excavated at the end of a stormwater pipe, to the largest Type 1 'wet' sediment basin.

Sediment trapping efficiency is primarily governed by the surface area (A_s) of the formed settling pond, which can be sized in accordance with the same design standards specified for *Coarse Sediment Traps, Rock Filter Dams* and *Sediment Weirs.* Special attention must also be applied to the control of inflow 'jetting' (refer to guidance provided for *Sediment Basins*).

Table 1 provides the required settling pond surface area per unit discharge in circumstances where the treatment standard has been specified.

Table 1 – Required pond surface area for various treatment standards ($m^2/m^3/s$)

Design standard	Critical sediment size (mm)	Surface area of settling pond per unit discharge for various water temperatures ($m^2/m^3/s$) [1]		
		10° C	15° C	20° C
Type 3 sediment trap	0.50	7.2	6.3	5.5
	0.20	45	40	35
	0.15	80	70	62
Type 2 sediment trap	0.10	180	160	140
	0.05	720	630	550

[1] A 20% increase in the theoretical surface area has been included to account for inflow turbulence.

Figure 1 shows the recommended minimal dimensional requirements of an excavated sediment trap placed within a minor drainage path.

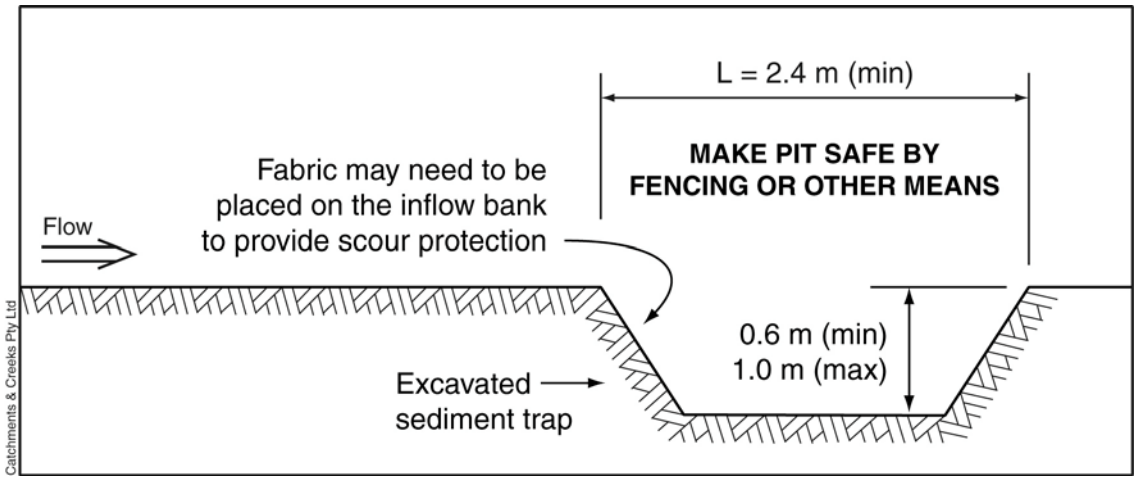

Figure 1 – Minimal dimensional requirements of excavated sediment trap located within a minor drainage path

Figure 2 shows the recommended minimal dimensional requirements of an excavated sediment trap placed downstream from a stormwater outlet.

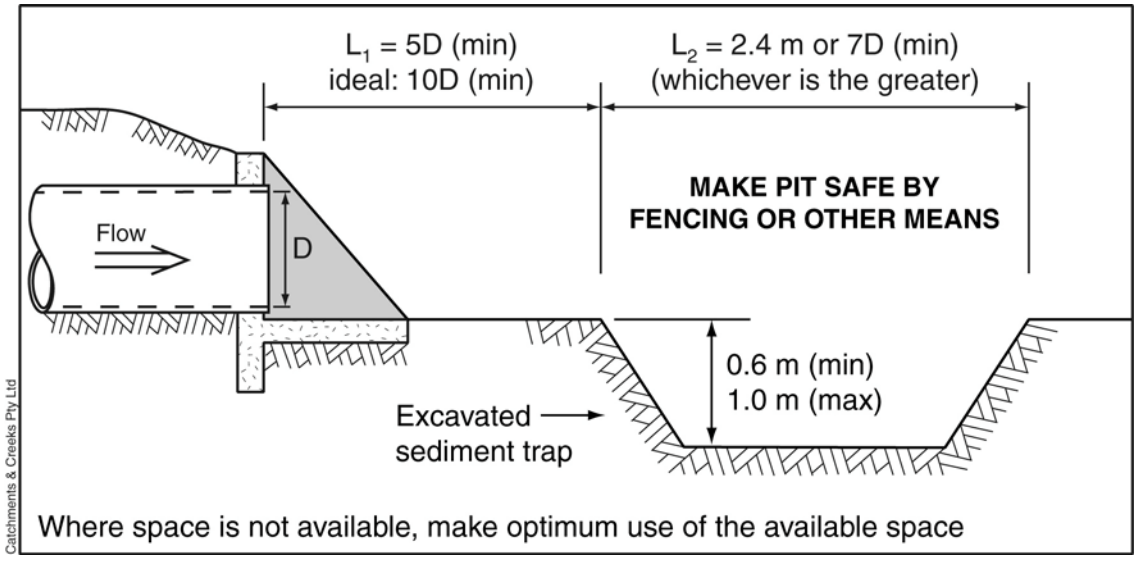

Figure 2 – Ideal minimal dimensional requirements of excavated sediment trap located downstream of a stormwater outlet

In circumstances where the stormwater pipe discharges at least 300mm above the receiving discharge channel, a *Filter Tube Dam* can be incorporated into the excavated sediment trap (Figure 3) to improve the sediment capture process.

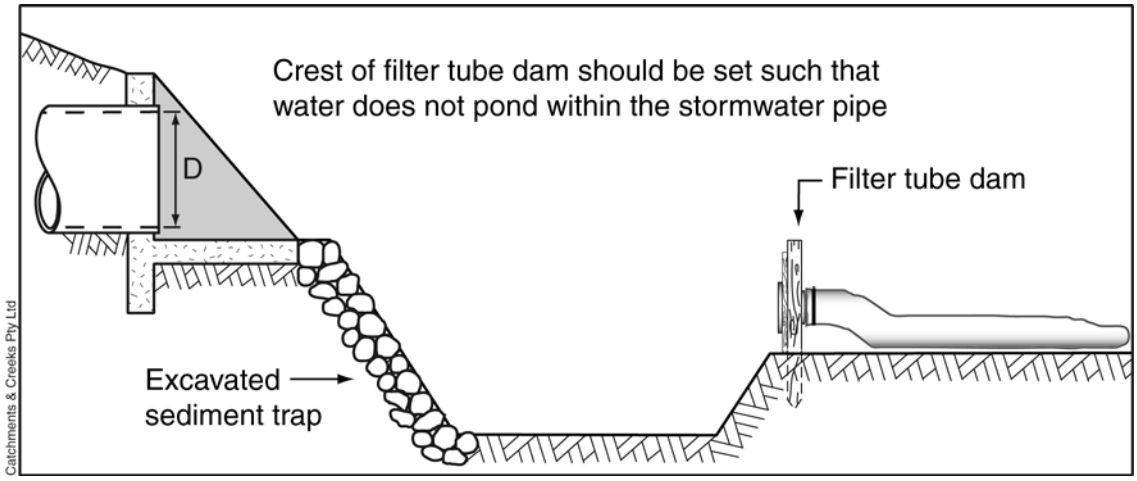

Figure 3 – Filter tube dam placed downstream of an excavated sediment trap to improve the sediment capture process

In circumstances where the stormwater pipe discharges at least 500mm above the receiving discharge channel, a *Rock Check Dam* or *Rock Filter Dam* can be incorporated into the excavated sediment trap (Figure 4) to improve the sediment capture process. To further improve the treatment process, *Filter Tubes* can be incorporated into the *Rock Filter Dam*.

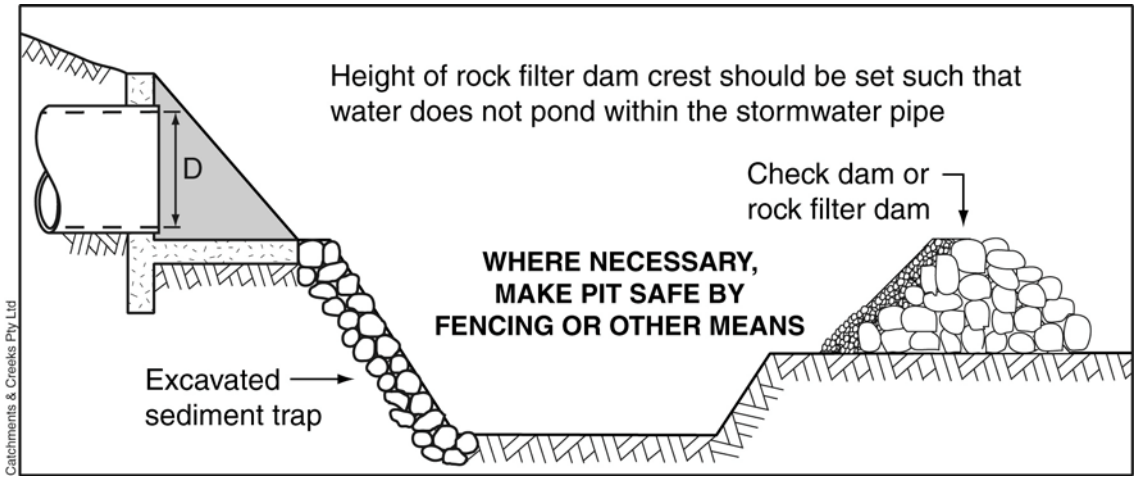

Figure 4 – Rock filter dam placed downstream of an excavated sediment trap to improve the sediment capture process

Description

An excavated pit capable of allowing sedimentation to occur as water passes through/over the formed settling pond.

The excavated pit may incorporate an outlet structure such as a *Check Dam, Rock Filter Dam* or *Sediment Weir.*

Purpose

Excavated sediment traps are most useful when working in areas where it is not safe or desirable to pond water above ground level.

Often used as a coarse sediment trap immediately up-slope of a Type 2 sediment trap.

Limitations

These sediment traps provide very limited capture of fine sediments.

Sediment trapping efficiency can be significantly compromised by inflow jetting.

Advantages

Quick and cheap to install and maintain.

Can be used to reduce the maintenance requirements of a down-slope Type 2 sediment trap.

Disadvantages

Can represent a safety risk to site workers and the public.

Common Problems

Scour or slumping of the steep-sided earth banks.

Special Requirements

Special attention must be applied to the control of inflow 'jetting'. Sediment fence baffle systems can be used to control such jetting—refer to guidance provided for *Sediment Basins*.

Location

Immediately downstream of low gradient stormwater outlets.

Immediately upstream of Type 2 sediment traps such as *Filter Tube Dams*.

Site Inspection

Check for potential safety risks.

Check for damage to the banks of the excavated pit.

Construction

1. Refer to approved plans for location and construction 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. Clear the foundation area of the outlet structure (if any), and install as per separate instructions.
3. Excavate the settling pond in accordance with the approved plans. Unless otherwise specified, the excavated pit should have a side slope of 2:1(H:V) or flatter.
4. Appropriately stabilise any bank subject to direct inflow.
5. Establish all necessary up-slope drainage control measures to ensure that sediment-laden runoff is appropriately directed into the sediment trap.
6. Take all necessary measure to minimise the safety risk caused by the structure.

Maintenance

1. Check excavated sediment traps after each runoff event and make repairs immediately.
2. Inspect the banks for slumping or excessive scour.
3. If flow through the structure is reduced to an unacceptable level due to blockage of the outlet structure (if any), then make all necessary repairs and maintenance to restore the desired flow conditions.
4. Check the structure and surrounding channel banks for damage from overtopping flows and make repairs as necessary.
5. Remove sediment and restore original sediment storage volume when collected sediment exceeds 30% of the pit volume.
6. Dispose of sediment and debris in a manner that will not create an erosion or pollution hazard.

Removal

1. When the up-slope drainage area has been stabilised, remove all materials included deposited sediment and dispose of in a suitable manner that will not cause an erosion or pollution hazard.
2. All water and sediment should be removed from the basin prior to the dam's removal. Dispose of sediment and water in a manner that will not create an erosion or pollution hazard.
3. Bring the disturbed area to a proper grade, then smooth, compact and stabilise and/or revegetate as required.