

# Modular Sediment Traps

## SEDIMENT CONTROL TECHNIQUE

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

[1] Classification depends on the flow rate able to pass through the filtration system (over a sustained period of time) relative to the required design storm flow rate.

[2] Limited capture of clay-sized particles, but typically better than most traditional Type 3 systems.

Symbol  MST



Photo 1 – Modular sediment trap



Photo 2 – Modular unit

**Modular sediment barriers as discussed within this fact sheet are a modification of the 'Sediment Weir' technique presented within a separate fact sheet. It should be noted that a patented design exists ('WaterClean FilterBale' by Star Water Solutions) for individual modular units containing replaceable filter cartridges and wrapped in filter cloth.**

### Key Principles

1. Most filtration systems have only a limited ability to capture and retain clay-sized particles; therefore, operators should not expect a significant change in the colour or clarity of water passing through the structure, especially when working in clayey soils.
2. Sediment trapping is primarily achieved by the filtration of minor flows that pass through the structure, however, sedimentation may also occur within the settling pond that forms by the modular weir during high flows.
3. The critical design parameter for optimising particle settlement is the 'surface area' of the settling pond. The hydraulic properties of the modular barrier are critical in achieving the desired stage-discharge relationship to achieve optimum settling pond conditions.
4. The allowable flow rate through the modular barrier is governed by the maximum allowable hydraulic head, the allowable flow rate per module, and the number of modules.
5. Sediment 'filtration' and gravity-induced 'sedimentation' can be improved by filling the modular units with compost or special pollutant-adsorbing filter bags (e.g. 'WaterClean FilterBale'), or attach one or more filter tubes to the weir (Figure 4).

### Design Information

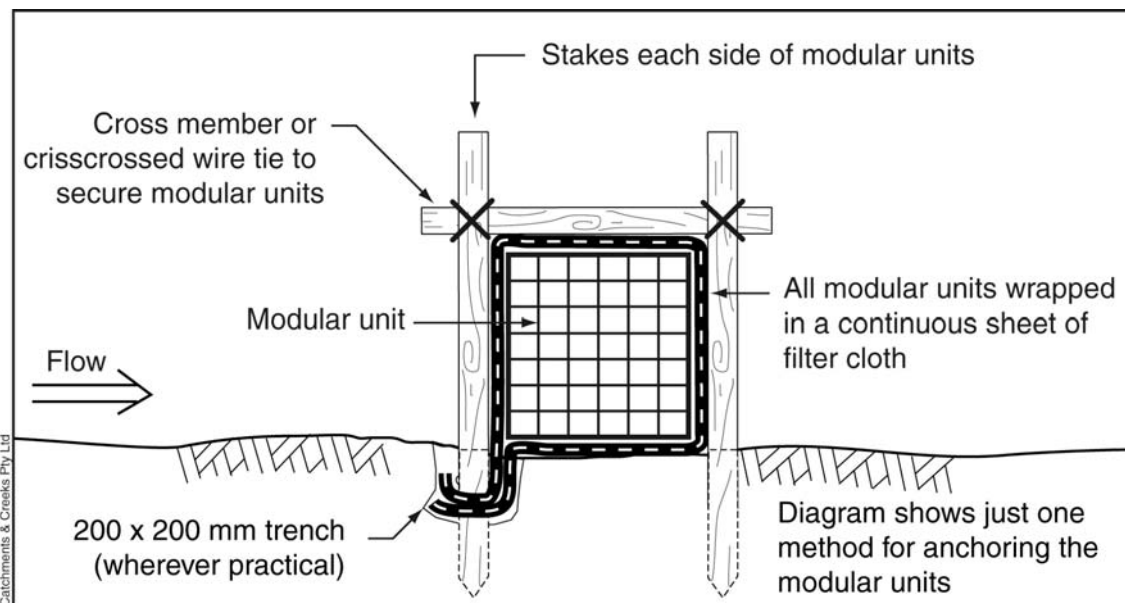
Discharge capacity of the modular sediment trap can be estimated as per the recommendations for *Sediment Weirs* (refer to separate fact sheet). Wherever possible, product-specific head vs discharge relationships should be obtained from the manufacturer or distributor.

Recommended sediment trapping classification is presented in Table 1.

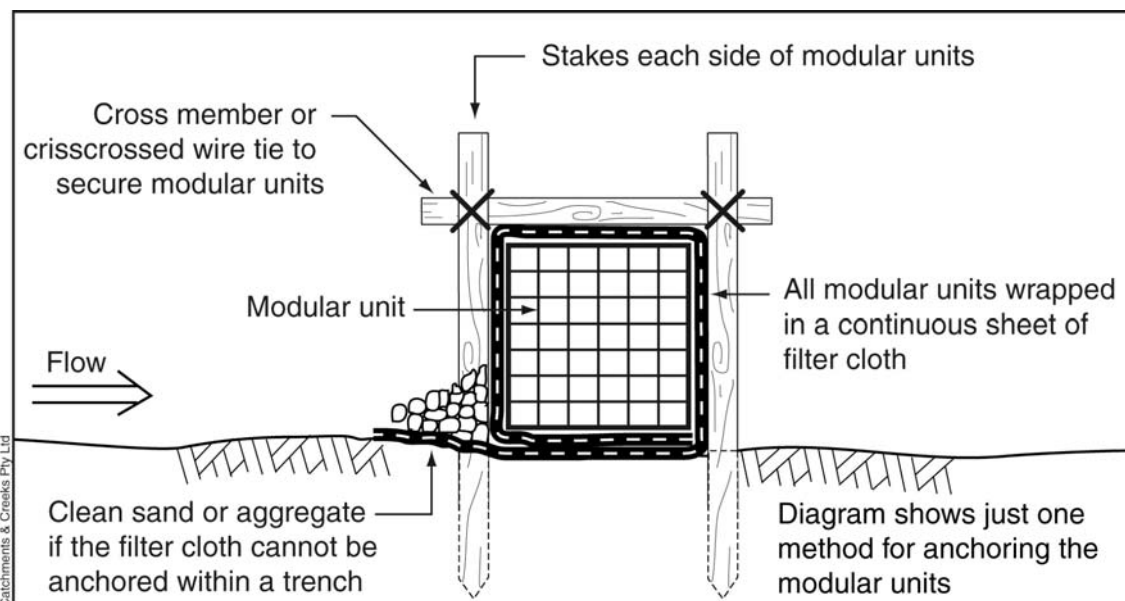
**Table 1 – Recommended sediment trapping classification**

Classification	Requirements
Type 2	<ul style="list-style-type: none"> <li>Minimum filter fabric specifications: pore size EOS less than 160microns, <math>O_{95}</math> less than 90microns; minimum mass of 300gsm (minimum 'bidim' A44 or equivalent).</li> <li>Specified design flow rate able to pass through the combined filter system (based on 50% blockage) without flow bypassing.</li> <li>Minimum surface area of upstream pond during design flow of <math>80m^2/(m^3/s)</math>.</li> </ul>
Type 3	<ul style="list-style-type: none"> <li>Minimum filter fabric specifications: pore size EOS less than 160microns, <math>O_{95}</math> less than 90microns; minimum mass of 300gsm (minimum 'bidim' A44 or equivalent).</li> <li>Alternatively, modular units wrapped in sediment fence fabric.</li> </ul>

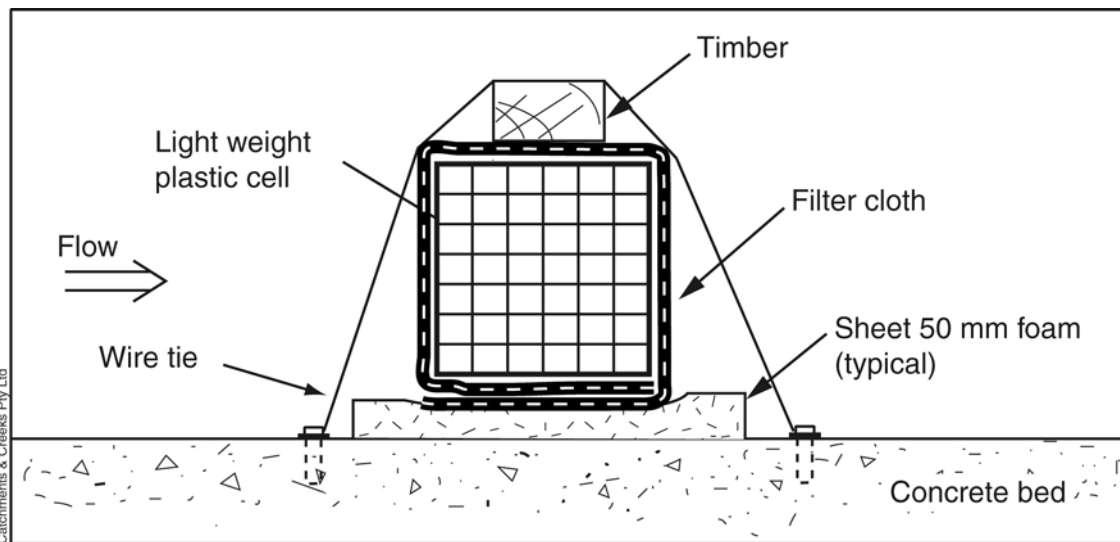
Wherever practical, the filter fabric should be anchored within a backfilled 200mm deep trench (as per sediment fence installation), otherwise bury the fabric under aggregate.



**Figure 1 – Preferred method of anchoring geotextile wrap**

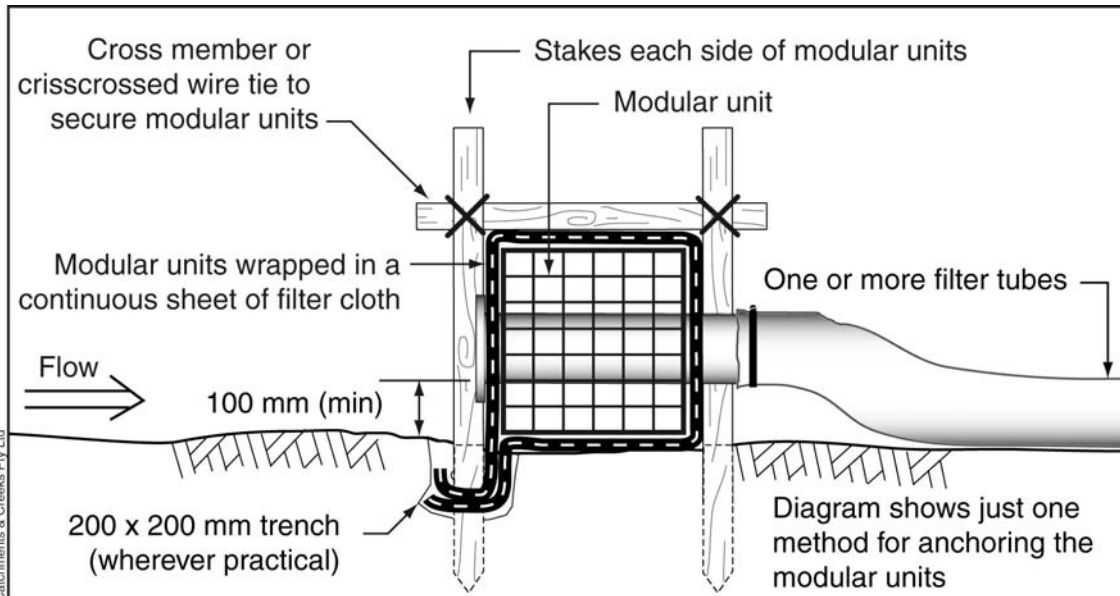


**Figure 2 – Alternative method of anchoring geotextile wrap**



**Figure 3 – Typical installation of modular sediment trap within a concrete drain**

Incorporating filter tubes into modular sediment traps (Figure 4) requires the modification of some of the modular units to house the connection pipes; however, once modified, these units can be reused on similar installations.



**Figure 4 – Typical arrangement of filter tubes incorporated into a modular sediment trap**

**Description**

A sediment filtration trap formed from modular units wrapped in filter cloth.

The modular units are used as a modern replacement for straw bales.

**Purpose**

Modular sediment traps are a specialist sediment control system developed for specialist installation purposes.

Originally developed to allow the formation of a sediment weir type structure within concrete lined drainage channels during construction and maintenance activities.

Used as a modern alternative to straw bales. They are both reusable and significantly more durable.

**Limitations**

In the absence of an appropriate internal filter media, the filter cloth provides limited capture of clay-sized particles.

**Advantages**

Light, reusable and durable.

**Disadvantages**

Can be difficult and time consuming to install.

## Special Requirements

The use of heavy-duty filter cloth ('bidim' A44 or equivalent) is generally preferred to woven sediment fence fabric.

Woven fabrics do not allow 'filtration' to occur, but do encourage ponding and 'sedimentation' up-slope of the sediment trap.

It is important to ensure a good contact is achieved between the modular units and the ground surface to prevent leakage.

## Site Inspection

Check for leakage under or around the sediment trap.

## Materials

- Modular units: open mesh stackable cells (e.g. *Atlantis* Matrix Tank Modules or milk crates), typical size of around 400 x 450 x 600mm.
- Filter Fabric: heavy-duty, needle-punched, non-woven filter cloth minimum 'bidim' A44 or equivalent. Minimum fabric width of 2.4m; however 2m wide fabric can be used with care.
- Support posts/stakes: 1500mm<sup>2</sup> (min) hardwood, 2500mm<sup>2</sup> (min) softwood, or 1.5kg/m (min) steel star pickets.
- Aggregate: 15 to 25mm clean gravel or aggregate.
- Foam: minimum 50mm thick, soft foam.

## Installation

### **Installation within an off-stream location:**

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. Suitably clear and prepare the surface where the units will be installed.
3. Unless directed by the site supervisor or the approved plans, excavate a 200mm wide by 200mm deep trench along the proposed barrier, placing the excavated material on the up-slope side of the trench.
4. Using 2.4m wide fabric, lay the fabric on the ground with 200mm of the up-slope edge placed with the trench.

5. Using 2m wide fabric, lay the fabric on the ground with the up-slope edge aligned 200mm down-slope of the trench.
6. If more than one sheet of fabric is used, then overlap the filter fabric a minimum of 600mm at all joints.
7. Place the modules end to end on the fabric with the up-slope edge aligned with the down-slope edge of the trench.
8. Fold the remainder of the filter cloth over the modular units such that the end of the fabric extends at least 200mm into the trench.
9. Secure stakes immediately up-slope and down-slope of each modular unit. The up-slope stake should be used to both secure the modular units and anchor the fabric.
10. Using either a timber cross member or crisscrossed wire, secure the modular units to the stakes such that vertical movement is prevented.
11. Backfill the trench and tamp the fill to firmly anchor the bottom of the fabric to prevent water from flowing under the sediment barrier.

## Maintenance

1. Inspect the sediment trap at least weekly and after any significant rain. Make necessary repairs immediately.
2. When making repairs, always restore the system to its original configuration unless an amended layout is required.
3. Remove accumulated sediment if the sediment deposit exceeds a depth of 1/3 the height of the barrier.
4. Dispose of sediment in a suitable manner that will not cause an erosion or pollution hazard.

## Removal

1. When work area upstream of the modular sediment barrier is sufficiently stabilised to restrain erosion, the barrier must be removed.
2. Remove all materials and deposited sediment and dispose of in a manner that will not cause an erosion or pollution hazard.