Sump Pits

DE-WATERING SEDIMENT CONTROL TECHNIQUE

Low Flow Rates	✓	Low Filtration	✓	Sandy Soils	✓
Medium Flow Rates		Medium Filtration		Clayey Soils	✓
High Flow Rates		High Filtration		Polluted Soils	

Symbol

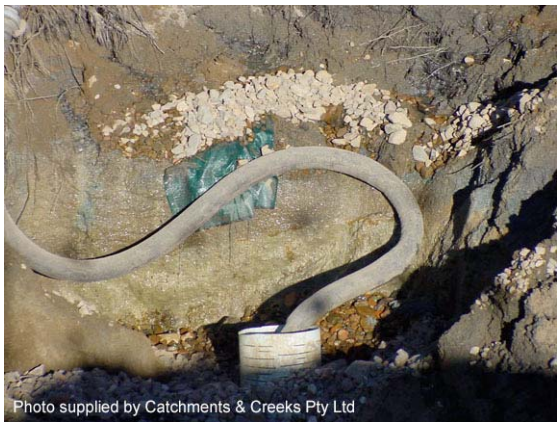

Photo 1 – Sump pit in operation

Photo 2 – Perforated stand pipe (foreground)

Key Principles

1. Water treatment is primarily by filtration, firstly through the aggregate, then possibly through a filter surrounding the removable intake pipe.
2. Sump pits are primarily used as a pre-treatment system with water pumped from the pit to a secondary treatment unit before discharge from the site.

Design Information

Typical pit volume of 1.5 m^3 per 100 m^2 of contributing catchment area.

Minimum pit depth of 1m, width of 2m, and excavated volume of 2 m^3.

The stand pipe is normally 300 to 600mm diameter with perforation consisting of 10mm holes at 60mm spacing, or the equivalent in saw cuts (Photo 2).

Filter aggregate consist of 15 to 25mm aggregate if sediment filtration is essential, or 50 to 75mm aggregate if the sump pit is used as a pre-treatment system.

To meet the prescribed water quality standards, the water will likely need to discharge to a secondary treatment system.

If the effluent is discharged directly to the stormwater system, then the pump intake (foot valve) may need to be housed inside a strong, removable wire cage wrapped in a suitable filter in order to achieve the desired effluent quality. It is not advisable to attach filter cloth to any component of the sump pit that cannot be easily removed for cleaning/maintenance.

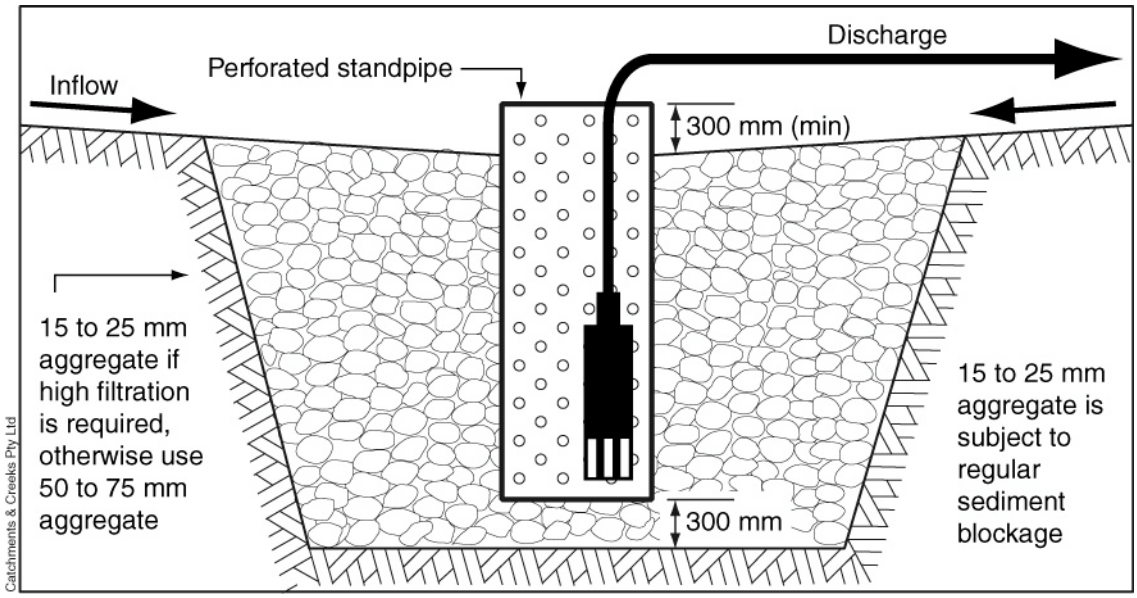

Figure 1 – Typical layout of a sump pit

Description

An excavated pit used to collect and filter contaminated runoff. A perforated stand-pipe is placed vertically in the centre of the excavated pit prior to backfilling with clean aggregate.

Filtered water is pumped from inside the standpipe to a secondary treatment system or a suitable discharge point.

Purpose

Typically used as a pre-treatment system prior to the water being pumped to a secondary filtration system, or when only low quality treatment is required.

Limitations

Suitable for pumping low flow rates.

Low treatment standard when used as a single treatment process.

Advantages

Can be very effective for small catchments.

Small in surface area and generally do not interfere with construction.

Disadvantages

Can affect groundwater levels (generally only a short-term issue).

Special Requirements

Filter cloth (if used) must be attached to a component of the sump pit that can be easily removed for cleaning/maintenance.

Overall treatment efficiency may be improved by constructing the pits within a well-drained soil.

Site Inspection

If the pit is used over an extended period, de-silting may be required.

Check for excessive blockage of the aggregate causing water to spill directly into the standpipe.

Materials

- Filter medium: 15 to 25mm or 50 to 75mm aggregate (depending on use).
- Filter cloth: minimum 'bidim' A34 or the equivalent.
- Standpipe: 300 to 600mm diameter corrugated or PVC pipe perforated with the equivalent of 10mm holes at 60mm spacing.

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. Excavate the pit to the dimensions shown on the approved plans. The pit should be at least 1m deep and a diameter 2m greater than the standpipe's diameter.
3. Place a 300mm deep bed of 50 to 75mm aggregate on the base of the pit.
4. Construct a standpipe by perforating a 300 to 600mm diameter corrugated or PVC pipe and place it upright in the centre of the pit. Ensure the standpipe extends at least 300mm above the anticipated standing water elevation.
5. Once the standpipe is installed, backfill the surrounding pit with either 15 to 25mm or 50 to 75mm clean aggregate as directed within the plans.

Additional filter cloth wrap (optional)

1. If effluent from the sump pit is to be discharging directly to a water body or into an impervious drain or gutter, then install an additional cloth filter as directed.
2. Option 1: Form a suitable wire mesh cage around the submersible pump or foot valve, then wrap the cage with filter cloth. This option may be subject to frequent sediment blockage.
3. Option 2: Assemble a second, smaller diameter pipe that can be easily inserted and removed from the standpipe. Wrap this pipe in heavy-gauge wire mesh (to separate the filter cloth from the pipe), then cover with filter. The removable pipe must be the same height as the standpipe and of sufficient diameter to allow insertion of the submersible pump or foot valve.

Maintenance

1. Inspect the sump pit regularly and at least daily during de-watering operations.
2. Make repairs as needed to the pit.
3. Remove any sediment accumulated on the surface of the sump pit.
4. If the sump pit fails to achieve the desired flow rate or water quality standard, then the pit should be re-established or replaced with a suitable alternative sediment trap.

Removal

1. When the sump pit is no longer required, it must be removed or otherwise suitably stabilised.
2. Remove materials and collected sediment and dispose of in a suitable manner that will not cause an erosion or pollution hazard.
3. Grade and stabilise the area as specified within the approved plan. Re-seed or turf the disturbed ground as necessary to minimise the erosion hazard.