

VERIFICATION REPORT FOR DRAINAGE SYSTEM BASED ON SUDS SYSTEM / ATTENUATION

1.0 DRAINAGE SYSTEM AND ATTENUATION TANK INSTALLATION

The drainage system has been drained on a separate system within the site as noted in the Drainage Strategy Report and in accordance with the drainage arrangement drawing 2500 D1. The foul water discharges to the combined adopted drain in Gladeside Road to the North of the site and the surface water discharged to the existing adopted surface water drain to the West in Greenwood Road.

As part of the surface water drainage, a SUDs assessment has been undertaken and the discharge has been restricted with a restricted discharge of 5.0 litres per second (l/s) with the flow being attenuated within a crate system.

Photographs of the installation are attached in Appendix A.

2.0 CONFIRMATION OF MAINTENANCE AGREEMENT

A maintenance agreement has been entered into with the Building owners.

A copy of the maintenance schedule is shown in Appendix B.

3.0 CONFIRMATION OF ATTENUATION CRATE INSTALLATION

The crate system utilised has been Envirocrate by Pennine Manufacturing Ltd which has been encapsulated within a membrane system. (Specification attached to the rear).

The attenuation tank has been back filled following installation of the membrane in accordance with manufacturers specification.

A copy of the specification of the attenuation crates as installed is shown in Appendix C.

4.0 CONFIRMATION OF AS BUILT INSTALLATION

A copy of the As Built arrangement is shown on drawing 2500 D1D attached in Appendix D.

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APPENDIX A

PHOTOGRAPHS



ATTENUATION CRATE



ATTENUATION CRATE



ATTENUATION CRATE

APPENDIX B

MAINTENANCE AGREEMENT

DRAINAGE MAINTENANCE SCHEDULE

GREENWOOD ROAD, WYTHENSHAW

SUMMARY OF DRAINAGE DESIGN PHILOSOPHY:

FOUL DRAINAGE

Foul drainage collected from around the building to discharge under gravity to manhole to North Western corner and into the adopted drainage system in Gladeside Road.

SURFACE WATER DRAINAGE

Roof water collected from high level roof to discharge under gravity to manhole with flow restrictor to North Western corner prior to discharging to adopted drainage system in Gladeside Road.

Small parking area to Eastern side drained to falls to discharge to gullies and run to collect with roof water.

Basement car park laid to falls to surface water drainage channels. The car park is fully enclosed, only run off from the cars and the ramp are required to be collected. Drainage channels to discharge to pumped system with pump to collecting manhole.

Attenuation provided with crate system located in exterior car park and discharged via flow restrictor.

OPERATION AND MAINTENANCE REQUIREMENT FOR GENERAL SYSTEM – BOTH FOUL AND SURFACE WATER

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in manholes and gullies	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment from gullies with gully cleaner and rinse drainage channels with water jet	As required, based on inspections – minimum Annually
Occasional Maintenance	Basement Pump - obtain maintenance programme with manufacturer	Annually
Occasional Maintenance	Flow Restrictor – inspect for sediment	Annually

OPERATION AND MAINTENANCE REQUIREMENT FOR ATTENUATION STORAGE TANKS

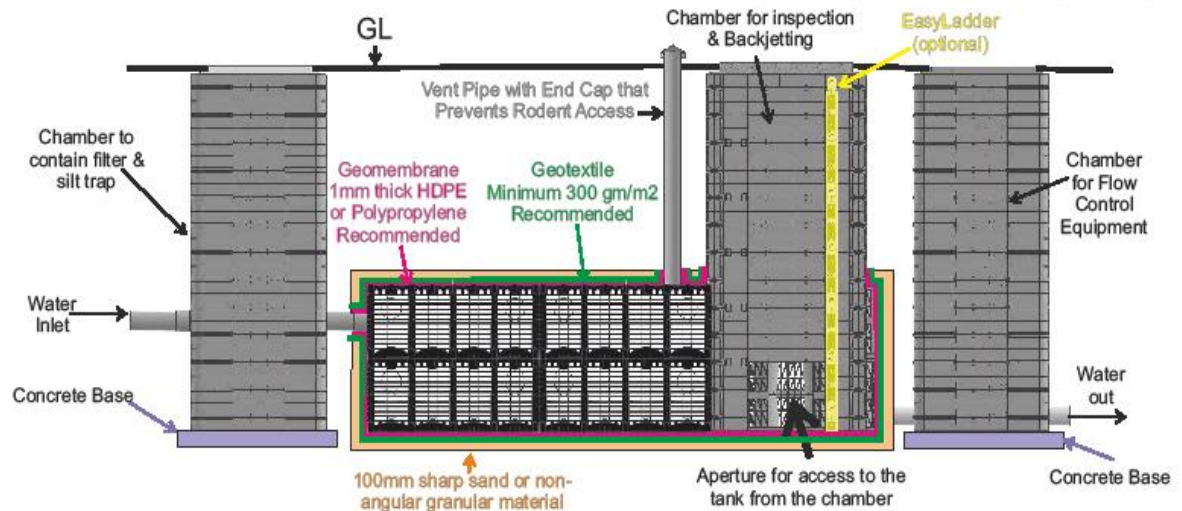
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from silt trap pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Rinse/jet inside of tank for removal of sediment build-up	Every 2 years or as required

APPENDIX C

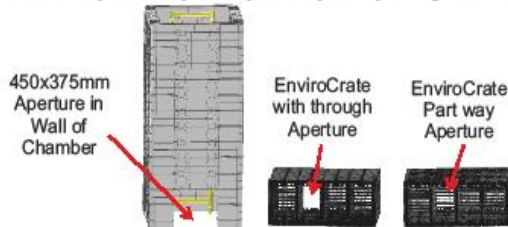
ATTENUATION CRATES INSTALLATION

Pennine

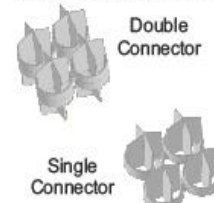
EnviroCrate Attenuation Tank with Access Chamber for Inspection & Backjetting



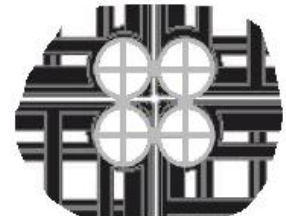
Extra Components for Inspection/Backjetting Chamber



Other Components used in an EnviroCrate Tank



Plan view of connector joining the corners of four crates



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EnviroCrate Installation Instructions Pre-installation notes:

For attenuation systems: position the inflow and outflow connections level with the base of the EnviroCrate structure

For infiltration systems: position the inflow connection at the top of the EnviroCrate structure.

For traffic with axle weight up to 12 tonnes the minimum cover required is 450mm

For traffic with axle weight up to 10 tonnes the minimum cover required is 400mm

For traffic with axle weight up to 5 tonnes the minimum cover required is 300mm

For traffic with axle weight up to 2 tonnes the minimum cover required is 250mm

For traffic with axle weight up to 1 tonnes the minimum cover required is 200mm

Installation Instructions:

1/. Excavate to the required length, width and depth and level the base. Make sure that the area is enough to allow plant access around sides to compact the backfill material (500mm minimum)

Ensure the base is smooth and level with no sharp protrusions. Check that the slopes are cut back to a safe angle or adequately supported and that a safe access is possible to allow site personnel to enter the excavation.

2/. Inspect the base for soft spots and if any are present, excavate and replace with compacted granular fill material.

3/. Lay 75mm sharp sand bedding layer to the base of the excavation and level off. Lay the geotextile protection fleece (180g non woven, needle punched type GT1900), ensuring a minimum 150mm overlap. This is required for both attenuation and infiltration tanks(soak-aways).

4/. Lay the geomembrane (if tank is for water storage) over the geotextile and sand bedding layer and up the sides of the excavation. Examine the geomembrane for damage and test all welds/ taped joints.

5/. Assemble the EnviroCrate units (1m x 1m x 0.4m High) and install within the void in accordance with the installation schedule for correct positioning. Special clips are provided to join the units to prevent displacement (single clips for adjacent units (3 per unit) and double clips for all multi layer applications (1per unit)).

6/. Complete the geotextile and/or geomembrane encapsulation to the sides and top of the installation, ensuring that the protection fleece (if attenuation) has sufficient to overlap by 150mm minimum. The geomembrane should be welded with double seams or taped using double sided tape and inspected for damage, testing the welds/joints as required.

7/. Connect the drainage connections to the installation using proprietary adaptors. Alternatively for infiltration systems use flange adaptors and attach them to the EnviroCrate units with self tapping screws. For attenuated systems, it is recommended that all connections and air vent installations are achieved using sealed drainage connections into a preformed socket using proprietary seals "top hats" available to order.

8/. Backfill around the installation with Type 1 or 2 sub base, compacting in 150mm layers, in accordance with the Specification for Highway Works.

9/. Place a 75mm sharp sand protection layer if required over the top of units and continue to backfill as follows:

For trafficked areas (car parks etc):

Type 1 or 2 sub base material compacted in 150mm layers in accordance with the Specification for Highway Works.

Compaction equipment on top of the system not to exceed 2,300kg per sq.metre.

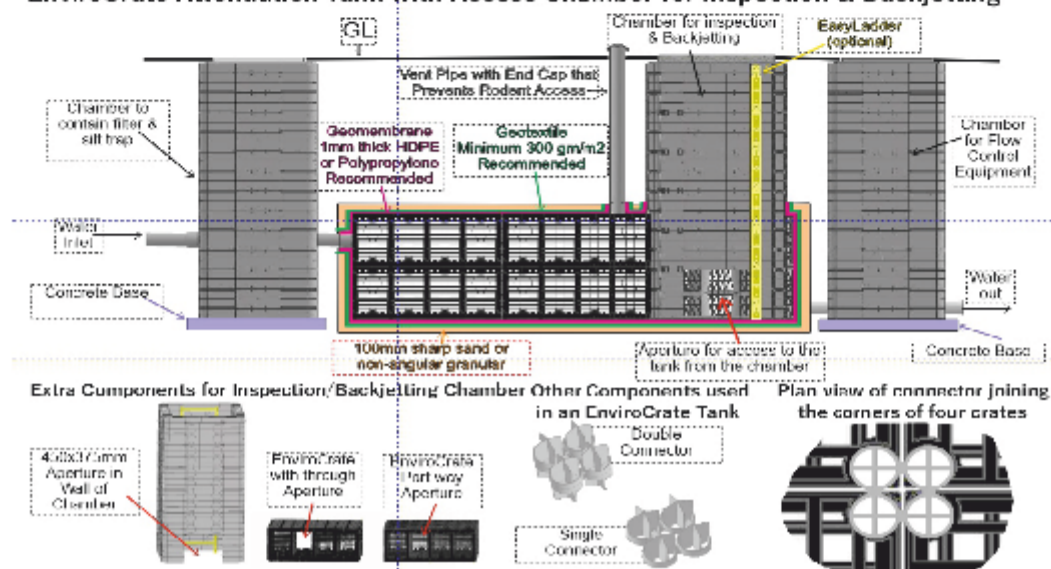
Backfill the sides with granular material (not cohesive)

For landscaped and non-trafficked areas:

Selected "as dug" material with a unit size no more than 75mm compacted to 90% maximum dry density. Compaction equipment on top of the system not to exceed 2,300kg per sq.metre.

10/. Finalise the pavement construction / landscaping over the EnviroCrate system.

EnviroCrate Attenuation Tank with Access Chamber for Inspection & Backjetting



APPENDIX D

AS BUILT ARRANGEMENT DRAWING

2500 D1D