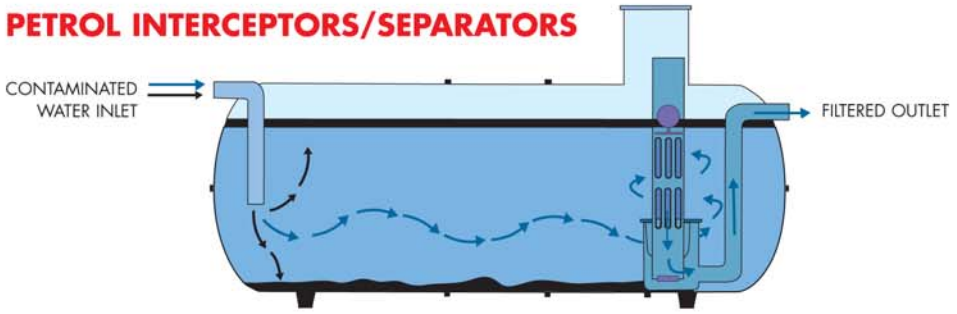
Stormbox STORMWATER MANAGEMENT SYSTEM(SuDS)

PETROL INTERCEPTORS/SEPARATORS



PRODUCT RANGE

BYPASS SEPARATOR - FULL RETENTION SEPARATOR - SILT SEPARATOR - SILT TRAP - GREASE TRAP

BYPASS SEPARATORS

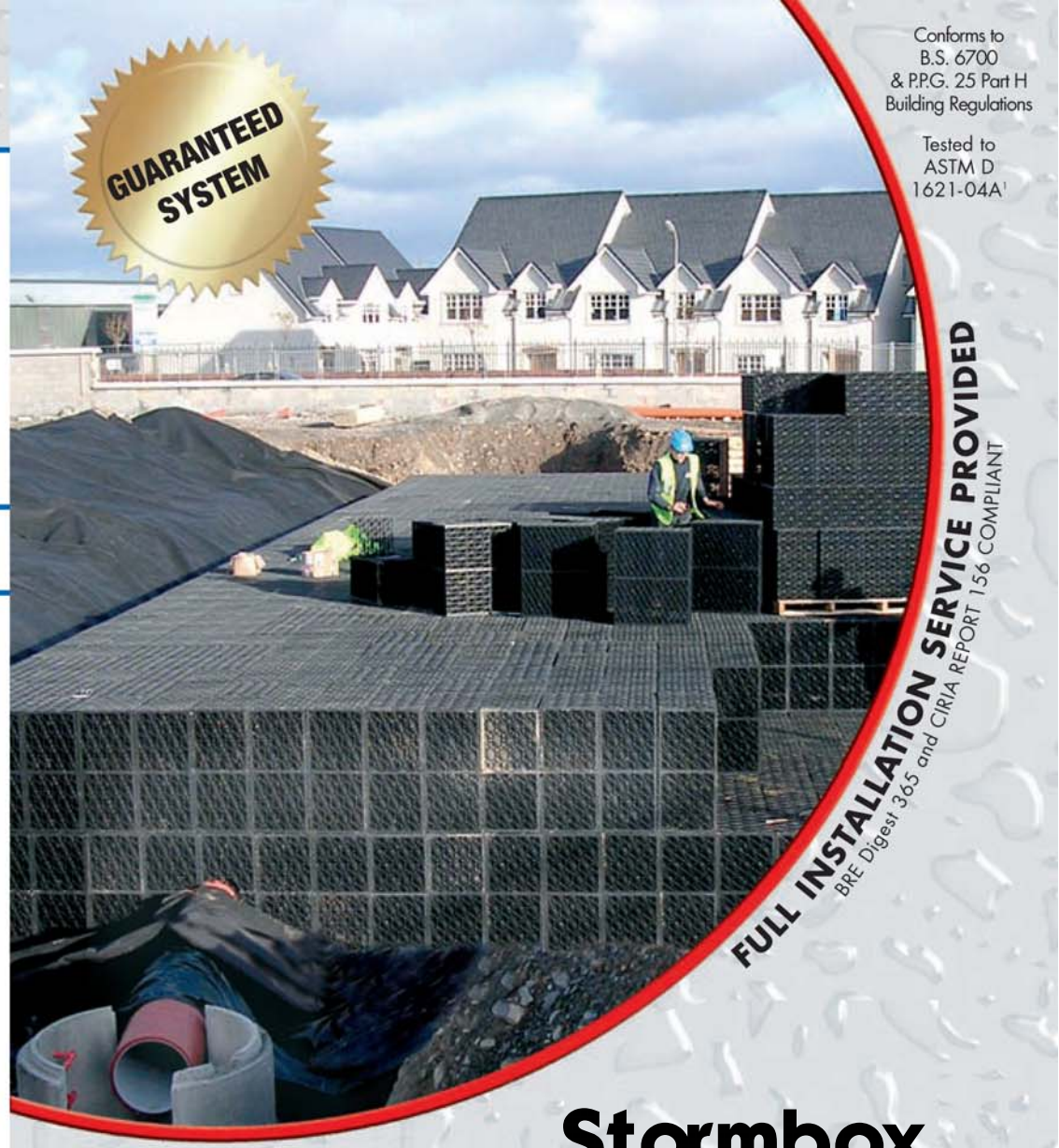
Nominal Size	Flow (l/s)	Peak Flow Rate (l/s)	Drainage Area (m^2)	Storage Capacity		Length (L)	Dia. (D)	Access Shaft Dia. (D1)	Base to Inlet Invert (A)	Base to Outlet Invert (B)	Standard Fall Across Unit	Min. Inlet Invert (E)	Standard Pipe Work Dia. DIN (C)
				Silt	Oil								
NSBD003	3	30	1670	300	45	1765	1225	750	1450	1350	100	500	160
NSBD004	4.5	45	2500	450	68	1765	1225	750	1450	1350	100	500	200
NSBD006	6	60	3335	600	90	1765	1225	750	1450	1350	100	500	200
NSBD008	8	80	4445	800	120	3065	1225	750	1450	1350	100	500	250
NSBD010	10	100	5560	1000	150	3065	1225	750	1450	1350	100	500	315
NSBD012	12	120	6670	1200	180	3915	1225	750	1450	1350	100	500	315
NSBD015	15	150	8335	1500	225	3915	1225	750	1450	1350	100	500	315
NSBD018	18	180	10000	1800	270	3200	2012	600	2110	2010	100	1000	375
NSBD024	24	240	13340	2400	360	3200	2012	600	2110	2010	100	1000	375
NSBD030	30	300	16670	3000	450	3915	2012	600	2110	2010	100	1000	450
NSBD036	36	360	20000	3600	540	3915	2012	600	2110	2010	100	1000	525
NSBD055	55	550	30560	5500	825	5085	2820	600	2310	2060	250	1000	600
NSBD072	72	720	40000	7200	1080	5820	2820	600	2310	2060	250	1500	675
NSBD084	84	840	46670	8400	1260	6200	2820	600	2310	2010	300	1500	750
NSBD096	96	960	53340	9600	1440	7375	2820	600	2310	2010	300	1500	825
NSBD110	110	1100	61110	11000	1650	7925	2820	600	2360	2010	350	1500	825
NSBD130	130	1300	72225	13000	1950	8725	2820	600	2360	2010	350	1500	825

All dimensions are in millimetres. *Some units have more than one access shaft - diameter of largest given.

[Above units available in Class 1 and Class 2. A Class 1 unit is filtered, a Class 2 unit is not]

Information needed before we can specify

1. **IS IT A HIGH RISK OR LOW RISK AREA?**
   eg: housing estate car park - low risk; garage forecourt/commercial park - high risk
2. **WHAT SIZE IS THE AREA DRAINED?**
   ie. site area minus building footprint



Stormbox

STORMWATER MANAGEMENT SYSTEM (SuDS)

STORMWATER ATTENUATION AND SOAKAWAYS
VORTEX FLOW CONTROL UNITS AND SEPARATORS/INTERCEPTORS

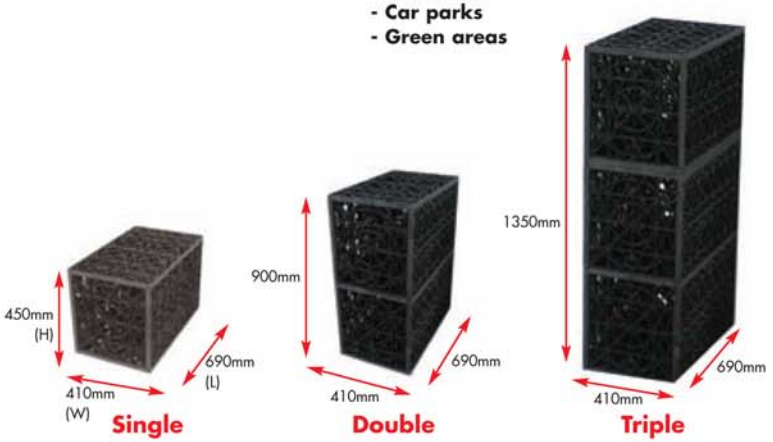
VORTEX FLOW CONTROLS

PRODUCT INFORMATION

Stormwater Storage Tank

SUITABLE FOR USE UNDER:
- **Roadways**
- **Car parks**
- **Green areas**

Note:
Blocks must be positioned in the correct orientation. See opposite diagram



Single
8.4 Modules/m³
Flowrate - 2300 l/min

Double
4.2 Modules/m³
Flowrate - 4600 l/min

Triple
2.8 Modules/m³
Flowrate - 6900 l/min

SPECIFICATION (SINGLE)

Weight (maximum)	9.17kg
Crush Strength (up to)	400kN/m²
Lateral Strength	80kN/m²
Long Term Loading	80kN/m²
Minimum Cover (green areas)	500mm
(trafficked areas)	650mm
Maximum Cover	3m
Material	Polypropylene
Void Ratio (Internal)	>95%

Design Requirements:

Tank storage capacity (m³)
Depth restrictions
Location (Road, Car Park, Green Area)
Design constraints on site

DESIGN CRITERIA

The attenuation tank is constructed using matrix module blocks. These blocks can take occasional passing loads of up to 40 tonnes/m². The void ratio of each block is 95%. The blocks are made from polypropylene.

The tank is sealed with a layer of 0.5 mm PVC membrane, which is fully welded together to form a 100% seal. All pipe penetrations are fully sealed to the membrane. The PVC membrane is protected on both sides by a layer of heavy duty protection geotextile, to prevent damage from construction or backfilling. A number of air extraction vents/flushing points are placed in the roof of the tank.

Note:
It is vital that underground tanks are fully sealed, otherwise ground water and silt particles may enter the void space and use up capacity. Preferably, the base of the tank should be 500mm above the ground water level. Otherwise ground water relief measures should be implemented.

THE COMPLETED TANK IS A FULLY SEALED SYSTEM

Note: Above specification is confined to installations with light traffic loading. In all other applications please consult an engineer for design guidance. Quoted figures above refer to a passing load over the tank. Long term loading figures above reflect a more accurate measurement for sustained loads on the tank. No vehicle with an average load in excess of 5 tonnes per wheel should travel on this tank. In no circumstances should vehicles with outrig-jacks load or unload whilst on or within 5m of the attenuation tank.

DESIGN

INDIVIDUAL DESIGN
All of our Vortex Flow Controls are individually designed to meet our clients' optimum performance criteria.

WILL OUR VORTEX FLOW CONTROLS BLOCK?
The relatively large cross sectional areas and high internal velocities greatly reduce the risk of blockage.

HOW LONG WILL THEY LAST?
Vortex Flow Controls have no moving parts to wear or fail. Made from stainless steel plate, or Polyethylene, they will resist scour, degradation and chemical attack. A Vortex Flow control should easily outlast the sewer in which it is installed.

MANUFACTURE

All of our Vortex Flow Controls are manufactured as follows:

MATERIAL USED
304 Grade Stainless Steel as standard. Other material optional (Polyethylene).

PLATE THICKNESS
Generally 3 mm thickness, thicker where required.

WELDING
Coded welders approved to BS4872 and CSWIP - all welded seams continuous for maximum strength.

RODDING ACCESS

Removable access plate on each unit, most units easily removed for access to the downstream pipe.

INSTALLATION

All our Vortex Flow Controls are purpose built to suit the specific site and to fit easily into the drainage infra structure. For example, units can be made with curved faces to fit into circular chambers and can be supplied in sections to ease assembly within confined spaces.

QUALITY ASSURANCE

We operate an externally regulated ISO 9001:2000 Quality Assurance System.

MAINTENANCE

Vortex Flow Control units themselves require no routine maintenance. Inspection chambers require inspection and maintenance in line with current practice.

What design information do we need?

We require the following basic information to specify a Vortex Flow Control for you:

1. The design Flow - maximum discharge in litres/second
2. The design Head - invert to top water level.

From this information we will size and design the Vortex Flow Control to meet the design criteria and to suit the proposed infrastructure.

- LOW COST
- EASY INSTALLATION
- FLOOD-ROUTING EASE
- CLOG RESISTANT
- QUICK DELIVERY
- FLEXIBLE DESIGN
- HYDRAULIC TEST DATA AVAILABLE
- CORROSION-RESISTANT

1. WE WILL PROVIDE EXCAVATION DRAWINGS.
2. CONTRACTOR TO EXCAVATE HOLE AND BLIND BASE WITH 50MM OF QUARRY DUST AND ROLL THE AREA. IF THE GROUND IS NOT STABLE, PLEASE SUPPORT IT WITH STONE PRIOR TO BLINDING WITH QUARRY DUST, ENSURING FALLS ARE CORRECT. **(MINIMUM GROUND LOADING BARING CAPACITY TO MATCH STRENGTH OF ATLANTIS TANK REQUIRED)**.
3. ANY WATER IN HOLE TO BE PUMPED OUT PRIOR TO LSW GOING ON SITE.
4. CONTRACTOR TO CONSTRUCT INLET AND OUTLET MANHOLES, WITHIN 3M OF THE ATLANTIS TANK.
5. AT LEAST 1 METRE FREEBOARD AROUND THE TANK AREA. THE SIDE WALLS SHOULD BE TAPERED TO A SAFE ANGLE (IE 45°), AN ACCESS RAMP INTO THE HOLE IS NECESSARY.
6. THE INLET MANHOLE NEEDS A 500MM SUMP.
7. THE OUTLET MANHOLE ALSO REQUIRES A 500MM SUMP.
8. CONTRACTOR WILL NEED TO PROVIDE TELEPORTER & DRIVER WITH FORK EXTENSIONS TO UNLOAD LORRIES AND TO EXCLUSIVELY SUPPLY LSW CREW WHEN BUILDING THE TANK. **CONTRACTOR ALSO TO PROVIDE A LOAD OF 40-50MM CLEAN WASHED STONE**.
9. PRIOR TO BACKFILLING, THE INLET & OUTLET PIPE ENTERING THE TANK SHOULD BE SUPPORTED IN PLACE WITH A CONCRETE PLINTH (TRUSS-BLOCK) POURED AROUND THE PIPE PENETRATION. THIS AREA DOES NOT NEED TO BE SHUTTERED. A MINIMUM OF 300MM OF CONCRETE NEEDS TO SURROUND THIS PIPE.
10. THE CONTRACTOR TO BACKFILL ALL FOUR SIDES OF THE TANK WITH CLAUSE 804, COMPACTED IN 300MM LAYERS WITH A MINIMUM OF 500 – 650 MM * PLACED ON THE ROOF OF THE TANK, PRIOR TO MACHINERY BEING ALLOWED TO TRAVEL ON THE TANK. THIS MATERIAL TO BE PLACED FROM SIDEBANKS OF TANK BY EXCAVATOR. *(SEE TECHNICAL SPECIFICATION)
    IT IS ESSENTIAL THAT SITE DEBRIS **SHOULD NOT BE USED** AS BACKFILL.
11. CONTRACTOR SHOULD SUPPORT AIR VENT DURING ROOF BACKFILL SO THAT THE PIPES ARE VERTICAL AND STRAIGHT.
12. OFF-LINE TANKS ALSO REQUIRE A 500MM SUMP IN THE INLET MANHOLE.

Please Note: It is important to remember that the roof of the tank must be lower than the lowest gulley on site.

How it works

Stormwater enters the attenuation tank via the inlet manhole, which incorporates a silt collection sump and a galvanised leaf collection basket. Water passes through the tank and enters the outlet manhole, which contains a vortex flow control device. (see drawings on next page)

This flow control device regulates the release rate of the water from the tank, and in so doing, enables the tank to fill. As a result of water entering the tank at a greater rate than it can exit, the void space then fills with water. While the tank fills, air is vented from the tank back through at least 4 air vents, which double up as monitoring points and these can also be used to flush out the tank for routine maintenance.

The Inlet/Outlet pipe will act as a flushing channel. This perforated pipe is wrapped completely in High Flow Filtering Geotextile, which prevents silt entering the block area. As the tank continues to empty at a determinant rate, air re-enters the tank via the same air vent system. **The roof of the completed tank must be lower than the lowest gully trap on site.**

Benefits

- 100% sealed tank
- Leak free guarantee
- Full installation service provided
- 20 years experience as market leader
- Quick installation - reduce site access delays
- Increased land usage - tanks are sub surface
- Economical - generally more cost efficient than any other equivalent sealed tank
- Cost effective - reduced costs for excavation and disposal of material
- Modular - easy to create any shape
- Strong - designed to support shear loading
- Lightweight - no cranes required
- Determinate volume - one cubic metre of matrix tank modules contain 950 litres of water, whereas stone fill will only provide 300 litres of storage per cubic metre.

Soakaway

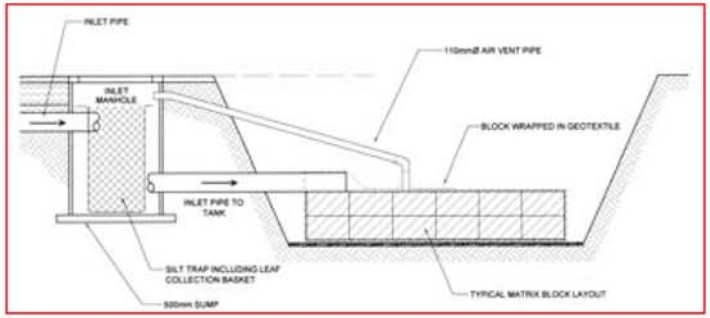
The soakaway is normally best built as a long narrow structure.

The inlet pipe comes in at roof level and faces downwards so the water can percolate into the tank.

The blocks are wrapped in geotextile, to protect them and also to keep clay from filling up the void.

An air vent pipe is installed on the highest point with a cowl on top or vented back to an inlet manhole.

There is no outlet from a soakaway, therefore no flow control unit is required.



Apart from excavation and back filling, Our experienced installation crew will supply and install your complete stormwater attenuation tank.

This includes

- **Fully sealed storage tank**
- **Geoplastic Sealing Membrane**
- **Protection Geotextiles**
- **All pipe and pipe penetration units**

We will supply only Vortex Flow Control Units, Petrol Interceptors and Silt Traps

Most Frequently Asked Questions

Q. *DO WE OFFER CCTV INSPECTION ACCESS? HOW ARE THEY PROTECTED FROM VANDALISM?*

A. Yes.Vent pipes and monitoring/flush points are extended from the roof of the attenuation tank up to ground level. The top of the vent pipe is surrounded in a slab of concrete and fitted with a lockable cover or grill, depending on the function. A filter basket can be incorporated into the vent pipe if desired, and/or a Vermin Inhibitor.

Q. *HOW DO WE PROTECT AGAINST GROUNDWATER PROBLEMS & IF GROUND WATER IS AN ISSUE HOW DO WE AVOID FLOTATION OF THE TANK?*

A. The water table can be higher than the base of the attenuation tank, in exceptional cases. The tank is 100% sealed, so external silt-laden water cannot enter the tank, unlike other systems on the market. The key to avoiding ground water uplift problems is to ensure that the depth of cover on the roof of the tank is greater that the depth of ground water extending up the tank sides. A few steps can also be taken to alleviate this uplift pressure. A series of land drainage pipes can be set into the floor of the excavation and piped into a manhole. This manhole can be emptied by a gravity line or a pump if required. Alternatively, in cases where depth of cover is restricted, a slab of concrete can be poured over the roof of the tank to act as ballast and also as protection. Alternatively by reducing the block depth, it may also eliminate this problem. It is important to note that if that is done the footprint of the tank is increased. As a rule of thumb, add to the normal cover requirements, the equivalent height of groundwater present in the excavation.

Q. *IN TIMES OF HEAVY RAINFALL HOW DO WE PREVENT THE GROUND ABOVE THE TANK FROM BOGGING OR WHAT MEASURES CAN BE TAKEN TO AVOID BOGGING?*

A. Bogging of ground areas above the tank has not been an issue yet However, if this is a concern, you could either incorporate some land drain pipes onto the roof of the tank or alternatively, we can cover the roof of the tank in a drainage geocomposite material that will divert all water to the perimeter of the tank. This geocomposite is used in basement applications, bridge abuttment structures and also in landfill application for drainage purposes.

Q. *IF BOGGING OCCURS IN THE GROUND AREA ABOVE THE TANK DOES THIS EXERT EXCESS PRESSURE ON THE TANK AND AFFECT THE LOADING CAPABILITIES OF THE MODULAR BLOCK?*

A. Water logged soils above the tank will only be an issue if the weights combine to exert a greater loading on the tank of 80KN/m2 or 8 tonnes/m2 long-term. If this was likely to be an issue, then you would take the steps outlined in the question above. You could also specify that a gravel fill be used instead of soil. Alternatively, you could design the tank to have a porous roof, and use it for water in filtration.

The tank structure and sealing membrane will not deteriorate from being permanently submerged in water. That is what they are designed for.

Most Frequently Asked Questions

Q. *HOW FAR AWAY DO TREES HAVE TO BE PLANTED FROM THE TANK?*

A. As a rule of thumb, no tank should be placed directly under the crown of a tree. Allowances should be made to allow for the tree to mature and the crown to get larger. A guide to which we work to is a distance of 6m from any tree line.

Q. *WHAT LANDSCAPING CAN BE USED OVER THE TANK?*

A. Landscaping over the completed tank is not a problem. The attenuation tank can take a 3m depth of permanent cover over its roof, if required. Very few trees / shrubs or plants will penetrate this deep, however, not all tanks will have his amount of cover. The sealing membrane that surrounds the tank acts as a root barrier to aggressive vegetation and all roots are diverted around the tank. Normal vegetation sowed over the tank includes grass, shrubs and small trees.

Q. *HOW DO YOU PREVENT SILT ENTERING THE TANK?*

A. Due to the design of our attenuation system there are a number of measures put into place to ensure that no silt enters the tank. A silt collection sump and leaf / debris basket is incorporated into the inlet manhole. This will trap all heavy silts, grit and debris. Secondly, the distribution pipe that extends through the length of the tank is fully slotted, and wrapped in a special hi-flow filter geotextile. Any silt that escapes from the inlet manhole, are trapped in the filter and only pure water enters the Atlanta-cell tank. These silt particles are then dislodged from the filter fabric when the tank empties through the distribution pipe. More importantly, each modular block has been designed geometrically to prevent any build up of silt. The design creates turbulence within the tank and when the tank empties it brings any particles with it. These tanks are installed in Australia for over 15 years and no silting has occurred yet. Yes, it is advisable to put an interceptor on the inlet line if possible, as it also traps an element of silt, but most importantly it traps oil's etc and prevents them entering the tank. However, in most circumstances, the interceptors are on the outlet from the LSW tank. This is because you can get away with a smaller unit. In any case, the tank will not be affected by the presence of oil's in the water.

Q. *WHAT LOADING WILL THE TANK WITH-STAND?*

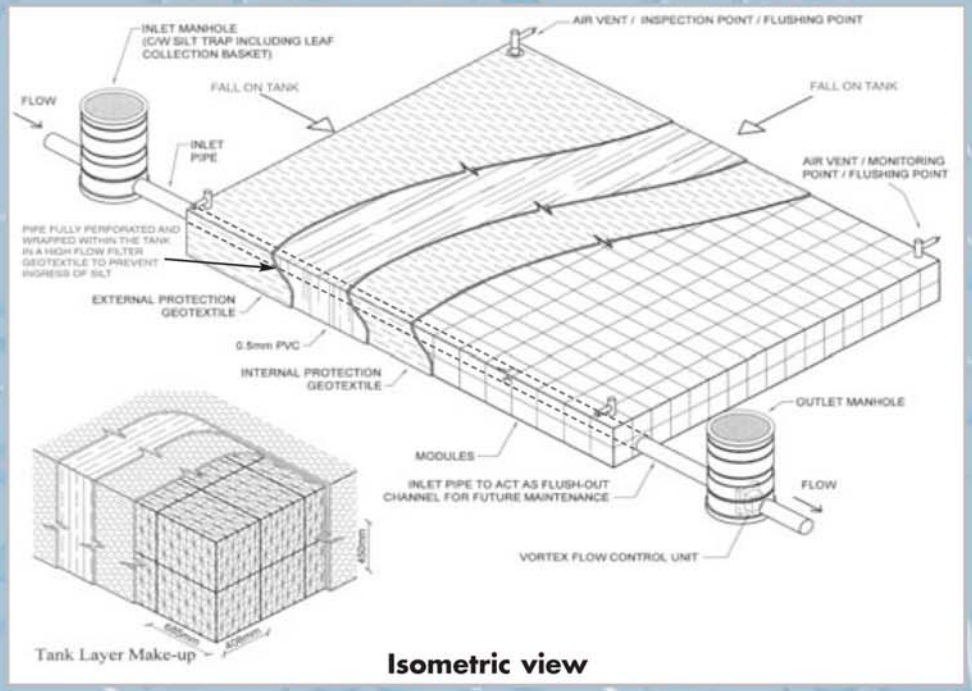
A. Tanks can be designed to take occasional loads of up to 400KN/m2 or 40 tonnes per m2. To give an example of loading, a single wheel on any artic lorry exerts only 5 tonnes/m2 approximately. You can see from the above that the tanks can take very heavy loads without damage occurring. **Almost 50% of the LSW tanks installed are used under roads and car park area's.** Grass cutting machinery will have no effect on the load bearing capacity of our tank.

Q. *HOW IS THE MEMBRANE PROTECTED DURING BACKFILL AND WHEN LOADING OCCURS?*

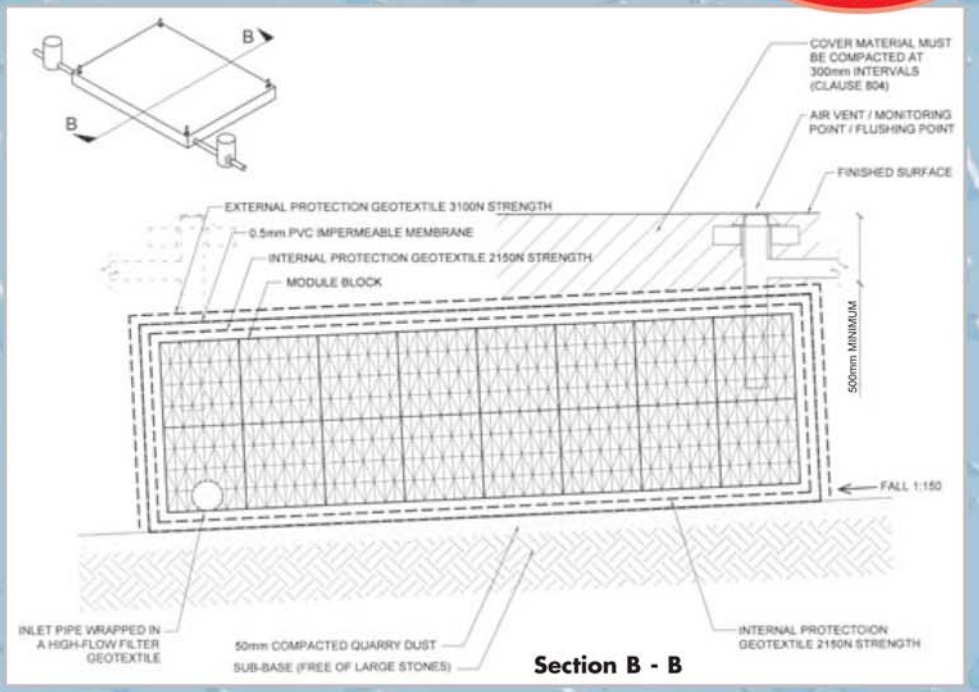
A. The membrane used to seal the tank is protected on both sides by a special heavy duty protection geotextile. Depending on the loading applied to the tank, a suitable geotextile is selected to cater for these needs. Strengths from 1000N to 6500N are normally used, but in exceptionally heavy-duty circumstance, strengths of 10,000N and more can be specified.

Technical information

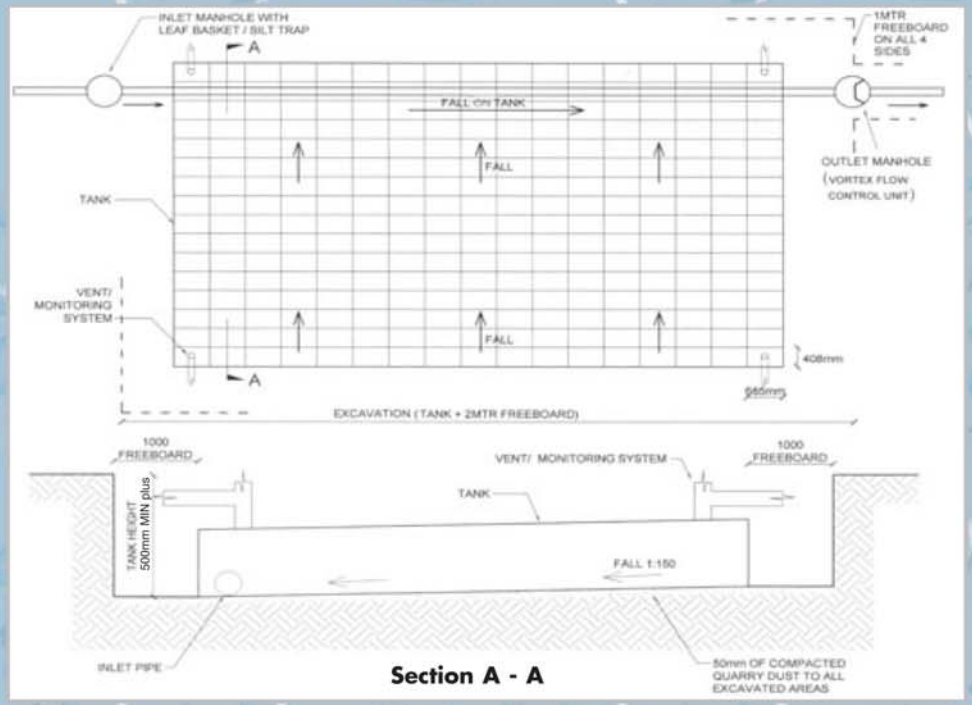
DRAWINGS AVAILABLE IN AUTOCAD FORMAT & PDF



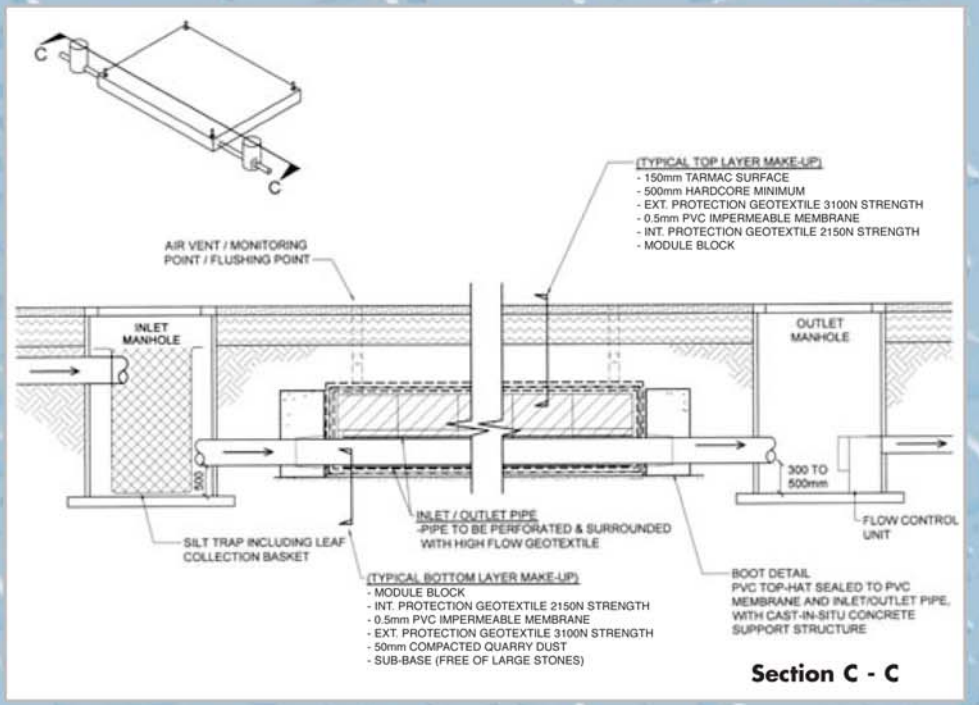
Isometric view



Section B - B

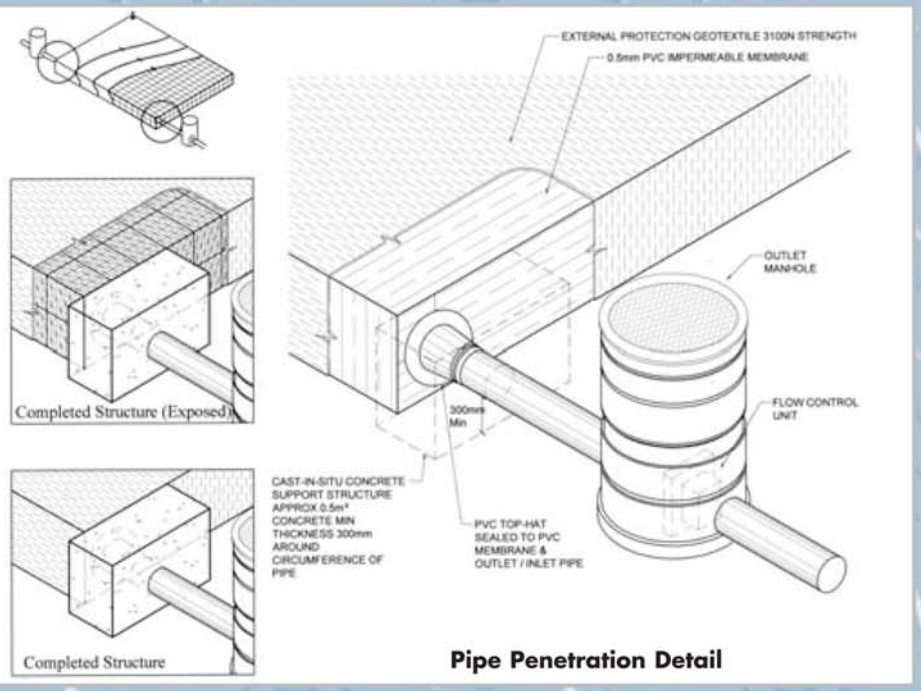


Section A - A

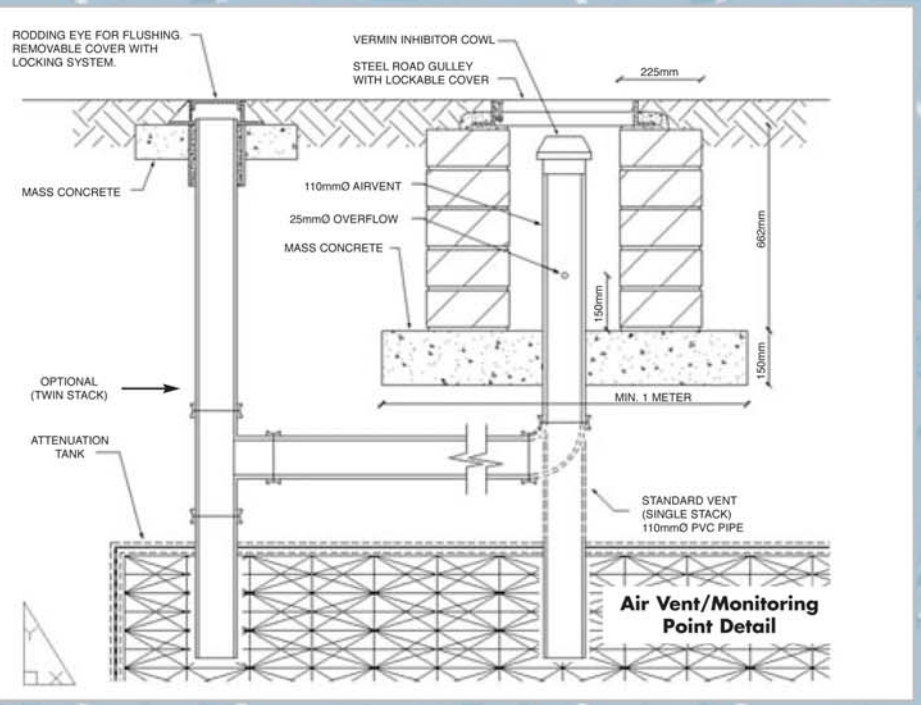


Section C - C

Technical information



Pipe Penetration Detail



Air Vent/Monitoring Point Detail

Sequence of Installation

Stage 1
Contractor to excavate initial hole and blind base with 50mm of quarry dust and compact with roller. LSW will provide a full excavation drawing with relevant falls and levels for site engineer. The contractor will be responsible for the construction of both inlet and outlet manholes. Each manhole will be located within 3 metres of the tank.

Stage 2
LSW's experienced installation team place the modular blocks on the pvc membrane which is sandwiched between two layers of heavy duty protection geotextile. The tank's perimeter blocks are secured with stainless steel fasteners to maintain the tank's structure and rigidity.

Stage 3
The pvc and geotextile layers are then wrapped around the tank and welded to form a 100% seal. All pipe penetrations including inlet, outlet and air vent pipes are fully sealed to the lining membrane. A concrete 'Truss-block' is poured around the inlet and outlet pipes for reinforcing purposes.

Stage 4
The contractor to backfill all four sides of the tank with clause 804, compacted in 300mm layers with a minimum 500 - 650mm* placed on the roof of the tank, prior to machinery being allowed to travel on the tank. This material to be placed from sidebanks of tank by excavator.
*(See technical specification)
It is essential that site debris **SHOULD NOT BE USED** as backfill.