



Modular Geo-Void Systems

Total Water Management



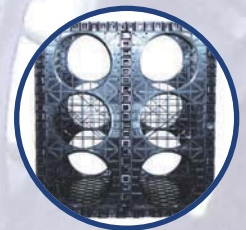
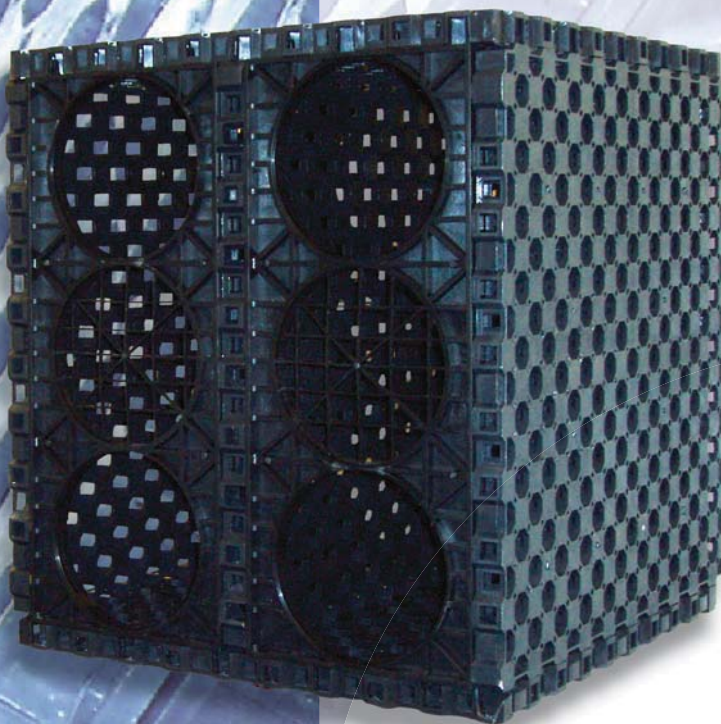
NSAI
Agrément

Alderburgh Ltd.
Pluvial Cube Attenuation and
Infiltration Systems

CERT No. 18/0401

Pluvial Cube

Total Linear Access
Precipitation Collection System

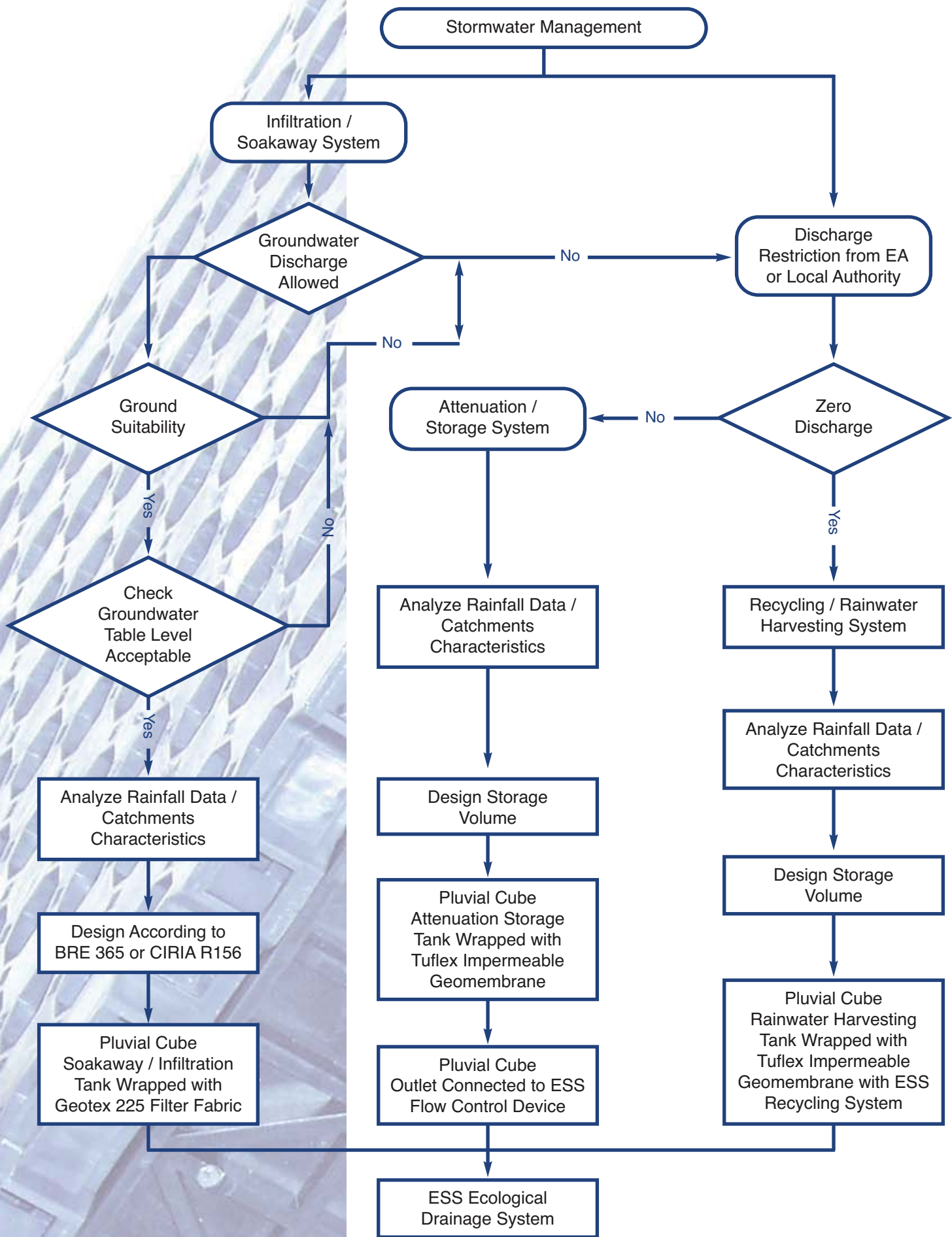


Unique Low Flow
Channel System



ENVIRONMENTAL SUSTAINABLE SOLUTIONS LTD

Flow Chart



Modular Geo-Cell Tank System

Infiltration, Detention and Re-use made easy...

Total Stormwater Management

E.S.S. Geo-Cell Modular Tank systems use surface and sub-surface infiltration techniques, resulting in clean water that can be re-used or allowed to re-enter the natural water system. E.S.S. Geo-Cell Modular Systems offer a highly efficient option for Stormwater Management in any kind of soils.

Water Quality

E.S.S. Geo-Cell Modular Tank Systems excel when there is a requirement to achieve a high water quality, particularly in the effective removal of nutrients and gross pollutants. In addition to the obvious environmental benefits, the sub-surface location of the tank system provides more usable space and an enhanced aesthetic setting compared to above ground concrete or plastic tanks.

The Modular Advantage

E.S.S. Geo-Cell Modular Tank System performance supersedes outdated aggregate trenches. The E.S.S. System provides a void space of over 90% compared to less than 20% in typical aggregate trenches. Consequently, the E.S.S. System offers a smaller footprint to achieve the same storage capacity as an aggregate trench. This saves time and money in installation and civil works costs. The lightweight design of E.S.S. Modular Tank Modules also make installation quicker, safer and cheaper. No sediment build up occurs in the E.S.S. System, unlike the clogging that is characteristic of aggregate based approaches.

System Components

Pluvial Cube Geo-Cell Tank Modules

EcoSand biologically engineered soils

E.S.S. Filtration Unit

Geotex Filtration Fabric

Tuflex Waterproofing Membrane

Geotex Protection Fleece

Ventilation Units

Preformed Pipe Connection Covers

Aquabrake Flow Control Devices and Chambers

Refer to separate data sheets

Benefits...

Complete Linear Access

Quick

Reduce site access delays

Lightweight

No cranes required

Strong

Designed for car loadings

Modular

Easily create any shape

Economical

Cheaper than concrete

Maintenance Free Tank

All debris and sediment is pre-filtered

Determinate Volume

One cubic metre of Pluvial Cube modules contain 950 litres of water

Cost Effective

Reduces excavation and disposal by two thirds compared with conventional soak wells

High Infiltration

90% void surface area

Structurally Designed

Supports shear loadings

Unique Low Flow Channels

Ensuring complete removal of any silts

Permeable Paving

Single Module



Size: 50cms x 50cms x 55cms
Units / m³: 0.1375m³
7.27 per m³

Double Module



Size: 50cms x 50cms x 107.5cms
Units / m³: 0.269m³
3.72 per m³

Triple Module



Size: 50cms x 50cms x 160cms
Units / m³: 0.40m³
2.50 per m³

Clear Linear Access Through Open Subterranean Channels

Water sensitive Urban Channels

The Channel Systems are based on permeable sub-surface waterways that restore water quality and recharge the natural environment. The sub-surface E.S.S. Channel System provides a unique way of working with nature to solve the enormous problems currently associated with open concrete channels and swales.

Traditional Concrete Channels

Open concrete channels and swales are currently one of the main methods of transporting large quantities of Stormwater for discharge into streams, rivers and oceans. Open channels are used widely in the urban landscape even though they are considered unsafe. Channels are also a breeding ground for vermin and vector that endangers human health. In addition to the health and safety problem, large concrete channels take up vast areas of land and have a negative impact on the amenity of the area.

Pluvial Cube Module Dimensions* (mm)	Module Configuration	Units per m ³	Module Volume (m ³)
500 (L) x 500 (W) x 550 (D)	Single	7.27	0.1375
500 (L) x 500 (W) x 1075 (D)	Double	3.72	0.2688
500 (L) x 500 (W) x 1600 (D)	Triple	2.5	0.4

Product Data	Pluvial Cube Module	Heavy Duty Pluvial Cube Module
Application	Stormwater Management	Stormwater Management
Average Weight (kg) - single module	7	8
Compressive Strength* (kN/m ²)	320	400
lateral Strength* (kN/m ²)	200	225
Long Term Creep Testing** (kN/m ²)	200	200
Void Ratio (%)	96	96
Surface Void Ratio (%)	Greater than 90	Greater than 90
Minimum Backfill Cover# (mm)	450	450
Maximum depth to invert (mm)	7000	7500
Material	Propylene	Propylene
Chemical Resistance	Good	Good
Bacterial Resistance	Good	Good
UV Resistance	Good	Good

Note: Other Modules with Compressive Strength more than 1500 kN/m² available

* Modules tested using UKAS calibrated test machine, range 0 – 60 Tons, UDL, loading rate 0.2 kN/m²

** Modules tested for long term creep testing for 90, 180 and 208 days / 5000 hours = 50 years design life / CIRIA C737.

Any cover less than 450 mm and for Min. backfill cover for trafficked areas – contact ESS design department

Maximum depth to invert based on soil type dense sand and gravel for different soil type–contact ESS design department

E.S.S. Channel System

E.S.S. Channels

With the E.S.S. Channel System being a sub-surface system, these problems with open concrete channels are rectified. The permeable channel system can be designed to follow the inherent contours of the landform and emulate the flow of natural waterways. The curvilinear channel design creates vertical flow, turbulence and reduces the overall flow of velocity while increasing the self cleansing capacity of the channel bed to create healthy aerobic conditions. The clear access channels allow for continual and future maintenance

Road Edge Infiltration Area.



Environmental Benefits

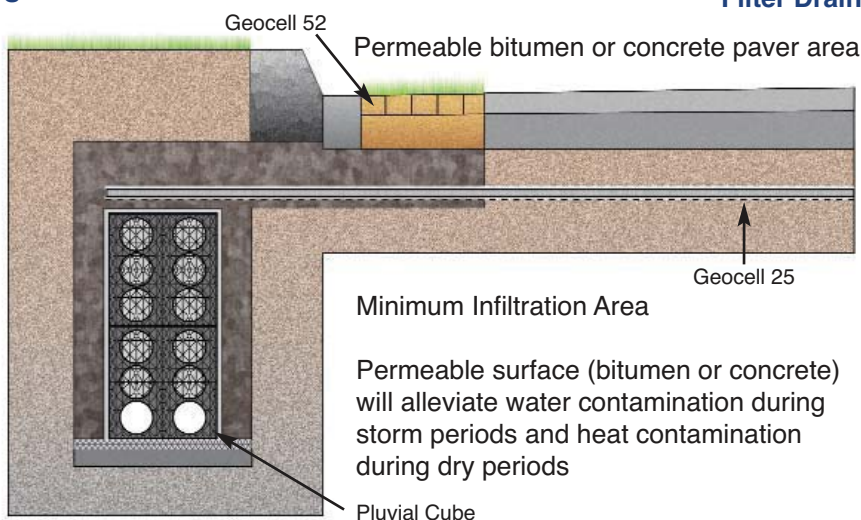
By replacing open concrete channels or swales with E.S.S. Channel Systems, cities can now benefit from increased environmental amenities, greater recreational space and healthier conditions by using the vast tracts of land once given over to rapid flowing concrete channels.



Car Park Infiltration Area.

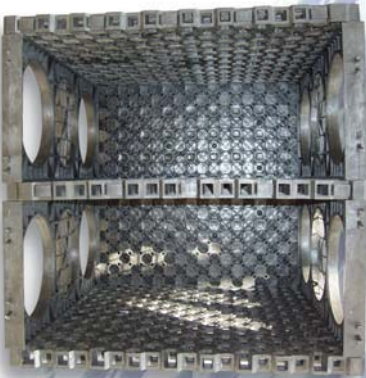
High Traffic Areas

Filter Drain



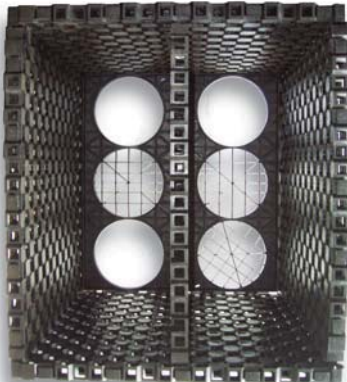
Low Flow Channel System

Self Cleaning at High Flow Velocity



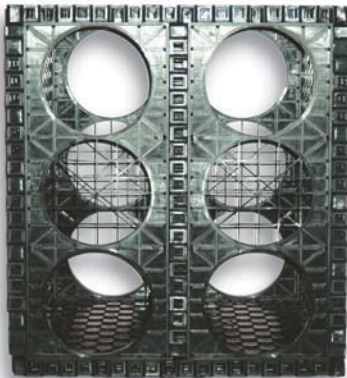
Top View
Showing Clear Channel

Provides Total Linear Access



2 Clear Channels
500mm x 210mm per 0.5mt width

Controls Silt at Low Flow Velocity



4 x 160mm Pipe
Access Point

The above channels can be multi-connected using preformed connectors to larger inlet / outlet pipes



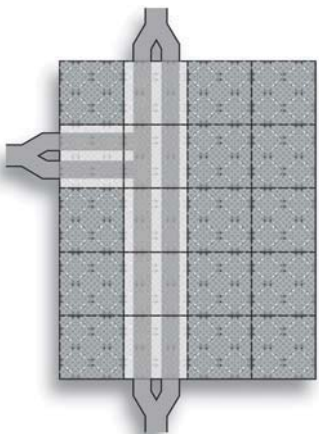
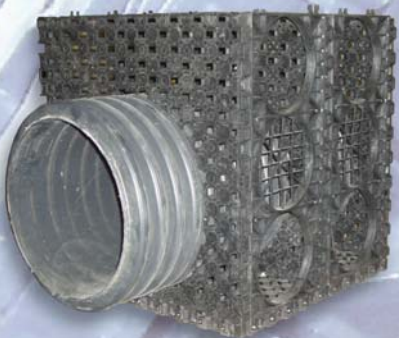
225 or 300mm
Internal Dia Channel



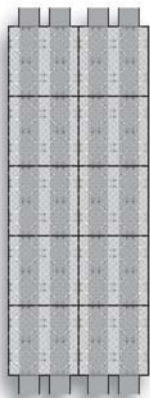
225 Low Flow Channel
(if required)



300mm Dia Low Flow Channel
(if required)



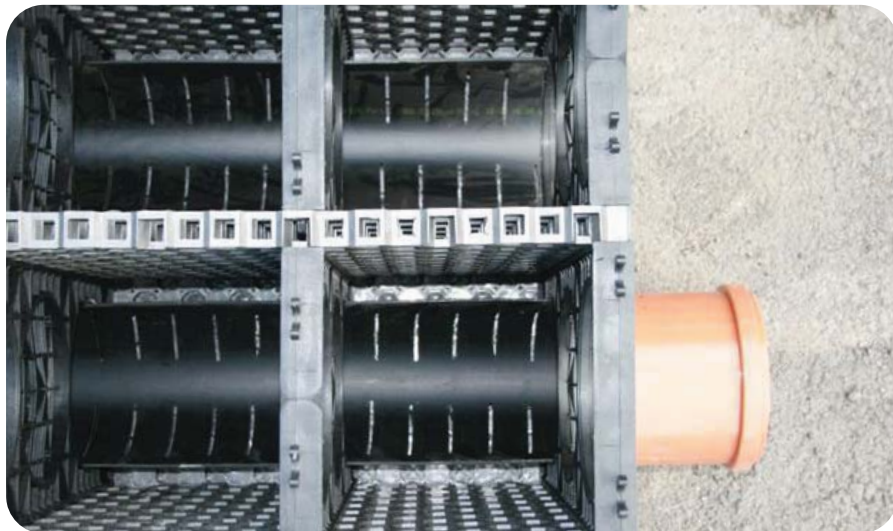
Typical Installation
Tank Format



Typical Installation Channel Format
4 Clear Access Channels x 210mm

Linear Access Channel.

With slotted low flow silt control channel installed



Top view showing low flow maintenance channel.

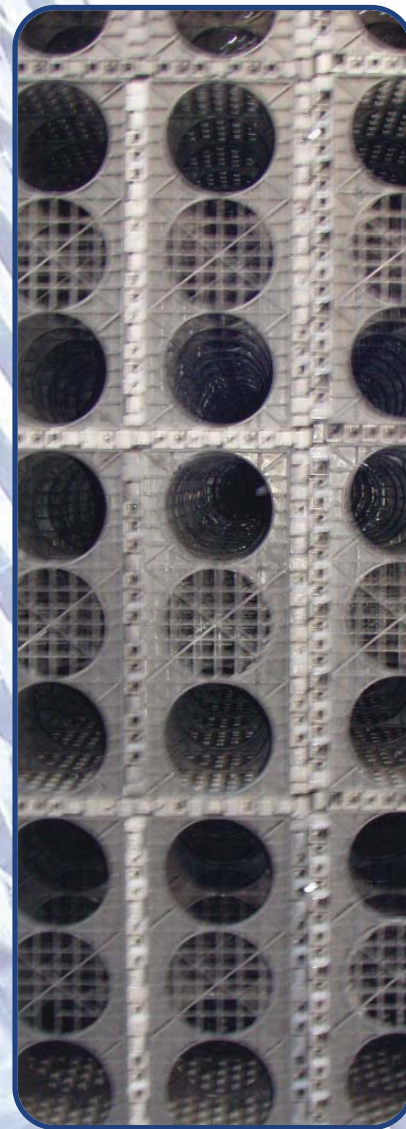


Self cleaning channels.



Connection to low flow maintenance channel at invert level.

Attenuation Tank Highlighting
Number and Position of Access
Points.



E.S.S. Systems Permeable Paving

Cover Materials

Cover materials are an essential part of the infiltration process. E.S.S. **EcoSand** Biologically Engineered sand is designed to provide maximum permeability through optimum physical, chemical and biological characteristics. To retain infiltration performance it is essential to choose the appropriate cover material and constantly maintain pH levels between 6 and 7.5.



Type 1 - Road run off



Type 2 - Road run off



Type 3



Type 4



Type 5 - Compactable



Type 1 - Road run off

The filter sand is engineered to installation and E.A. requirements. Depending on site contaminants expected.

Trafficable Landscape - Compaction Prevention:

If a trafficable, soft landscape surface is required (i.e. grass or gravel car parks, road verges etc.), it is recommended to use **E.S.S. GeoCell 52** grass reinforcement structure. The addition of product will allow long-term permeability of the cover soil.

Loading	Minimum Cover
Pedestrian	300mm
Occasional traffic	500mm

Infiltration Tank



Attenuation Tank.



2mts deep tank with 3mts cover

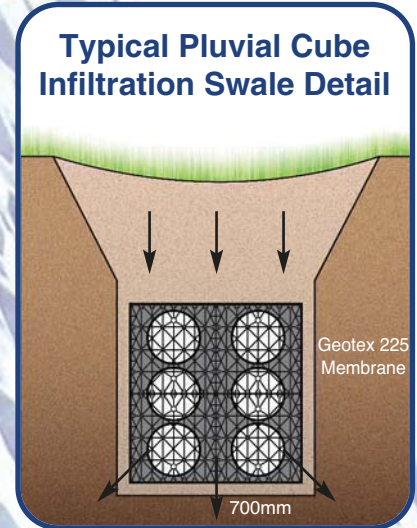
Infiltration Swales & Underground Channels

Subsurface Road Channels / Swales

Pluvial Cube Tanking System provides an efficient way of managing road stormwater runoff. It allows high infiltration areas, preventing road accidents, water ponding, and mosquito infestation. Provides new accessible space.

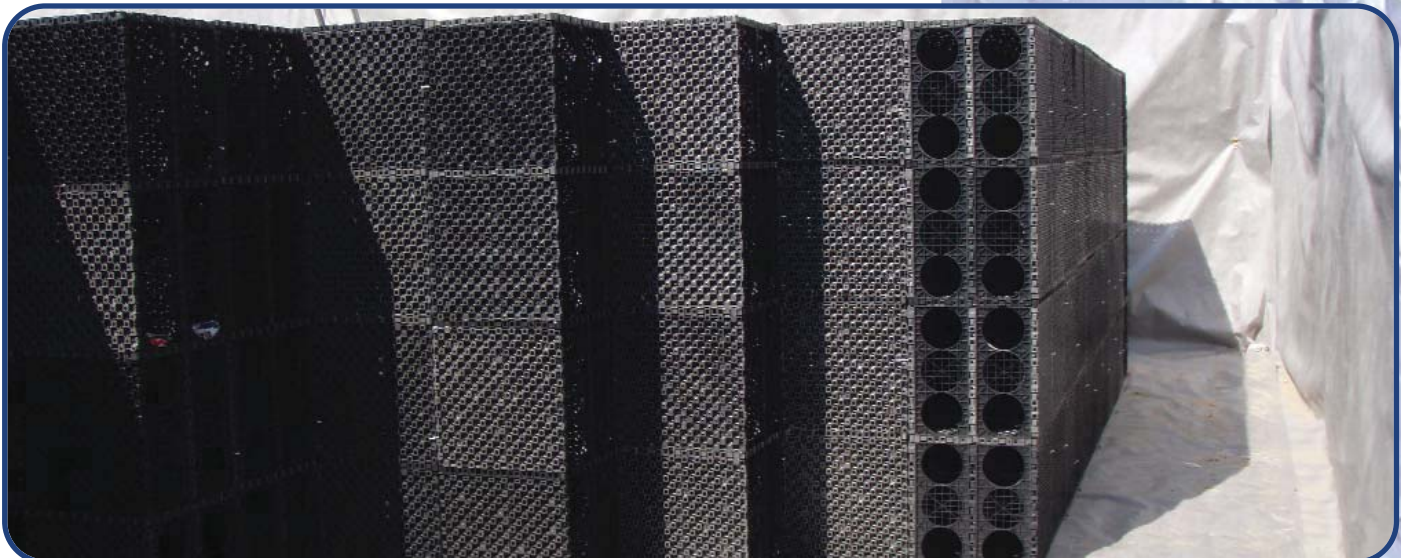
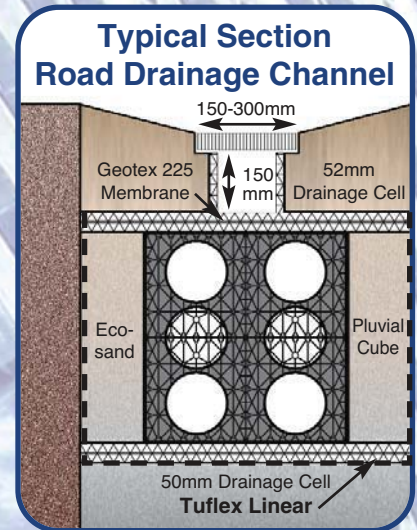
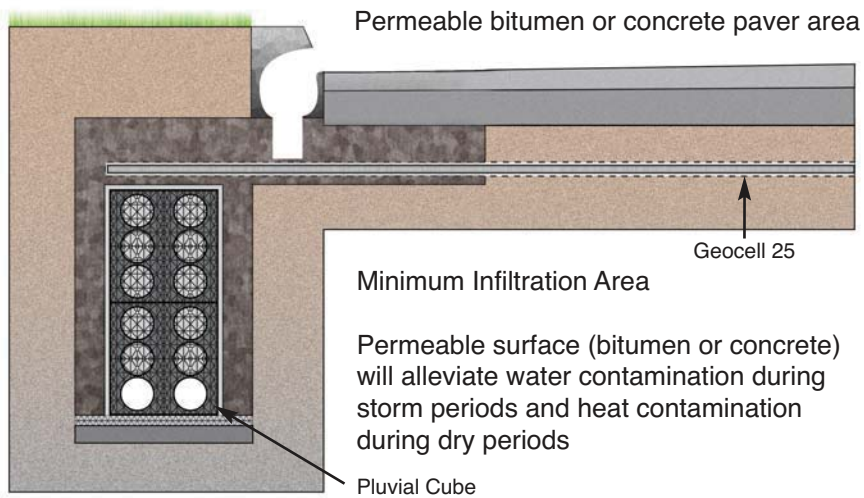


Attenuation Tank under Park and Ride Scheme showing versatility of modular system.



High Traffic Areas

Filter Drain



Tank 2mts deep with access channels.

Installation Procedures

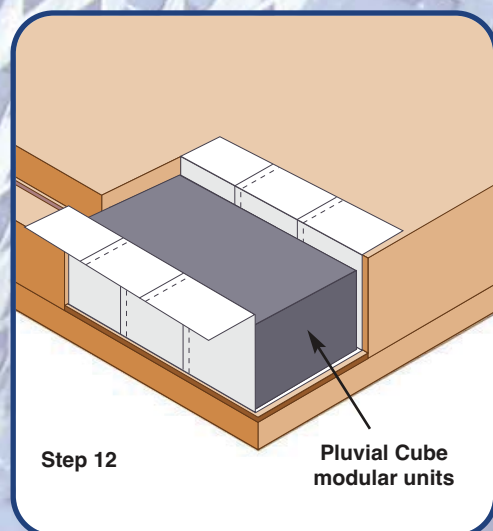
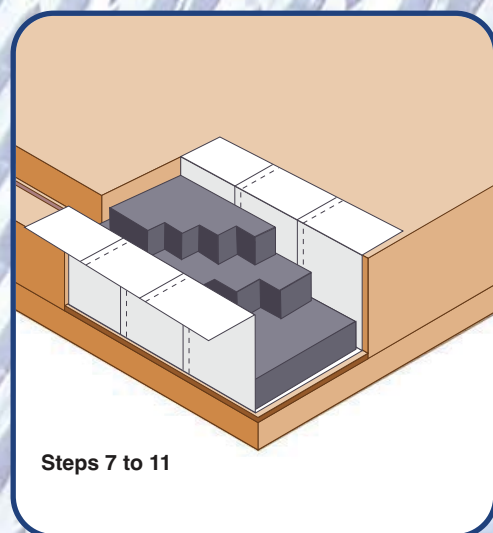
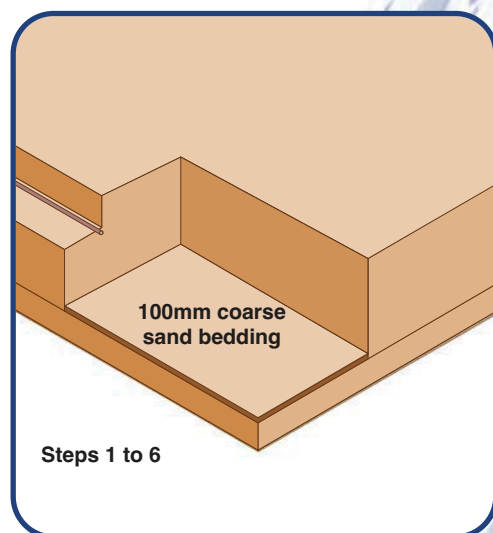
Infiltration Tanks

Installation Steps

1. Excavate the pipe trench and lay the inlet pipe to the required fall and install silt traps in appropriate locations in the pipe run.
2. Excavate the hole or trench to the required dimensions to modular units, and any external inspection chamber(s) and / or silt trap(s).
3. Ensure that the base plan dimensions of the hole allows sufficient working space for the site operatives to manoeuvre the units and geotextile into position.
4. Ensure that the base of the excavation is flat and level, batter back the sides of the excavation to a safe angle, and ensure that the safe access is provided for the site operatives.
5. Remove any soft spots from the excavation and replace with compacted granular material.
6. **a) For Soakaway**, lay 100mm coarse sand bedding to the base of the excavation and level.
b) For Attenuation, lay 100mm (minimum) compact solid level base (site concrete preferably).
7. **a) For Soakaway**, lay the geotextile, Geotex 225ff, over the base and up the sides of the excavation with minimum 200mm overlap joints between strips.
b) For Attenuation, repeat procedure with Tuflex Geo Membrane.
8. Ensure there is a minimum 200mm over-run of geo-textile at the end of the modular unit.
9. Inspect geotextile for damage.
Tuflex for Attenuation, ensuring integrity of all welded laps.
10. Assemble the module tanks to required dimensions.

The illustrations show the correct relationships, orientation, and sequence of connection of each panel to form a basic full module tank (500 x 500 x depth).

11. Assemble the Pluvial Cube Modules in orientation as per drawing.
L x W x D.



Installation Procedures

12. To receive the inlet pipe (and outlet/ inspection pipe if required). Insert tank connector and, using geotextile, form a wrap around apron of the tank connector spigot and secure using tape or jubilee clip. Ensure a minimum 50mm of spigot remains exposed.
For Attenuation tanks, all inlets and outlets are sealed with welded preformed pipe flanges.

13. **a) For Soakaway**, Continue with the geotextile encapsulation of the Pluvial Cube tank.
b) For Attenuation, use Tuflex Geo Membranes.

14. Fold the corners of the geotextile over-run at each end of the infiltration tank as shown, welting all corners. The same method applies for Tuflex Geo Membranes ensuring all corners are welted and folded (not cut).

15. **a) For Soakaway**, Complete the encapsulation by wrapping the geotextile horizontally around the tank and tape into position.
b) For Attenuation, use Tuflex Geo Membranes.

16. Connect inlet / outlet / vent pipe and inspection chambers using appropriate adaptors.

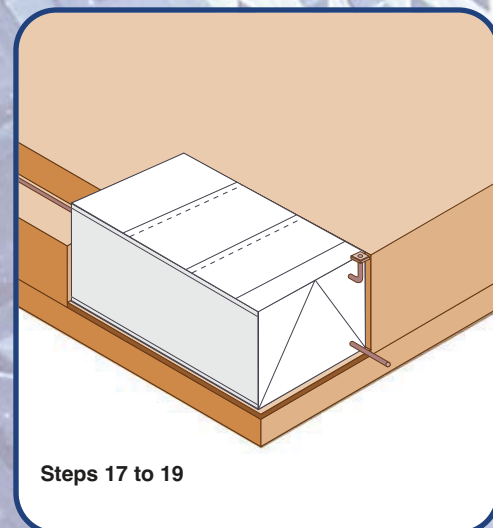
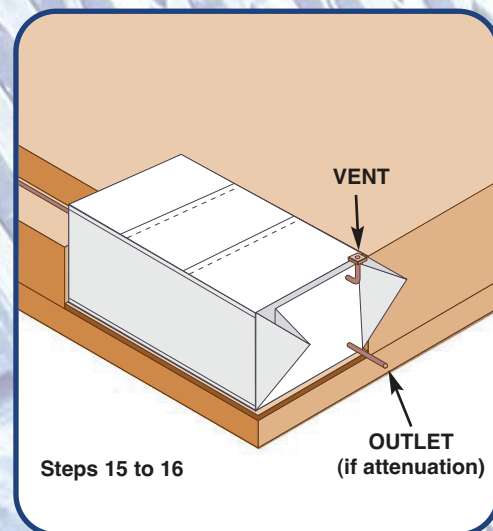
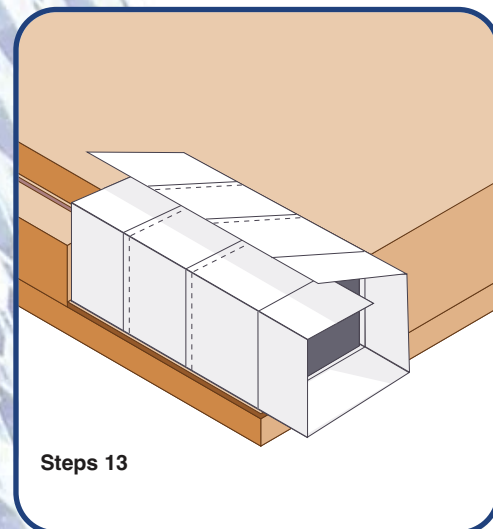
17. Backfill around excavation using type 1 or 2 sub base or selected granular material, and compact in layers of not less than 150mm. The first 500mm of any installation should be compacted by hand.

18. Use a coarse sand protection layer over the top of the Pluvial Cube tanks and geotextile and the back fill to the required depth using Type 1 or 2 sub base material. If the area is to be trafficked. Where the area is to be landscaped then as-dug material may be used provided sharp or large solid matter is removed.

19. The area should then be compacted using suitable compaction equipment in accordance with specification for highway Works.

20. **For Attenuation tank**, steps 7-16 are also followed to encapsulate the Tuflex Geo Membranes lined tanks with Geotex 300 protection membrane prior to backfill.

N.B. Please refer to full sequence of works data for more detailed instructions.



All products are manufactured to the highest quality, being subject to rigid quality control. However, the company cannot control conditions of application and use of its products, thus any warranty, written or implied, is given in good faith for materials only. ESS Ltd will not accept any responsibility for damage or injury arising from storage handling, misapplication or misuse of its products. All transactions are subject to our standard condition of sale, copies of which are available on request.

To find out more about these systems and products please contact us



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