



# Attenuation & Infiltration System

The StormMaster range of storage tank provides an economic versatile storage system for general use. Used as a soakaway the rainwater collected through pipes from the roof and/or road can be slowly infiltrated into the soil. By infiltrating relatively clean water into the soil, the sewage system is relieved and drying out of the subsurface can be prevented. The water used for this is taken from roofs and “clean” paved roads. Infiltration of rainwater is part of sustainable construction as advocated by the UK Government.

## The Product

The StormMaster system is an extremely strong 100% recycled plastic water permeable crate with a 95.8% void ratio, allowing rainwater run off to be temporarily stored and then released gradually, either into the soil acting as a soakaway or attenuated for transfer to the sewer system after a rainfall event. The box has a high pressure strength so is suitable for most applications and is easy to expand in all directions to create any size of structure.

### The Advantages of the StormMaster:

- Large format - just 2.5 units/m<sup>3</sup>
- Lightweight - 17kg per unit
- Choice of diameters for incoming/outgoing connections
- Good Bearing Capacity, sufficient for pedestrian & traffic use
- Large Storage Capacity (400litres) with 95.8% voids
- Economic and fast to install
- Applicable for both high and low groundwater situations



## The Principle

For soakaways, these underground storage units are wrapped in a non woven, needle punched geotextile to allow water discharge to the sub-surface to re-charge groundwater. For attenuation systems, a sealed geomembrane is wrapped around the tank to create a watertight seal and a protection fleece is then wrapped around to protect the geomembrane. The StormMaster has a high bearing capacity and can easily be expanded in all directions.

The construction of the storage void is achieved by the use of the StormMaster, a geocellular high-quality synthetic rectangular box with dimensions 1.0m x 1.0m x 0.4m (L x W x H) with a storage capacity of 400 litres (95.8% void ratio). The standard loading capacity of 400 kN/m<sup>2</sup> is sufficient for most situations, whether pedestrian or trafficked.

N.B. For HGV applications please contact our tech services.

### Why use StormMaster?

- Prevents extreme peak flows to main drainage and water purification systems.
- Rainwater is “cleaned” by geotextile surround.
- Decreases inconvenience of flooding during heavy rain falls.
- Promotes the balance in the groundwater position.
- Decreases environment problems caused by development.

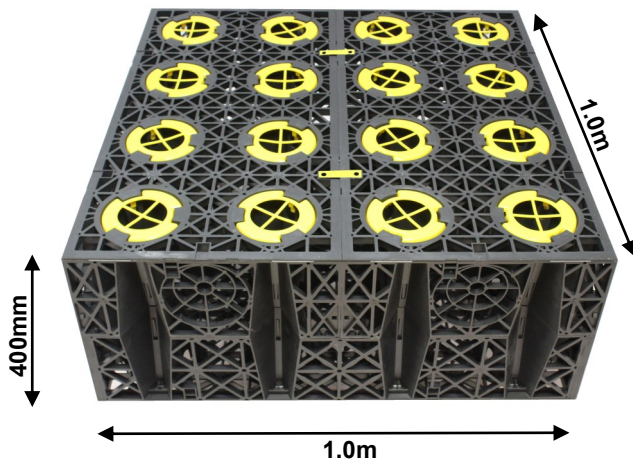
## Design

Following detailed assessment of the required volume of stormwater to be stored (see CIRIA C680/737 & BRE 365 for soakaway assessment).

The total number of StormMaster units can be calculated using 2.5/m<sup>3</sup> (1,000 litres). Decide on the best configuration for the characteristics of the site in question and create the “box” accordingly using the length and width dimensions.

StormMaster is suitable for landscaped and car park areas as well as heavier duty use. As a guide units require approx 0.5m of cover in landscaped areas and 0.75m cover in vehicular areas with a 75mm sharp sand base.

For full design & installation details see separate literature



## Applications

StormMaster is ideal for the bulk storage of stormwater in both attenuation and infiltration schemes. Buried with 0.5m of cover for non vehicular or 0.75m for vehicular use, standard connection (100 & 150mm are built in & any diameter can be accommodated. Ideal in amenity areas and even under car parks and roadways, the StormMaster is able to take traffic loading.

### Product Data

NOMINAL SIZE	1.0m (L) x 1.0m (W) x 0.4m(H)
COVERAGE RATE	2.5 units / m <sup>3</sup>
CAPACITY	400 litres (383 litres actual)
UNIT WEIGHT	17 kg per unit
VOID RATIO	95.8%
COMPRESIVE STRENGTH	Min 400 kN/m <sup>2</sup> Vertical Min 90 kN/m <sup>2</sup> Lateral (CIRIA 680)
MAXIMUM DEPTH	3.5 m to base of units (29°Shear)

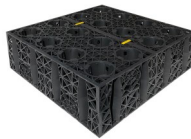
### Design Procedure:

1. Decide system application: Determine whether its porous paving & whether its attenuation of infiltration.
2. Decide on the location and quantity of storage systems: Locate the best site position to minimise excavation and pipe runs (normally at low point in site).
3. Decide the surfacing above the storage structure: Parking or leisure area etc. (this will decide the loading on the units).
4. Calculate required capacity: This is based on storm intensity, duration, porosity of soil, EA restrictions etc.
5. Calculate quantity of StormMaster units: (2.5 per m<sup>3</sup>)
6. Based on the layer depth of StormMaster of 400mm calculate the dimensions of the tank to suit local site conditions.
7. Decide on silt trap positions and inflow locations: Water entering any storage device is best passed through a silt trap prior to storage. For infiltration systems this can be the geotextile barrier.
8. Decide on outflow locations (if required—attenuation systems): This would normally be at the base of the unit for attenuation systems and should be of a size required to suit the outflow requirements.
9. Select StormMaster liner: If a permeable infiltration system is required choose a single layer a suitable non-woven needle punched geotextile. If an attenuated system is required a Geomembrane would envelope the units with a protective fleece around it.
10. Decide position of maintenance access: Although systems of this type require virtually no maintenance, it is advisable to provide for visual inspection to all types of system.
11. For attenuated systems decide on position of vent: This can be a simple 100mm dia pipe per 5,000m<sup>2</sup> of drained area.

### Features & components of StormMaster:

#### Our StormMaster system comes as two types of crates:

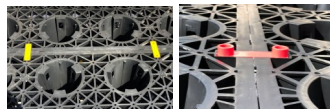
A full crate ready assembled with sides, knockouts etc. This is supplied for smaller projects to enable simple installation. For larger projects, this crate forms the outer ring of any structure to enable inspection/maintenance routes to be created and both incoming & outgoing connections to be made.



An inner crate is also supplied for larger projects that is supplied without sides to allow unfettered access to water entering the system which forms the inner volume within the full crate perimeter.



Systems are supplied with unit to unit yellow connectors (4 per unit) and layer to layer red connectors (2 per unit) that also act as unit to unit connectors where required.



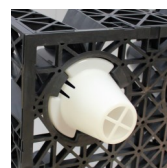
A yellow closer unit is supplied to cap the top layer of crates prior to covering with geotextile and/or geomembrane to create a flat top surface (16 per unit) for the top layer only.



StormMaster units are designed to include purpose designed inspection & maintenance routes within every unit running in both directions. Because of this routes can be created running the width or length of the structure at virtually any position to aid use.



Where possible units are supplied on purpose designed plastic feet that are retained within the cones of the StormMaster units after use rather than a pallet to ensure the minimum of waste on site & avoid large numbers of pallets to be disposed of.



#### Product manufactured in the EU

Information contained herein is subject to change without notice. Customers should check with Balstreet Ltd to ensure that they have the latest details. Liability in respect of any statements, conditions, warranties and representations made on behalf of Balstreet Ltd is limited in accordance with the terms set out in the Standard Conditions of Sale.



### Pre-installation notes:

For **attenuation** systems: Position the inflow and outflow connections level with the base of the StormMaster structure

For **infiltration** systems: Position the inflow connection at the top of the StormMaster structure.

### Installation Instructions:

- 1/. Excavate to the required length, width and depth and level the base. Ensure area is enough to allow plant access around sides to compact the backfill material (500mm minimum). Ensure base is smooth and level with no sharp protrusions. Cut back slopes to a safe angle or adequately support and allow safe access for site personnel.
- 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 (non woven, needle punched), ensuring a minimum 150mm overlap. This is required for both attenuation and infiltration structures.
- 4/. Lay the geomembrane (if attenuation) over the geotextile and sand bedding layer and up the sides of the excavation. Examine the geomembrane for damage and test all welds if apparent.
- 5/. Install the StormMaster units (1.0m x 1.0m x 0.4m) within the void in accordance with the installation instructions supplied. Arrange the units so that the outlet positions are in correct alignment with the inlet and outlet pipes. In multi layer installations use the shear connectors provided to secure the units against accidental displacement around the edges of the structure.
- 6/. Complete the geotextile and/or geomembrane encapsulation to the sides and top of the installation, ensuring 150mm minimum overlap for the protection fleece. Geomembrane should be welded with double seams and inspected for damage, testing the welds as required.
- 7/. Make drainage connections using proprietary adaptors. Ensure that the pre-formed socket positions are located correctly to receive the pipe-work. Alternatively for infiltration systems use flange adaptors and attach them to the StormMaster units with self tapping screws. For attenuated systems, it is recommended that all connections and air vent installations are installed using sealed drainage connections into a preformed socket with proprietary seals.
- 8/. Backfill the installation sides with Type 1 or 2 sub base, compacting in 150mm layers, in accordance with Specification for Highway Works.
- 9/. Place a 75mm sharp sand protection layer if required over the top of units and continue to backfill over units 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 metre width.

#### 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 metre width.

#### Specification Clause

To assist in the specification of the StormMaster stormwater retention system we would suggest the following clause:

The Stormwater retention system shall be StormMaster as supplied by Balstreet Ltd., Units shall manufactured from 100% recycled plastic and be 400mm deep and have a plan area of 1.0m x 1.0m with a void ratio not less than 95.8%. Standard units shall have a vertical loading capability of not less than 400kN/m<sup>2</sup> and a lateral loading capability of not less than 90kN/m<sup>2</sup>.



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