StormMaster O&M Manual

Purpose:
This document is provided as a framework to be adapted to suit individual site conditions and configurations for a particular site and sets out operational and maintenance regimes and responsibilities for the StormMaster sustainable drainage features associated with the particular development.

1 - Overview:

Contents: Site Name & Location, Client, Issue Date & StormMaster product utilised

2 – Introduction

This manual is intended to give an overview of the operation and maintenance for the StormMaster range of attenuation crates and is based on the manufacturer's instructions and recommendations which should be followed unless specifically noted otherwise due to project constraints.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

3 – Location & Description

Details of each location of tanks should be included as a permanent record together with an overview of size and depth together with cover to enable easy identification

3 – Operation

An overview of the design criteria (if available) should be included within this document i.e. 1 in 100 storm plus climate change event

4 – Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of attenuation tanks as designed. Although very little maintenance is required for correctly designed systems, as the feature is buried, a regularly inspection regime is very important to ensure the correction functionality of the surface water drainage network. Maintenance responsibility for the attenuation tanks and their surrounding areas should be placed with site.

Maintenance Schedule	Required Action	Frequency
Regular monitoring	Inspect inlets, outlets and overflows in adjacent manholes for blockages and clear if required. Inspect vent outlet if present.	Half yearly and after large storms
Regular maintenance & inspection	Debris& sediment removal from catch-pits or other pre-treatment structures	Half yearly and after large storms
Other maintenance & inspection	Survey inside of tank using CCTV for sediment build up and remove if necessary	Every 5 years or as required
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required
The above maintenance procedures are to be undertaken in accordance with health and safety good practice		

Attenuation & Infiltration System

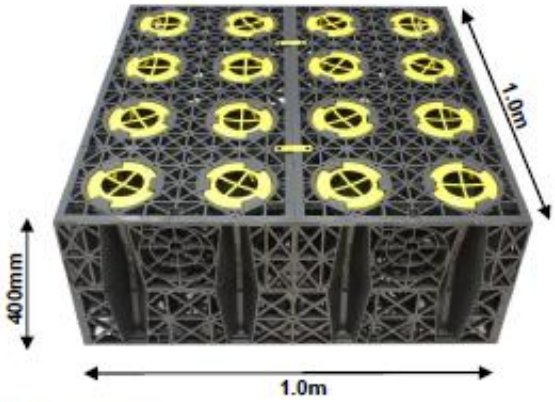
The StormMaster range of storage tank provides an economic versatile storage system for general use. Used as a soakaway the rainwater collected through pipes from the roof and/or road can be slowly infiltrated into the soil. By infiltrating relatively clean water into the soil, the sewage system is relieved and drying out of the subsurface can be prevented. 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/m3
- 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



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

	Standard (Black)	Lite (Grey)
NOMINAL SIZE	1.0m (L) x 1.0m (W) x 0.4m(H)	
COVERAGE RATE	2.5 units / m3	2.5 units / m3
CAPACITY	400 litres (383 litres actual)	
UNIT WEIGHT	16.8kg per unit	16.2kg per unit
VOID RATIO	95.8%	95.8%
COMPRESIVE STRENGTH	400 kN/m2 Vertical 90 kN/m2 Lateral	200 kN/m2 Vertical 80 kN/m2 Lateral
MAXIMUM DEPTH	3.9 m to unit base (30°Shear)	3.0m to unit base (30°Shear)

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/m2 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/m3 (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

Installation

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 m3)
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 5,000m2 of drained area.

Features & components of StormMaster:

StormMaster comes as two strengths of crate: 400kN/m2 (40T) & 200kN/m2 (20T) dependant on anticipated use. The units can also be supplied fully assembled, or for larger projects as both assembled & open:

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 enabling both inspection/maintenance routes to be created and 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 three purpose designed inspection & maintenance routes within every unit running in both directions. Because of these routes can be created running the width or length of the structure at virtually any position this aids versatility in design.

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.

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 excavated base and level off. Lay the geotextile protection fleece (non woven, needle punched), ensuring a min. 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 x1.0m 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.

For a professional installation:

We have partnered with various highly experienced installers and as such we are able to offer a supply and install service throughout the UK with gas sealed joints and a guaranteed installation.

Please contact us for details

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 1.0mm 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/m2 and a lateral loading capability of not less than 90kN/m2. Lite units shall have a vertical load of not less than 200kN/m2 vertically & 90kN/m2 laterally.

Produot manufaotured in the EU

For more information Contact:

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Please note that the information in this O&M Manual is provided as a guide only and is supplied in good faith and without charge. It does not form part of any contract or intended contract with the user.

Final determination of the suitability of any information or material for the use contemplated and the manner of use is the sole responsibility of the user and the user must assume all risk and liability in connection therewith. Any suggested design or change to the original design should be checked by a suitably qualified engineer prior to implementation.

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