PercolationTests.ie
Planning Assessments & Land Surveys

Tel: 087 6636 757 Email: percolationtests@gmail.com Web: www.percolationtests.ie

BRE Digest 365 Report.

Prepared on behalf of:

Brian Monaghan

At:

Tig Mhuire,
Old Bridge Road,
Templeogue,
Dublin.

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Scope of Report.

The findings of this report are the result of an on-site infiltration test. Interpretations and conclusions included in the report are based on knowledge of the ground conditions following detailed investigations, as well as the regional soils, subsoils and bedrock geology, and the experience of the author. David Ryan has prepared this report in line with the best current practice and with all reasonable skill, care and diligence in consideration of the limits imposed by the survey techniques used and resources devoted to it by agreement with the client.

David Ryan accepts no responsibility for any matters arising if any recommendations contained in this document are not carried out, or are partially carried out, without further advice being obtained from David Ryan.

Cillron Limited
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BRE Digest 365 Test

		Revision	1.00
Job No	101	Page	C/01
Section	Tig Mhuire, Old Bridge Road, Templeogue	Prepared By	DR	Date	12/11/2021

ALTERNATIVE SOAKAWAY SIZES

	trench soakaways		
width of trench *[mm]*	450	600	900
required trench length *[m]*	22 72	18 51	13 48
	ring soakaways		
diameter of ring *[mm]*	1500	2100	2400
required pit diameter *[m]*	2 18	2.18	2 18

** Based on effective depth and number of pits as in Soakaway Data table*

SUMMARY OF CALCULATIONS

critical design rainfall duration 't_{crit}' =	360	*min*
required storage volume 'V_{req}' =	10 56	m^3
provided storage volume 'V_{prov}' =	10 64	m^3
utilisation factor =	**0.99**	**.OK**
required time to discharge 50% 't_{50}' =	6 88	*hours*
utilisation factor =	**0.29**	**.OK**

GENERAL DATA

site location. [redacted] **Ireland**
soakaway type **infilled pit or trench**

impermeable area drained to soakaway 'A' *[m^2]* =	300
60 min rainfall depth of 5 year return period 'R' *[mm]* =	16
M5-60 to M5-2d rainfall ratio 'r' =	0.28
allowance for climate change	20%

SOAKAWAY DATA

soakaway width 'W' [m] =	3.50
soakaway length 'L' [m] =	4.00
total depth from ground level 'D_b' *[m]* =	1.10
depth to drain invert level 'D_d' *[m]* =	0.30
soakaway effective depth 'D_{eff}' *[m]* =	0 80
free volume in infill aggregate *[%]* =	95

SOIL INFILTRATION DATA

allowance for infiltration through soakaway base 50%
available on-site infiltration test results (●) Yes ( ) No
use soakage trial pit table below

internal surface area of trial pit 'a_{p50}' [m^2] =	1.76
storage volume between 75-25% 'V_p' [m^3] =	0.19
time for water to fall from 75-25% 't_p' [min] =	110.00
soil infiltration rate 'f' [m/s] =	1 65E-05

SOAKAGE TRIAL PIT DATA

soakage trial pit width 'W_t' *[m]* =	0.80
soakage trial pit length 'L_t' *[m]* =	1.20
total depth from ground level 'D_{tb}' *[m]* =	1.10
depth to pipe invert level 'D_{tp}' *[m]* =	0.70
soakage trial pit effective depth 'D_{teff}' *[m]* =	0 40
free volume in infill aggregate *[%]* =	100

NOTE faces of excavation assumed to be vertical

REQUIRED STORAGE CAPACITY PER RAINFALL DURATION

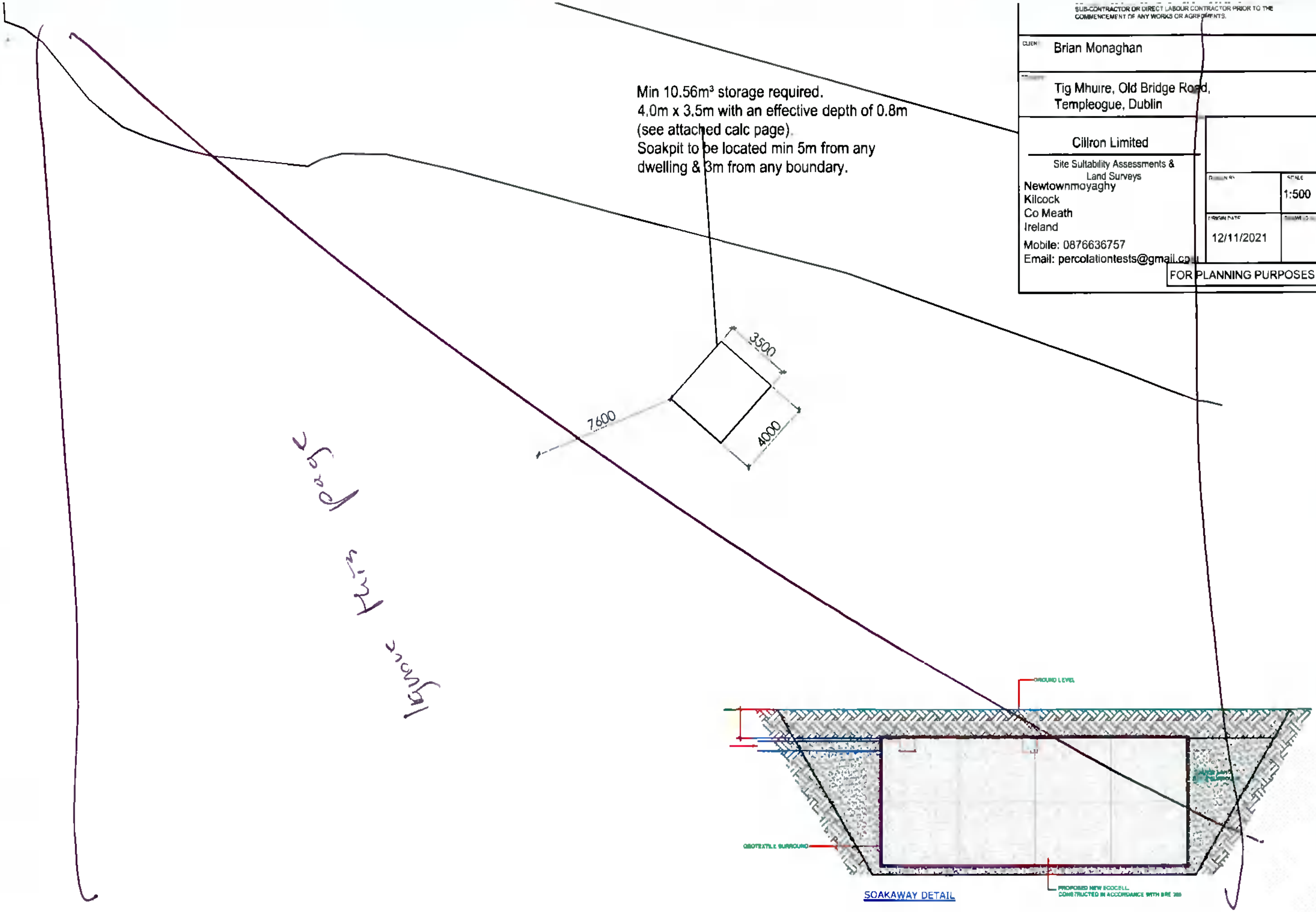
rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M30-D Z2	M30-D rainfalls *[mm]*	M30-D inflow *[m^3]*	ignore Z2	ignore rainfalls *[mm]*	ignore inflow *[m^3]*	ignore Z2	ignore rainfalls *[mm]*	ignore inflow *[m^3]*	outflow from soakaway *[m^3]*	required storage *[m^3]*
5	0 33	5 21	1 44	9 02	2 71							0.06	2.64
10	0 48	7 57	1 47	13 31	3.99							0.13	3 86
15	0 58	9 14	1 48	16 24	4 87							0.19	4 68
30	0 76	11 96	1 49	21.41	6 42							0.39	6 04
60	1 00	15 70	1 49	28.08	8.42							0.77	7 65
120	1 27	19 88	1 47	35.15	10 55							1 55	9 00
240	1 63	25 53	1 46	44 67	13.40							3.09	10.31
360	1 86	29 20	1 45	50 67	15 20							4.64	**10.56**
600	2 22	34 79	1 43	59 66	17 90							7 74	10.16
1440	3 05	47 85	1 38	79 36	23 81							18 57	5 24

** Z2 is a growth factor from M5 rainfalls*

SOAKAGE TRIAL PIT INFILTRATION TEST RESULTS

water level measurement N°:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Soakage Trial 1	time *[min]* =	0	80	165																
	depth to water *[m]* =	0.70	0.80	0.90																
Soakage Trial 2	time *[min]* =	0	90	190																
	depth to water *[m]* =	0.70	0.80	0.90																
Soakage Trial 3	time *[min]* =	0	100	210																
	depth to water *[m]* =	0.70	0.80	0.90																

Ignore this page



SOAKAWAY DETAIL

SUB-CONTRACTOR OR DIRECT LABOUR CONTRACTOR PRIOR TO THE COMMENCEMENT OF ANY WORKS OR AGREEMENTS.

CLIENT	Brian Monaghan
	Tig Mhuire, Old Bridge Road, Templeogue, Dublin

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Site Suitability Assessments & Land Surveys
Newtownmoyaghy
Kilcock
Co Meath
Ireland
Mobile: 0876636757
Email: percolationtests@gmail.com

DRAWN BY	SCALE 1:500
DESIGN DATE 12/11/2021	DRAWING NUMBER

FOR PLANNING PURPOSES ONL

USE FIGURED DIMENSIONS IN PREFERENCE TO SCALING FROM DRAWINGS
ALL MEASUREMENTS HEIGHTS AREAS LEVELS AND CONSTRUCTIONAL
DETAILS TO BE CHECKED AND VERIFIED BY THE BUILDING CONTRACTOR
SUB-CONTRACTOR OR DIRECT LABOUR CONTRACTOR PRIOR TO THE
COMMENCEMENT OF ANY WORKS OR AGREEMENTS

Brian Monaghan

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1 250

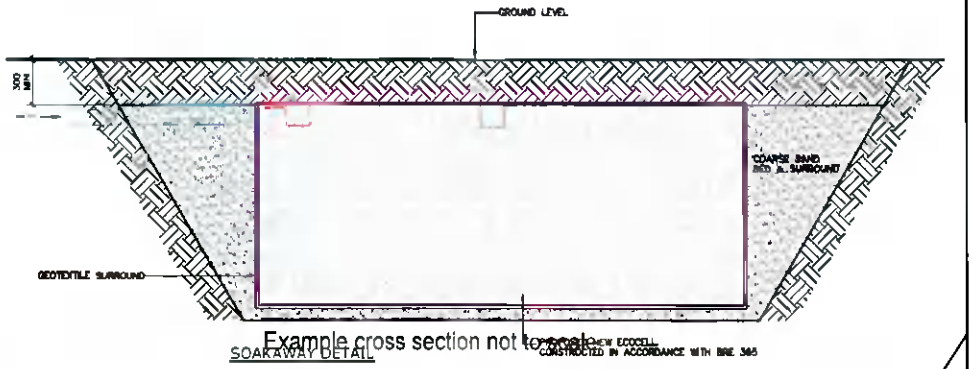
12/11/2021

FOR PLANNING PURPOSES ONLY

Min 10.56m³ storage required.
4.0m x 3.5m with an effective depth of 0 8m
(see attached calc page).
Soakpit to be located min 5m from any
dwelling & 3m from any boundary.

AREA OF SITE 0.1161ha

All surface water drainage to soak away, soak away to be designed and certified in accordance with BRE365 to engineer spec; soakaway report included in the application



SOAKAWAY DETAIL

Example cross section not to scale

Attenuation & Infiltration System

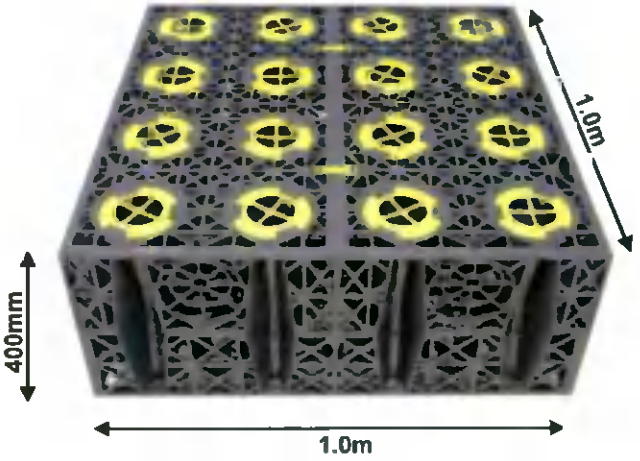
The StormMaster range of storage tank provides an economic versatile storage system for general use. Used as a soakaway the rainwater collected through pipes from the roof and/or road can be slowly infiltrated into the soil. By infiltrating relatively clean water into the soil, the sewage system is relieved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

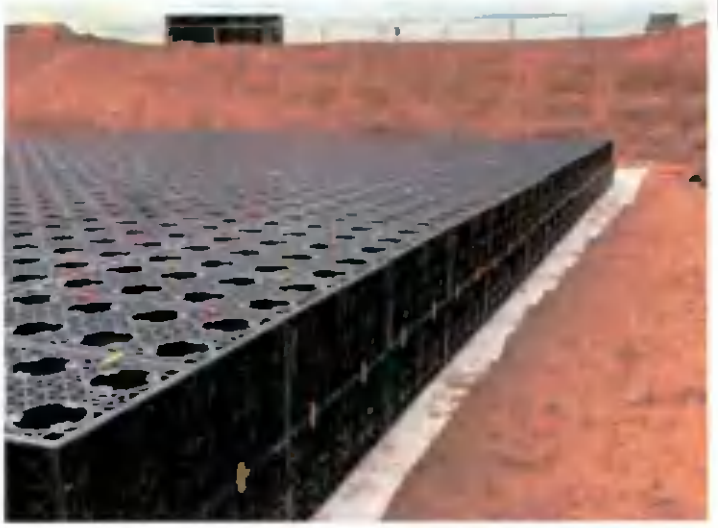
The Product

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 as a soakaway or attenuated for transfer to the sewer system after a rainfall event. *The box has a high 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 (400 litres) with 95.6% 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/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.

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 / m3
CAPACITY	400 litres (383 litres actual)
UNIT WEIGHT	17 kg per unit
VOID RATIO	95.8%
COMPRESIVE STRENGTH (CIRIA 680)	Min 400 kN/m2 Vertical Min 90 kN/m2 Lateral
MAXIMUM DEPTH (Depends on soil strength)	3.5 m to base of units (29°Shear) 4.6 m to base of units (36°Shear)

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:

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

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 of compacted sharp sand or a rounded granular stone 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 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 Further information please contact.

O'Reilly Oakstown Environmental
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Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 319075, Northing: 232626,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.7,	4.2,	5.1,	5.7,	6.2,	7.8,	9.6,	10.7,	12.4,	13.9,	15.1,	16.8,	18.2,	19.4,	N/A ,
10 mins	3.6,	5.1,	5.9,	7.2,	8.0,	8.7,	10.8,	13.3,	15.0,	17.3,	19.4,	21.0,	23.5,	25.4,	27.0,	N/A ,
15 mins	4.2,	6.0,	7.0,	8.4,	9.4,	10.2,	12.7,	15.7,	17.6,	20.3,	22.8,	24.7,	27.6,	29.9,	31.8,	N/A ,
30 mins	5.6,	7.8,	9.0,	10.8,	12.1,	13.0,	16.2,	19.7,	22.0,	25.3,	28.2,	30.5,	34.0,	36.7,	38.9,	N/A ,
1 hours	7.3,	10.2,	11.7,	14.0,	15.5,	16.7,	20.5,	24.8,	27.6,	31.5,	35.0,	37.7,	41.8,	45.0,	47.7,	N/A ,
2 hours	9.7,	13.3,	15.2,	18.0,	19.9,	21.3,	26.0,	31.2,	34.5,	39.3,	43.4,	46.6,	51.5,	55.3,	58.4,	N/A ,
3 hours	11.4,	15.5,	17.7,	20.8,	23.0,	24.6,	29.8,	35.6,	39.4,	44.6,	49.3,	52.8,	58.2,	62.3,	65.7,	N/A ,
4 hours	12.8,	17.3,	19.7,	23.2,	25.5,	27.2,	32.9,	39.2,	43.3,	48.9,	53.9,	57.6,	63.4,	67.9,	71.5,	N/A ,
6 hours	15.1,	20.2,	22.9,	26.8,	29.4,	31.4,	37.8,	44.8,	49.3,	55.6,	61.1,	65.3,	71.6,	76.5,	80.5,	N/A ,
9 hours	17.8,	23.7,	26.7,	31.1,	34.0,	36.3,	43.4,	51.2,	56.3,	63.2,	69.3,	73.9,	80.9,	86.2,	90.6,	N/A ,
12 hours	20.0,	26.4,	29.7,	34.6,	37.7,	40.2,	47.9,	56.4,	61.8,	69.3,	75.7,	80.7,	88.2,	93.9,	98.6,	N/A ,
18 hours	23.5,	30.8,	34.6,	40.1,	43.6,	46.4,	55.0,	64.5,	70.5,	78.7,	85.9,	91.3,	99.6,	105.9,	111.0,	N/A ,
24 hours	26.4,	34.4,	38.5,	44.5,	48.4,	51.4,	60.7,	70.9,	77.4,	86.2,	93.9,	99.8,	108.6,	115.3,	120.7,	139.4,
2 days	32.1,	41.1,	45.6,	52.1,	56.3,	59.5,	69.5,	80.2,	87.0,	96.2,	104.2,	110.1,	119.1,	125.9,	131.5,	150.2,
3 days	36.7,	46.4,	51.3,	58.3,	62.8,	66.2,	76.7,	88.0,	95.1,	104.7,	112.9,	119.1,	128.3,	135.3,	141.0,	160.2,
4 days	40.7,	51.1,	56.3,	63.7,	68.4,	72.0,	83.1,	94.8,	102.2,	112.1,	120.6,	127.0,	136.5,	143.7,	149.5,	169.1,
6 days	47.8,	59.3,	65.0,	73.0,	78.2,	82.1,	94.1,	106.7,	114.5,	125.1,	134.1,	140.8,	150.8,	158.4,	164.5,	184.9,
8 days	54.0,	66.5,	72.6,	81.2,	86.8,	90.9,	103.7,	117.0,	125.3,	136.4,	145.8,	152.9,	163.4,	171.2,	177.5,	198.7,
10 days	59.6,	73.0,	79.5,	88.7,	94.5,	98.9,	112.4,	126.4,	135.0,	146.7,	156.5,	163.8,	174.7,	182.8,	189.4,	211.2,
12 days	64.9,	79.1,	86.0,	95.6,	101.7,	106.3,	120.4,	135.0,	144.0,	156.1,	166.3,	173.9,	185.1,	193.5,	200.3,	222.8,
16 days	74.7,	90.2,	97.8,	108.3,	114.9,	119.9,	135.1,	150.8,	160.4,	173.3,	184.2,	192.2,	204.1,	213.0,	220.1,	243.8,
20 days	83.7,	100.5,	108.6,	119.9,	127.0,	132.3,	148.5,	165.1,	175.3,	188.9,	200.3,	208.8,	221.3,	230.6,	238.1,	262.9,
25 days	94.2,	112.4,	121.2,	133.3,	140.9,	146.6,	163.9,	181.6,	192.5,	206.9,	218.9,	227.9,	241.1,	250.8,	258.7,	284.6,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

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Tig Mhuire - 12/11/2021

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SOUND INSURANCE

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sound.ie

David Ryan
Newtownmoyaghy
Kilcock
Co Meath

Date: 06/04/2021
Reference: RYDA01001

INSURANCE CERTIFICATE

To Whom It May Concern

We confirm we act as Insurance Brokers to the above and set out below a summary of cover we have arranged:

Business Description: *Soil Engineer (Percolation Testing)*

PROFESSIONAL INDEMNITY

Policy No:	**PID00024862**
Provider:	**Optio Europe Ltd**
Insurer:	**Accredited Insurance (Europe) Ltd**
Period of Insurance:	**04/03/2021 to 03/03/2022**
Limit of Indemnity:	**€1,000,000**

Subject always to Insurers policy wording, warranties, conditions, restrictions & exclusions a copy of which is available on request.

We trust this is in order but if you have any queries, please do not hesitate to contact us.

Yours sincerely,

Gary Kinsella
Commercial Broker
P: (01) 524 1415
E: Gary@sound.ie