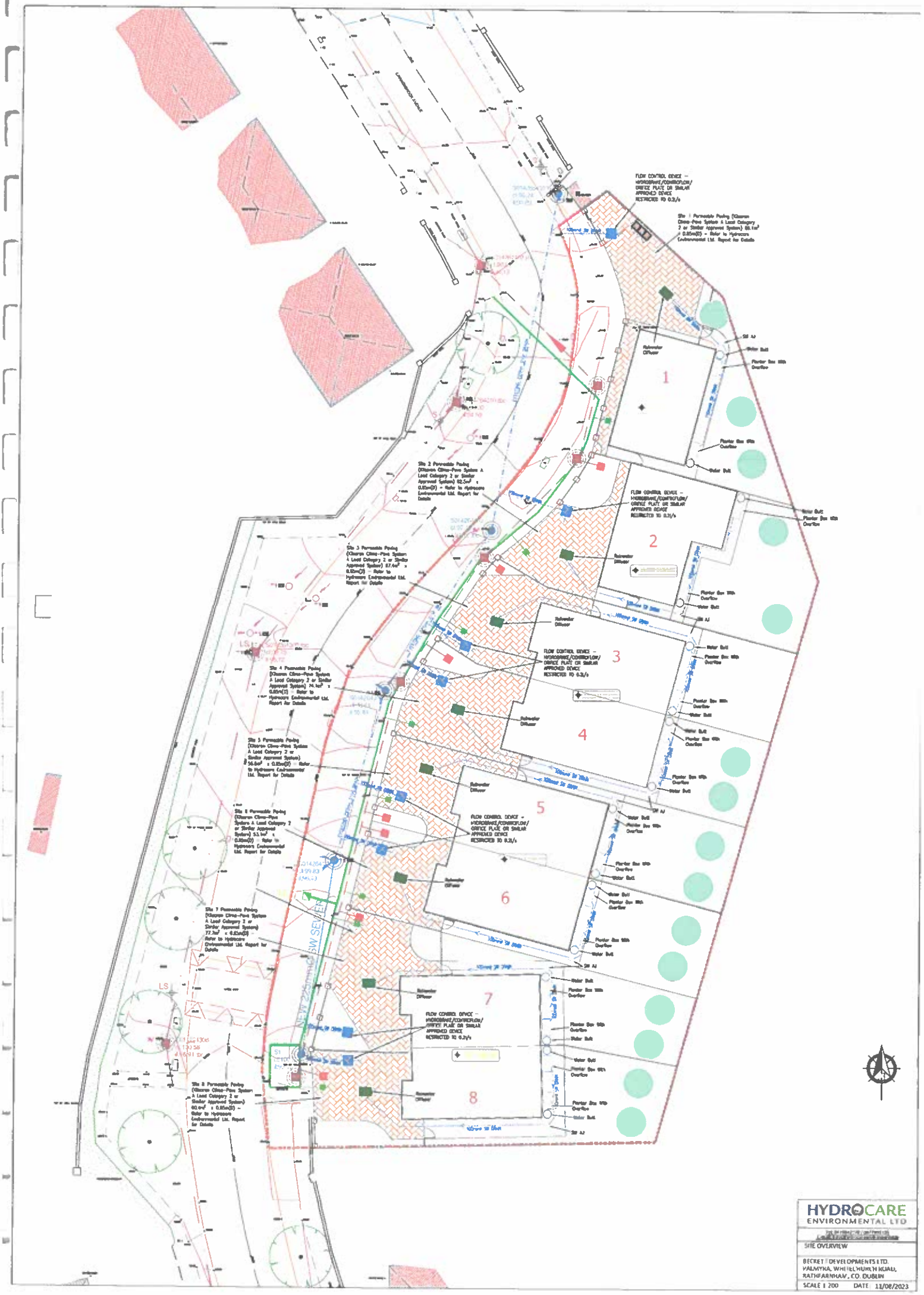


HYDROCARE ENVIRONMENTAL LTD

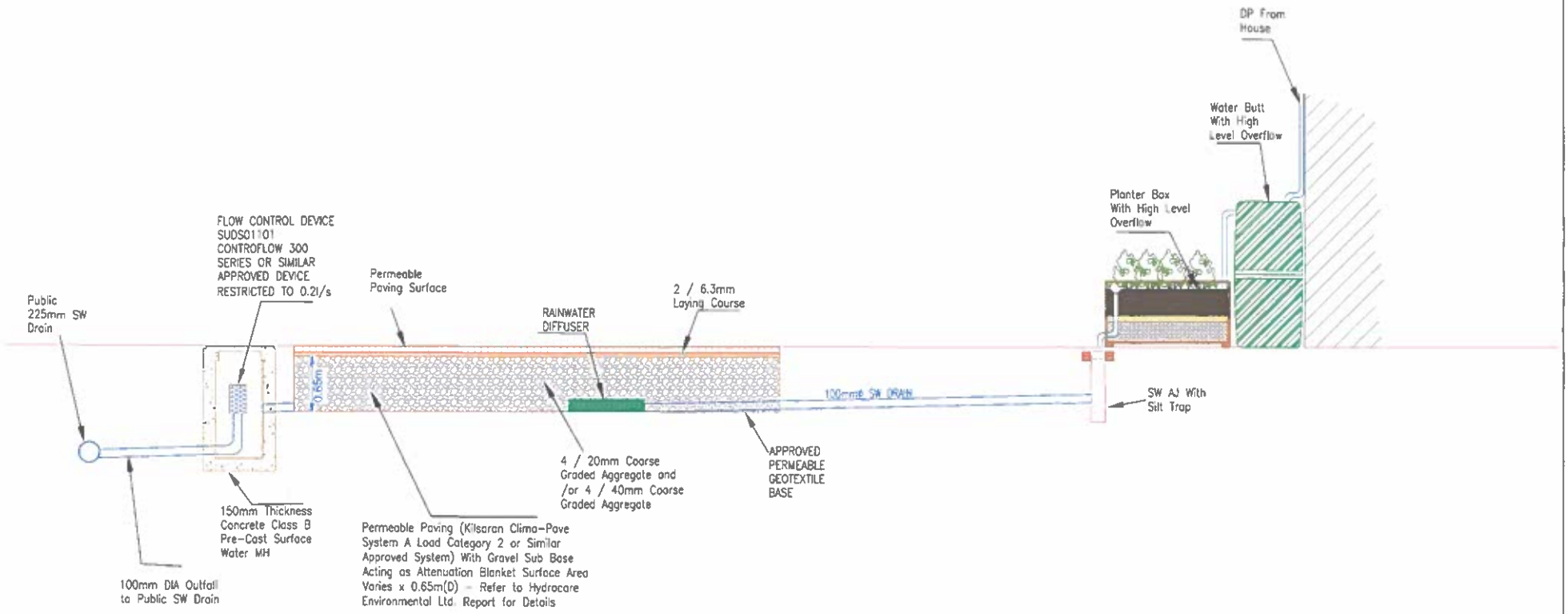
SITE OVERVIEW

BECRET DEVELOPMENTS LTD.
PALMYRA, WHITECHURCH ROAD,
RATHFARNHAM, CO. DUBLIN

SCALE 1:200 DATE 11/08/2023

FOR PLANNING PURPOSES ONLY
NOT CONSTRUCTION ISSUE

SURFACE WATER DRAINAGE LONG SECTION



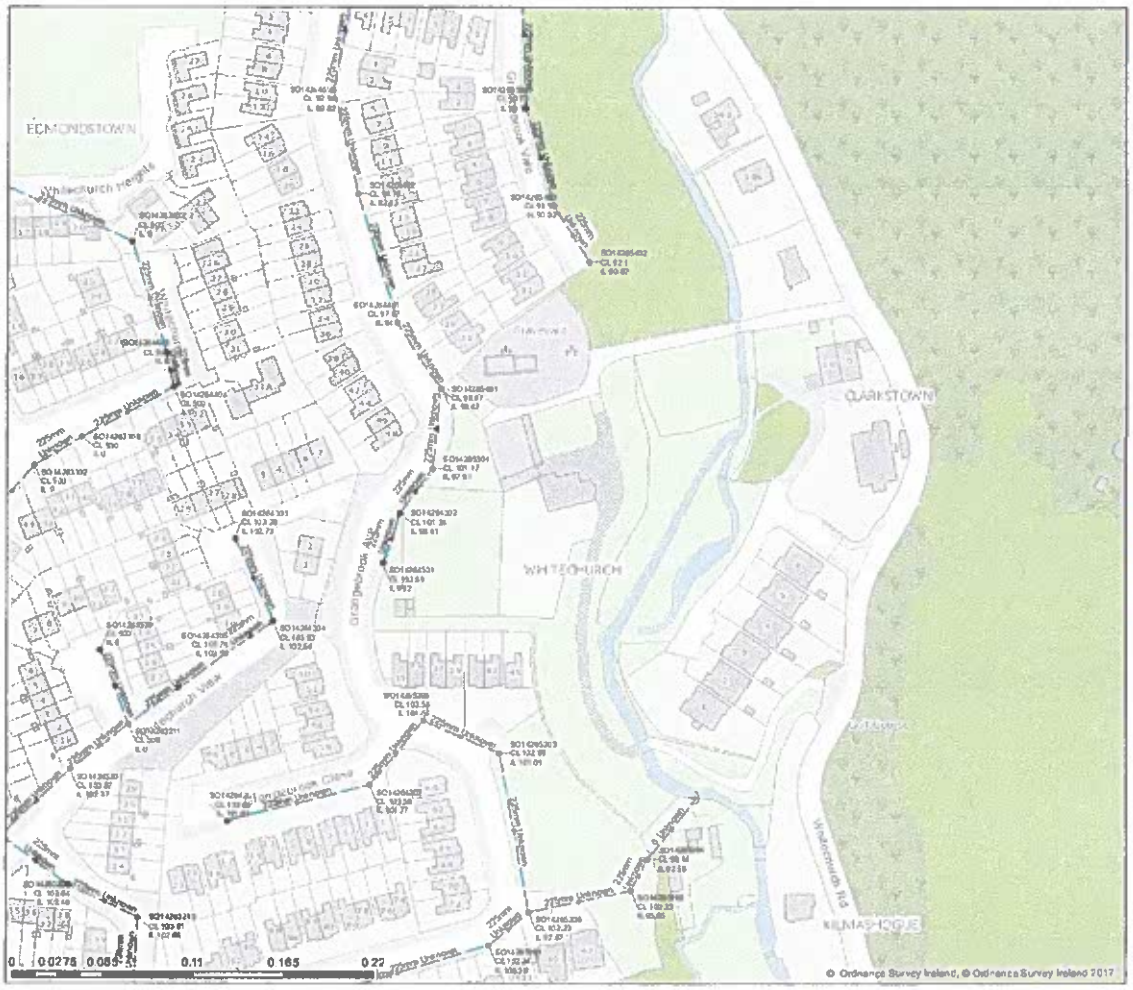
HYDROCARE ENVIRONMENTAL LTD
Tel: 0419842378 / 0877905155
E-mail: info@hydrocareenvironmental.ie

ATTENUATION SYSTEM SW LONG SECTION

BECKETT DEVELOPMENTS LTD.
PALMYRA, WHITECHURCH ROAD,
RATHFARNHAM, CO. DUBLIN

SCALE 1:50 DATE: 11/08/2023

Irish Water Web Map



UISCE ÉIREANN IRISH WATER

Print Date: 09/02/2023

Printed by: Irish Water

Permavoid Rainwater Diffuser Unit

Data Sheet

PRODUCT INFORMATION P1 ISSUE 3 - JUNE 2018

Run-off from building roofs is collected into downpipes and flows into a back inlet gully incorporating an internal filter or catchpit inspection chambers. The back inlet gully or chamber discharges the filtered stormwater into the permeable sub-base via Permavoid Rainwater Diffuser Unit encapsulated in a 2mm mesh fabric. The run-off will then diffuse out of the Permavoid Rainwater Diffuser Unit and into the modified granular sub-base layer. The Permavoid unit is a 150mm deep modular interlocking plastic unit storage system designed for use as a combined drainage component and sub-base replacement system, ideal for shallow infiltration/attenuation.

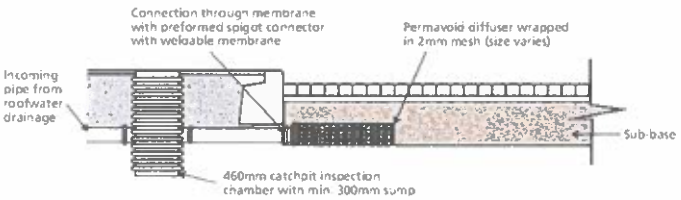
Permavoid Rainwater Diffuser Unit - Configuration Options

Length \ Width	354mm	708mm	1062mm	1416mm	2124mm
708mm	✓	✓	✓	✓	✓
1062mm	✗	✓	✓*	✓	✓
1416mm	✓	✓	✓	✓	✓
2124mm	✓	✓	✓	✓	✓

*1062 x 1062mm diffuser unit has a 354 x 354mm central opening.
Depths available are either 150mm or 300mm.
Connections available are either Ø110mm or Ø160mm.

Catchpit: 460mm diameter catchpit with 160mm inlet - PSMST 160
460mm diameter catchpit with 110mm inlet - PSMST 110

Typical Layout - Rainwater downpipe drainage into sub-base reservoir



Technical Support

Detailed guidance and assistance is available.
For further information, please contact our Technical Team on **+44 (0) 1509 615 100** or email **civils@polypipe.com** or visit **www.polypipe.com/civils-technical-hub**

ELEMENT	VALUE
PHYSICAL PROPERTIES	
Weight per unit	3kg
Length	708mm
Width	354mm
Depth	150mm
SHORT TERM COMPRESSIVE STRENGTH	
Vertical	715kN/m²
Lateral	156kN/m²
SHORT TERM DEFLECTION	
Vertical	1mm per 126kN/m²
Lateral	1mm per 15kN/m²
TENSILE STRENGTH	
Of a single joint	42.4kN/m²
Of a single joint at (1% secant modulus)	18.8kN/m²
Bending resistance of unit	0.71kN/m
Bending resistance of single joint	0.16kN/m
OTHER PROPERTIES	
Volumetric void ratio	95%
Average effective perforated surface area	52%
Intrinsic permeability (k)	Minimum 1.0×10^{-5}
Ancillary	Permavoid Permatie Permavoid Shear Connector
Material	Polypropylene (PP)

HYDRAULIC PERFORMANCE						
3 units wide, 1 unit deep (1.06m x 0.15m)						
FREE DISCHARGE						
Gradient (%)	0	1	2	3	4	5
Flow rate (l/m/s)	*8*	*13*	*15*	*17*	*19*	*21*

Polypipe Civils,
Charnwood Business Park, Loughborough, Leicestershire LE11 1LE
Tel: +44 (0) 1509 615100 Fax: +44 (0) 1509 610215 Email: civils@polypipe.com
www.polypipe.com/wms

Polypipe

Permavoid Rainwater Diffuser Unit

Data Sheet

Permavoid Rainwater Diffuser Unit can be utilised in these SuDS techniques

TECHNIQUES													
Blue-Green roofs	Podium Decks	Trees	Sports Pitches	Cycle Paths	Permeable Paving (sub base & podium)	Bioretention & Rain Gardens	Attenuation Storage Tanks	Infiltration	Swales	Filter Drains	Detention Basins	Ponds & Wetlands	Filter Strips
			✓		✓		✓						

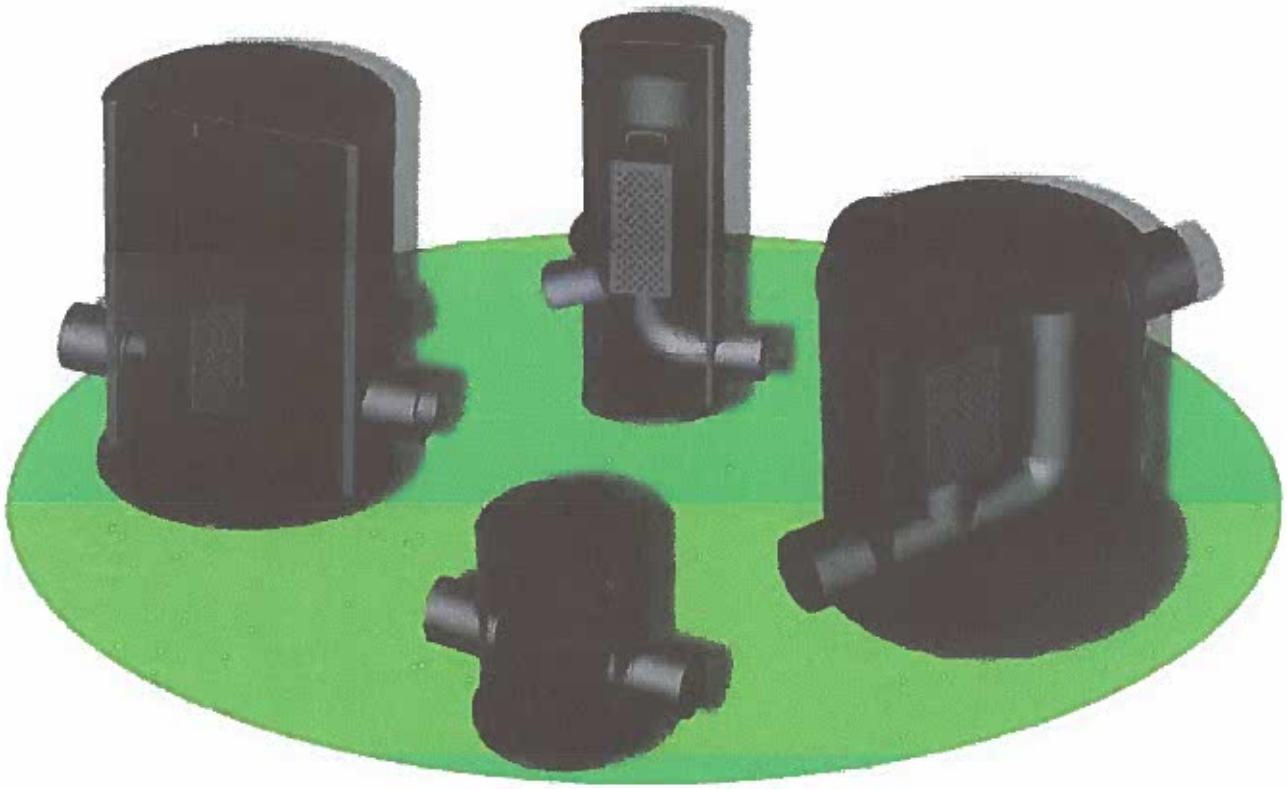
Visit **www.polypipe.com/greeninfrastructure**

Polypipe Civils,
Charnwood Business Park, Loughborough, Leicestershire LE11 1LE
Tel: +44 (0) 1509 615100 Fax: +44 (0) 1509 610215 Email: civils@polypipe.com
www.polypipe.com/wms

Polypipe

Controflow

flow controls dedicated to SuDS



www.controflow.com

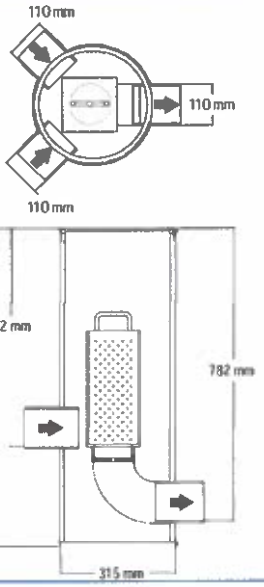
Controflow
exclusively from SuDS store

Controflow 300 Series Stepped Invert Protected Orifice

SUDS01101

Description

The Controflow 300 Series Stepped Invert Protected Orifice is specifically designed for attenuation on housing developments. The standard 11mm diameter orifice, protected by a removable filter, allows for surface water runoff to be restricted to a flow rate of 0.2l/s, preferably within the curtilage of each plot to suit the site layout. The chamber is complete with two standard 110mm diameter inlet spigots, and a 200mm sump to accommodate the deposition of any suspended solids. Chambers are supplied with a temporary protective site cover (permanent cover and frame not included).



Packaging Details

Element	Value	Unit
Packaging unit dimension	440 x 852 (WxD)	mm
Packaging unit weight	TBC	kg
Number of units per pallet	TBC	nr
Pallet dimensions	1200 x 1200 x 150 (LxWxD)	mm
Pallet weight	TBC	kg

Specification

Element	Value	Unit
Overall width	436	mm
Overall depth	847	mm
Sump depth	200	mm
Depth to invert of inlet	582	mm
Depth to invert of outlet	782	mm
Inlet Spigot O.D ⌀	110	mm
Outlet Spigot O.D ⌀	110	mm
Maximum flow rate	0.2	l/s
Unit weight	TBC	kg
Material	HDPE	

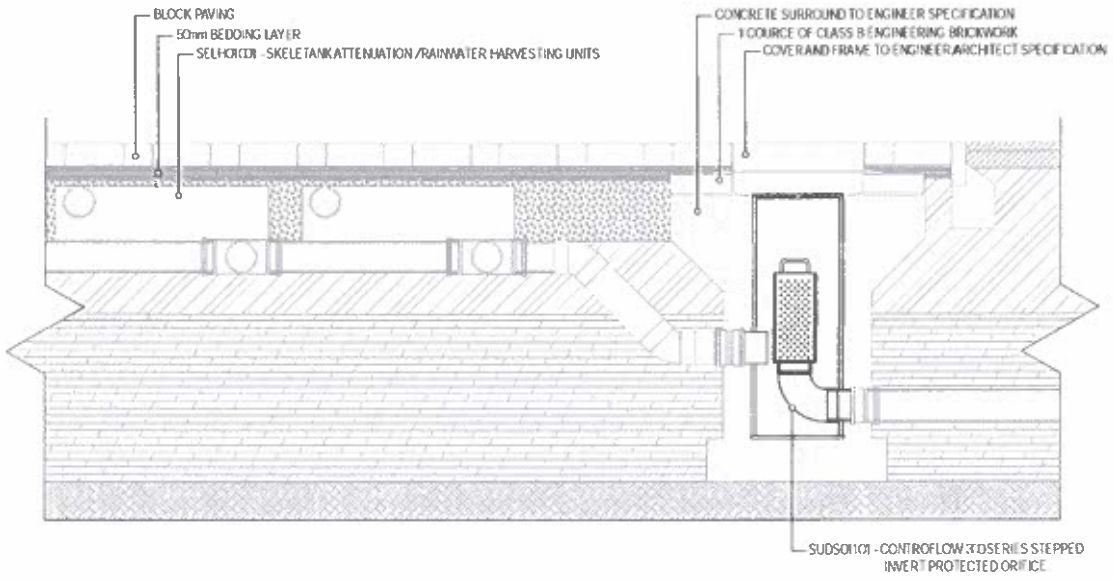
Designed for housing developments

Protected orifice

0.2l/s restricted flow rate

SUDS01101 - CONTROFLOW 300 SERIES STEPPED INVERT PROTECTED ORIFICE

GENERAL APPLICATION - CONTROLLING OUTLET FLOWS FROM SHALLOW RAINWATER HARVESTING TANKS



Controflow

Clima-Pave™

Permeable Paving Solutions

Kilsaran

ideas taking shape

Selection of Pavement Type

The type of permeable pavement system to be adapted is based primarily on site ground conditions, site suitability and the permeability values of the sub-grade encountered on site from infiltration soak-pit testing. Table 1 gives guidance on the suitability of the three types of permeable pavement system.

Table 1: Guidance on selection of a pavement system

		System A - total infiltration	System B - partial infiltration	System C - no infiltration
Permeability of subgrade defined by coefficient of permeability, k (m/s)	10^{-3} to 10^{-5}	✓	✓	✓
	10^{-5} to 10^{-6}	✗	✓	✓
	10^{-7} to 10^{-8}	✗	✗	✓
Highest recorded water table within 1000mm of formation level		✗	✗	✓
Pollutants present in subgrade		✗	✗	✓

Selection of Pavement Sub-Base Thickness

The design of the sub-base for the permeable pavement should take into account the traffic loadings likely to use the pavement. It is essential to take into account any future increase in traffic volume and any HGV traffic which may use the pavement irrespective of how frequent. The correct loading category should be then selected from Table 2 taking into account the above considerations. It should be noted that no layers of the permeable pavement are designed for site traffic to use them and when finished the permeable pavement surface should not be trafficked by site traffic vehicles which are heavier than that for which the pavement was designed. It is advisable to complete paving works after all other work in the vicinity has been completed.

Typical build up details for each traffic category are illustrated on page 20 and 21 for guidance purposes.

Table 2: Loading Categories

1 DOMESTIC PARKING	2 CAR	3 PEDESTRIAN	4 SHOPPING	5 COMMERCIAL	6 HEAVY TRAFFIC
No Large Goods Vehicles	Emergency Large Goods Vehicles only	One Large Goods Vehicles per week	Ten Large Goods Vehicles per week	100 Large Goods Vehicles per week	1000 Large Goods Vehicles per week
Zero standard axles	**100 standard axles**	**0.015msa**	**0.15msa**	**1.5msa**	**15msa**
Patio	Car Parking Bays and Aisles	Town/city Pedestrian Street	Retail development delivery access route	Industrial Premises	Main road
Private Drive	Railway Station platform	Nursery Access	School/college access road	Lightly Trafficked Public Road	Distribution Centre
Decorative feature	External Car Showroom	Parking area to residential development	Office block delivery route	Light Industrial development	Bus Station (bus every 5 minutes)
Enclosed Playground	Sports Stadium Pedestrian route	Garden centre external display area	Deliveries to small residential development	Mixed retail/ industrial development	Motorway Truck Stop
Footway with zero vehicle overrun	Footway with occasional overrun	Cemetery Crematorium	Garden centre delivery route	Town Square	Bus Stop
	Private drive/ footway crossover	Hotel Parking	Fire Station Yard	Footway with regular overrun	Roundabout
		Airport Car Park with no bus pickup	Airport Car Park with bus to terminal	Airport landside roads	Bus Lane
		Sports Centre	Sports Stadium access route/ forecourt		

msa = millions of standard 8,000 kg axles

Sub-Base Thickness For Water Storage

The sub base depth must also take into consideration the water storage requirements for the site. The depth of sub-base may have to be adjusted to allow for increased site specific water storage. Further guidance on hydraulic factors can be found in BS 7533-13:2009 section 5.4.

Adjustment To Pavement Design For Low CBR Sub-Grade

In the case of CBR values below 5%, either ground improvement work will be required for the site, or the thickness of the coarse graded aggregate sub-base will have to be adjusted in accordance with 5.6.3 and table 9 of BS 7533-13:2009

Permeable Paving Aggregates

All materials used as permeable paving aggregate must comply to the grading and physical requirements below, as well at the general requirements of BS EN 12620 and BS EN 13242. Sub-base laying course materials should be clean, sound, non-friable and sound crushed rock material. Rounded gravel materials are not recommended for sub-base layers. The jointing material may be either clean crushed material or clean gravel material. The materials should be tested to confirm that it meets the requirements below.

The contractor shall also ensure that on-going deliveries to site are checked frequently for grading, shape and inspected to ensure cleanliness.

During installation on site, great care and attention must be paid to ensure that the aggregates are kept free of contamination and deleterious matter. Construction traffic cannot be allowed to traverse the layers of permeable paving aggregates during installation.

4/40mm Coarse Graded Permeable Paving Aggregate

Sieve Size (mm)	Percentage Passing
80	100
63	98-100
40	90-99
31,5	-
20	25-70
10	-
4	0-15
2	0-5

4/20mm Coarse Graded Permeable Paving Aggregate

Sieve Size (mm)	Percentage Passing
40	100
31,5	98-100
20	90-99
10	25-70
4	0-15
2	0-5

2/6.3mm Laying Course Paving Aggregate

Sieve Size (mm)	Percentage Passing
14	100
10	98-100
6.3	80-99
2	0-20
1	0-5

3mm Jointing Grit

Sieve Size (mm)	Percentage Passing
40	100
8	100
6.3	95-100
4	85-99
2	15-35
1	0-10
0.063	0.0-1.5

Property	Category to BS EN 13242 or BS EN 12620
Grading	4/20 (preferred) or 4/40 as per table above
Fines Content	F4
Shape	FI20
Resistance to Fragmentation	LA30
Water Absorption to BS EN 1097-6:2000	WA2
For water absorption > 2% Magnesium Sulfate Soundness	MS18
Resistance to Wear	MDE20
Acid Soluble Sulfate Content	AS0.2
Total Sulfur	≤1% by mass
Recycled Aggregates	Seek guidance from Kilsaran Technical Department

Typical Design Diagrams

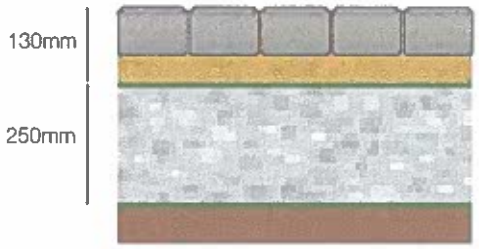
Below are typical build-up details for permeable pavement systems based on BS 7533-13:2009. These diagrams are based on ideal site conditions for drainage and CBR values of 5% or greater. The diagrams are for project appraisal purposes only and in all cases a site specific design in accordance with BS 7533-13:2009 will be required.

Key:

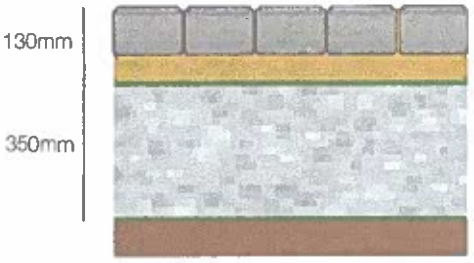
- 2 / 6.3mm Laying Course
- Hydraulically-Bound Coarse Graded Aggregate or 80mm of DBM Macadam
- 4 / 20mm Coarse Graded Aggregate and /or 4/40mm Coarse Graded Aggregate
- Capping Material
- Approved Geotextile
- Approved Impermeable Membrane

System A & B (Infiltrating & Partial Infiltration Systems)

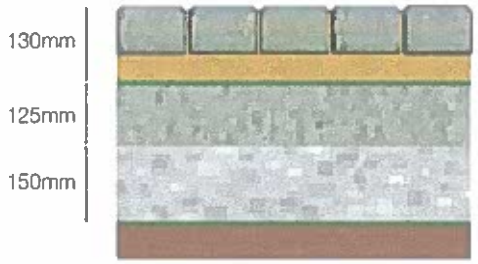
LOAD CATEGORY 1



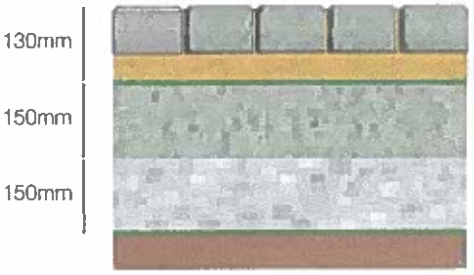
LOAD CATEGORY 2



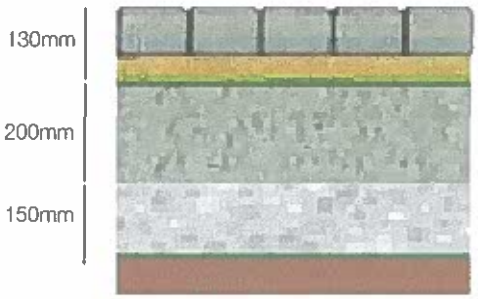
LOAD CATEGORY 3



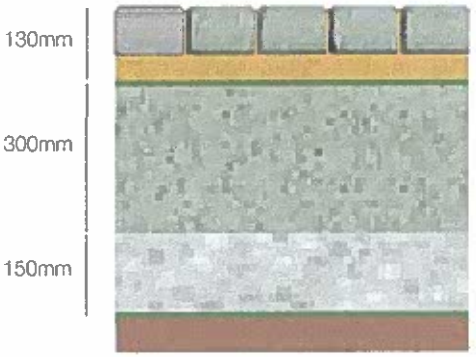
LOAD CATEGORY 4



LOAD CATEGORY 5



LOAD CATEGORY 6



Alternative build up / materials may be used depending on project specific details.

For load categories 3-6 the hydraulically-bound coarse graded aggregate (porous no fines concrete) layer may be replaced with 80mm depth of DBM Macadam to act as a stiffening layer. The macadam layer should be punctured at 750mm centres on grid. Further details on the DBM macadam layer are given on page 19.

Where the depth of aggregate sub-base is in excess of 350mm for the given loading category, it may be possible to reduce the depth of aggregate required and provide a more cost effective design with the use of an appropriate and approved geo-grid. This can be appraised at design stage.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 320597, Northing: 237733,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.5,	4.1,	4.9,	5.4,	5.8,	7.2,	8.7,	9.8,	11.2,	12.4,	13.4,	14.9,	16.1,	17.0,	N/A ,
10 mins	3.5,	4.9,	5.7,	6.8,	7.6,	8.1,	10.0,	12.2,	13.6,	15.6,	17.3,	18.7,	20.8,	22.4,	23.7,	N/A ,
15 mins	4.2,	5.8,	6.7,	8.0,	8.9,	9.6,	11.8,	14.3,	16.0,	18.3,	20.4,	22.0,	24.4,	26.4,	27.9,	N/A ,
30 mins	5.5,	7.6,	8.7,	10.3,	11.4,	12.2,	15.0,	18.0,	20.0,	22.8,	25.3,	27.2,	30.1,	32.3,	34.2,	N/A ,
1 hours	7.3,	9.9,	11.2,	13.3,	14.6,	15.7,	19.0,	22.7,	25.1,	28.4,	31.4,	33.6,	37.1,	39.7,	41.9,	N/A ,
2 hours	9.6,	12.9,	14.6,	17.1,	18.7,	20.0,	24.1,	28.5,	31.4,	35.4,	38.9,	41.6,	45.6,	48.7,	51.3,	N/A ,
3 hours	11.3,	15.1,	17.0,	19.8,	21.7,	23.1,	27.6,	32.6,	35.8,	40.3,	44.1,	47.1,	51.5,	54.9,	57.7,	N/A ,
4 hours	12.7,	16.8,	18.9,	22.0,	24.0,	25.6,	30.5,	35.9,	39.3,	44.1,	48.2,	51.4,	56.2,	59.8,	62.8,	N/A ,
6 hours	15.0,	19.6,	22.0,	25.5,	27.8,	29.5,	35.0,	41.0,	44.9,	50.1,	54.7,	58.2,	63.4,	67.4,	70.7,	N/A ,
9 hours	17.6,	22.9,	25.6,	29.6,	32.1,	34.1,	40.3,	46.9,	51.2,	57.0,	62.0,	65.9,	71.6,	76.0,	79.6,	N/A ,
12 hours	19.8,	25.6,	28.6,	32.8,	35.6,	37.7,	44.4,	51.6,	56.2,	62.4,	67.8,	71.9,	78.1,	82.8,	86.6,	N/A ,
18 hours	23.3,	29.9,	33.3,	38.1,	41.2,	43.6,	51.0,	59.0,	64.1,	71.0,	76.9,	81.4,	88.2,	93.3,	97.5,	N/A ,
24 hours	26.1,	33.4,	37.0,	42.3,	45.7,	48.2,	56.3,	64.9,	70.4,	77.8,	84.1,	88.9,	96.1,	101.6,	106.0,	121.0,
2 days	32.2,	40.3,	44.3,	50.1,	53.8,	56.5,	65.2,	74.3,	80.0,	87.7,	94.3,	99.2,	106.6,	112.1,	116.6,	131.7,
3 days	37.0,	45.9,	50.2,	56.4,	60.3,	63.3,	72.4,	82.0,	87.9,	95.9,	102.7,	107.8,	115.4,	121.1,	125.7,	141.1,
4 days	41.3,	50.7,	55.4,	61.9,	66.0,	69.1,	78.7,	88.6,	94.8,	103.1,	110.2,	115.4,	123.2,	129.1,	133.8,	149.5,
6 days	48.8,	59.2,	64.3,	71.4,	75.9,	79.2,	89.6,	100.2,	106.9,	115.7,	123.1,	128.6,	136.8,	142.9,	147.8,	164.2,
8 days	55.3,	66.6,	72.1,	79.7,	84.5,	88.1,	99.1,	110.3,	117.3,	126.5,	134.3,	140.1,	148.6,	155.0,	160.1,	177.0,
10 days	61.3,	73.4,	79.2,	87.3,	92.3,	96.1,	107.6,	119.5,	126.7,	136.4,	144.5,	150.4,	159.3,	165.8,	171.1,	188.6,
12 days	66.9,	79.7,	85.8,	94.3,	99.6,	103.5,	115.6,	127.9,	135.5,	145.4,	153.8,	160.0,	169.1,	175.9,	181.3,	199.2,
16 days	77.3,	91.3,	97.9,	107.1,	112.9,	117.1,	130.1,	143.3,	151.3,	161.9,	170.8,	177.3,	187.0,	194.1,	199.8,	218.6,
20 days	86.8,	101.9,	109.1,	118.9,	125.0,	129.6,	143.3,	157.2,	165.7,	176.9,	186.2,	193.0,	203.1,	210.5,	216.5,	236.0,
25 days	98.0,	114.3,	122.0,	132.5,	139.1,	143.9,	158.5,	173.3,	182.3,	194.1,	203.9,	211.1,	221.6,	229.4,	235.6,	256.0,

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