

1.5.2 Required Attenuation Volume

Return Period (Years):	100
Impermeable Area (m <sup>2</sup> ):	1276.80
Controlled Outflow (l/s):	2
Climate Change Increase Allowance:	20%

Required Attenuation Volume

Client: Beckett Developments Ltd.

Site Location: Palmyra, Whitechurch Road,  
 Rathfarnham, Co. Dublin

Agent: Terry & O'Flanagan Ltd., F1, Centrepoint  
 Business Park, Oak Road, Dublin 12

Duration (time)	Duration (secs)	Rainfall Depth (mm)	Rainfall Depth incl. Climate Change (mm)	Rainfall Intensity (mm/s)	Inflow Rate (m <sup>3</sup> /s)	Inflow Rate (l/s)	Overflow Flow Rate (l/s)	Storage Rate (l/s)	Storage Volume (litres)	Storage Volume (m <sup>3</sup> )
5 mins	300	19	22.8	0.07600	0.09704	97.04	2	95.04	28511.04	28,511.04
10 mins	600	26.5	31.8	0.05300	0.06767	67.67	2	65.67	39402.24	39,402.24
15 mins	900	31.1	37.32	0.04147	0.05294	52.94	2	50.94	45850.18	45,850.18
30 mins	1,800	39	46.8	0.02600	0.03320	33.20	2	31.20	56154.24	56,154.24
1 hours	3,600	48.9	58.68	0.01630	0.02081	20.81	2	18.81	67722.62	67,722.62
2 hours	7,200	61.3	73.56	0.01022	0.01304	13.04	2	11.04	79521.41	79,521.41
3 hours	10,800	69.9	83.88	0.00777	0.00992	9.92	2	7.92	85497.98	85,497.98
4 hours	14,400	76.8	92.16	0.00640	0.00817	8.17	2	6.17	88869.89	88,869.89
6 hours	21,600	87.6	105.12	0.00487	0.00621	6.21	2	4.21	91017.22	91,017.22
9 hours	32,400	100	120	0.00370	0.00473	4.73	2	2.73	88416	88,416
12 hours	43,200	109.8	131.76	0.00305	0.00389	3.89	2	1.89	81831.17	81,831.17
18 hours	64,800	125.4	150.48	0.00232	0.00297	2.97	2	0.97	62532.86	62,532.86
24 hours	86,400	137.7	165.24	0.00191	0.00244	2.44	2	0.44	38178.43	38,178.43

1.5.3 Attenuation Volume Calculations

<b>Required Storage for 1 in 100 year Peak Rainfall Event:</b>	
91.02 m <sup>3</sup>	See Attenuation Volume Calculation Overleaf
<b>Proposed Attenuation System</b>	
<b>Gravel Filled Attenuation Blankets</b>	
Void Ratio:	30%
Depth:	0.65 m
Dwelling 1 Permeable Paving:	76.6 m <sup>2</sup>
Dwelling 2 Permeable Paving:	62.5 m <sup>2</sup>
Dwelling 3 Permeable Paving:	67.4 m <sup>2</sup>
Dwelling 4 Permeable Paving:	74.1 m <sup>2</sup>
Dwelling 5 Permeable Paving:	56.6 m <sup>2</sup>
Dwelling 6 Permeable Paving:	53.1 m <sup>2</sup>
Dwelling 7 Permeable Paving:	77.7 m <sup>2</sup>
Dwelling 8 Permeable Paving:	60.4 m <sup>2</sup>
Total Volume:	103.04 m <sup>3</sup>
Proposed Storage Volume is	Sufficient

1.6 Attenuation & Outfall Flow Control

The flow control device limiting flows to the from the underlying gravel attenuation blankets to the public storm drain must be an easily accessible Orifice Plate, Hydrobrake, Controlflow or similar approved device which can be easily cleaned and maintained.

Please see attached herewith the proposed site layout drawing detailing the surface water drainage systems.

1.7 Maintenance Plan

A surface water drainage system has been designed for each of the 8 no. proposed dwellings. This will ensure that maintenance of each system is the responsibility of the homeowner or occupant of that respective dwelling.

- The systems have been designed to promote infiltration within the boundary of each site.
- Attenuation storage has been provided in excess of the 100-year peak rainfall event including a 20% allowance for climate change with a controlled outfall flow rate to the public storm drain.
- Each attenuation system will also include 2 no. rainwater harvesting systems consisting of water butts and planter boxes with overflow connections.
- In excess rainfall events, this will overflow to the gravel attenuation blankets underlying the permeable paving systems.
- Each underlying gravel attenuation blanket will be lined with a permeable geo-textile along the base allowing further infiltration to the ground within the site boundary.
- Each underlying gravel attenuation blanket will also have a non-return valve to the collector drain to ensure that it does not become surcharged.
- The collector drain will have a controlled outfall to the public storm drain restricted to 2l/s.
- Each dwelling house will have the same SUDS, varying only in the size of the underlying gravel attenuation blankets as required. This system is designed for easy maintenance which must include:
  - Regular inspection and day to day care – collecting leaves and vegetation from inlets and outlets and visually inspecting the permeable paving to ensure there is no ponding.
  - Occasional maintenance – the gullies, downpipes and flow control device must be cleared as needed. The permeable paving must also be inspected and maintained as set out in the maintenance schedule below.

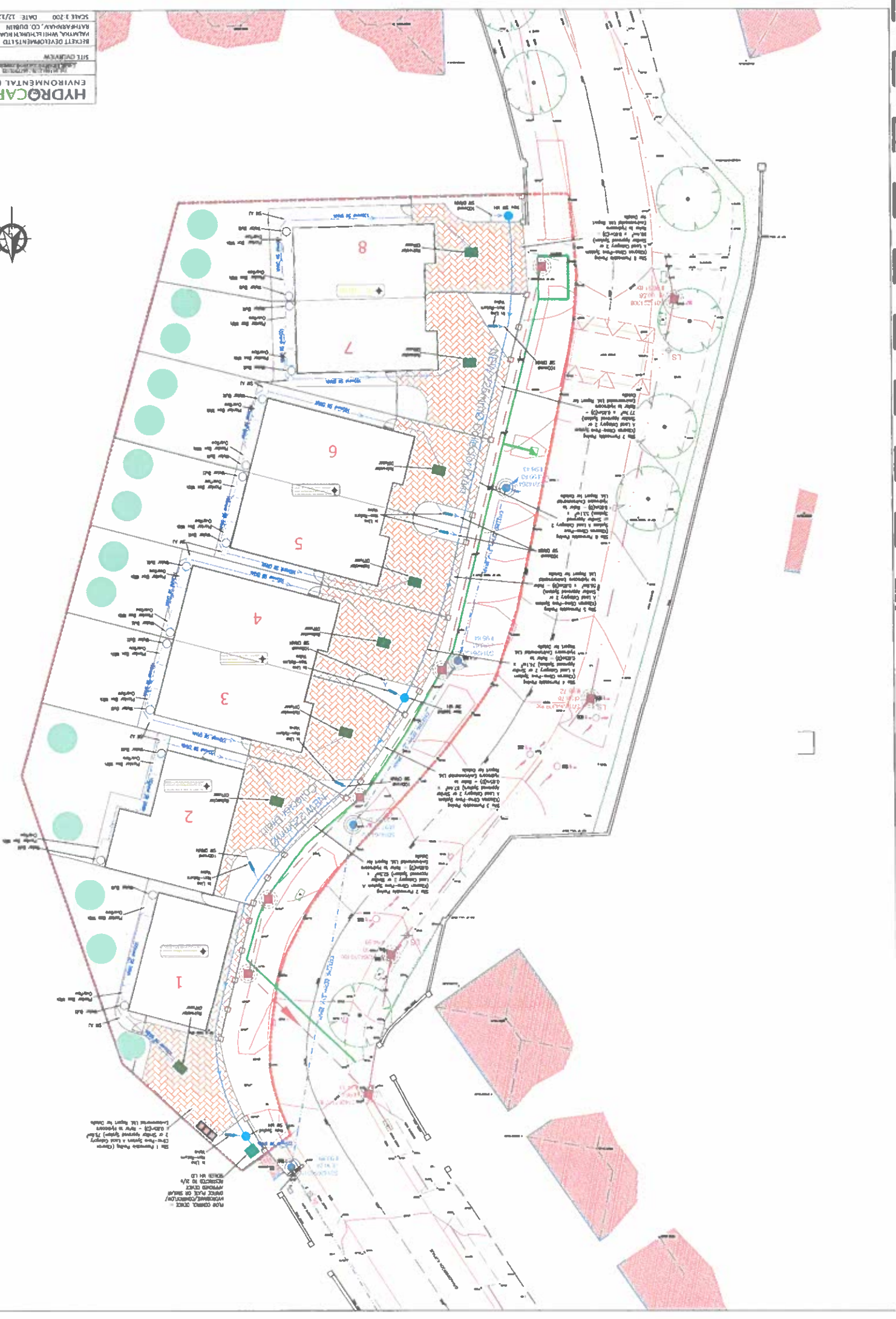
## 1.8 Maintenance Schedule

Schedule	Action	Frequency
<b>Paving Visual Inspection</b>	Visually inspect the permeable paving for ponding during or following a heavy rainfall event.	Once a Year
<b>Paving Maintenance</b>	Brush, vacuum, or power wash the joints of the permeable paving if ponding is observed.	As Required
<b>Paving Weed Control</b>	Treat with weedkiller or manually remove weeds.	As Required
<b>Paving Structural Maintenance</b>	Remove and replace damaged blocks.	As Required
<b>Flow Control Device Inspection</b>	Flow control chamber and unit should be visually inspected, and any debris or silt should be removed.	Once a Year
<b>Flow Control Device Maintenance</b>	The flow control device does not require routine maintenance. In the event of a suspected blockage the system shall be inspected, and the source of blockage removed until unit becomes operational.	As Required
<b>Gullys and Downpipes</b>	Visually inspect and remove any debris and check there is no physical damage.	Monthly
<b>High Level Overflow Maintenance</b>	Jet pipes from the tree-pit high level overflow and check by running water through the overflow.	Once a Year
<b>Water Butts</b>	Regularly empty the water butts by watering the garden etc. Inspect the tanks and clean of sludge, stains, and grime.	As Required
<b>Planter Boxes</b>	Check for damage and repair if needed. Ensure soil is not compacted and is free draining to the gravels. Ensure that leaves and dead plants are removed and replaced.	Once a Year

Met Stream  
Return Period Ratials Depths for sliding Durations  
Irish Grid: Easting: 320597, Northing: 237733

DURATION	Interval	1 year	2	3	4	5	10	20	30	50	75	100	150	200	250	500
5 mins		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		4.2	4.9	5.7	6.0	6.6	8.1	9.6	11.0	12.2	13.6	14.7	16.2	17.4	18.7	N/A
15 mins		4.5	5.8	6.7	7.6	8.0	9.6	11.0	12.2	13.6	14.7	16.2	17.4	18.7	20.8	N/A
30 mins		5.5	7.6	8.7	10.3	11.4	12.2	15.0	16.0	18.0	20.0	22.8	25.3	27.2	30.1	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	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	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	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	N/A
6 hours		15.0	19.6	22.0	25.5	27.0	29.5	35.0	41.0	44.9	50.1	54.7	58.2	63.4	67.4	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	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	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	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	N/A
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	N/A
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	N/A
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	N/A
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	N/A
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	N/A
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	N/A
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	N/A
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	194.5	N/A
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	N/A
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	N/A

NOTES:  
N/A Data not available  
These values are derived from a Depth Duration Frequency (DDF) Model  
For details refer to:  
.Pitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',  
Available for download at [www.met.ie/climate/data/products/Estimation-of-Point-Rainfall-Frequencies\\_TN61.pdf](http://www.met.ie/climate/data/products/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf)



FOR COMPLETION  
APPROVED CHECK  
DRAWN BY: [Name]  
DATE: [Date]

Site 1: Proposed Planting (Consult  
Landscape Architect) 15.00  
2 x Double Rowed (approx) 15.00  
Landscape - 15.00  
Site 2: Proposed Planting (Consult  
Landscape Architect) 15.00  
2 x Double Rowed (approx) 15.00  
Landscape - 15.00

Site 3: Proposed Planting (Consult  
Landscape Architect) 15.00  
2 x Double Rowed (approx) 15.00  
Landscape - 15.00

Site 4: Proposed Planting (Consult  
Landscape Architect) 15.00  
2 x Double Rowed (approx) 15.00  
Landscape - 15.00

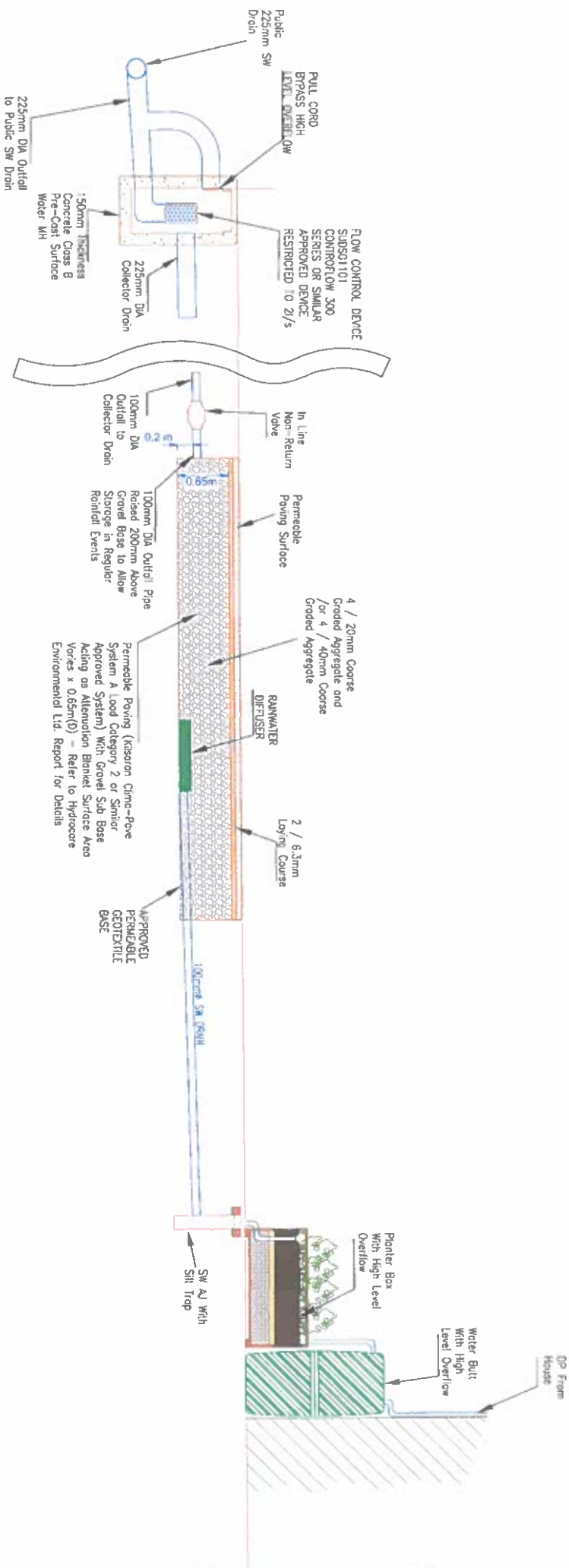
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Site 7: Proposed Planting (Consult  
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Landscape - 15.00

Site 8: Proposed Planting (Consult  
Landscape Architect) 15.00  
2 x Double Rowed (approx) 15.00  
Landscape - 15.00

# SURFACE WATER DRAINAGE LONG SECTION



**HYDROCARE**  
ENVIRONMENTAL LTD

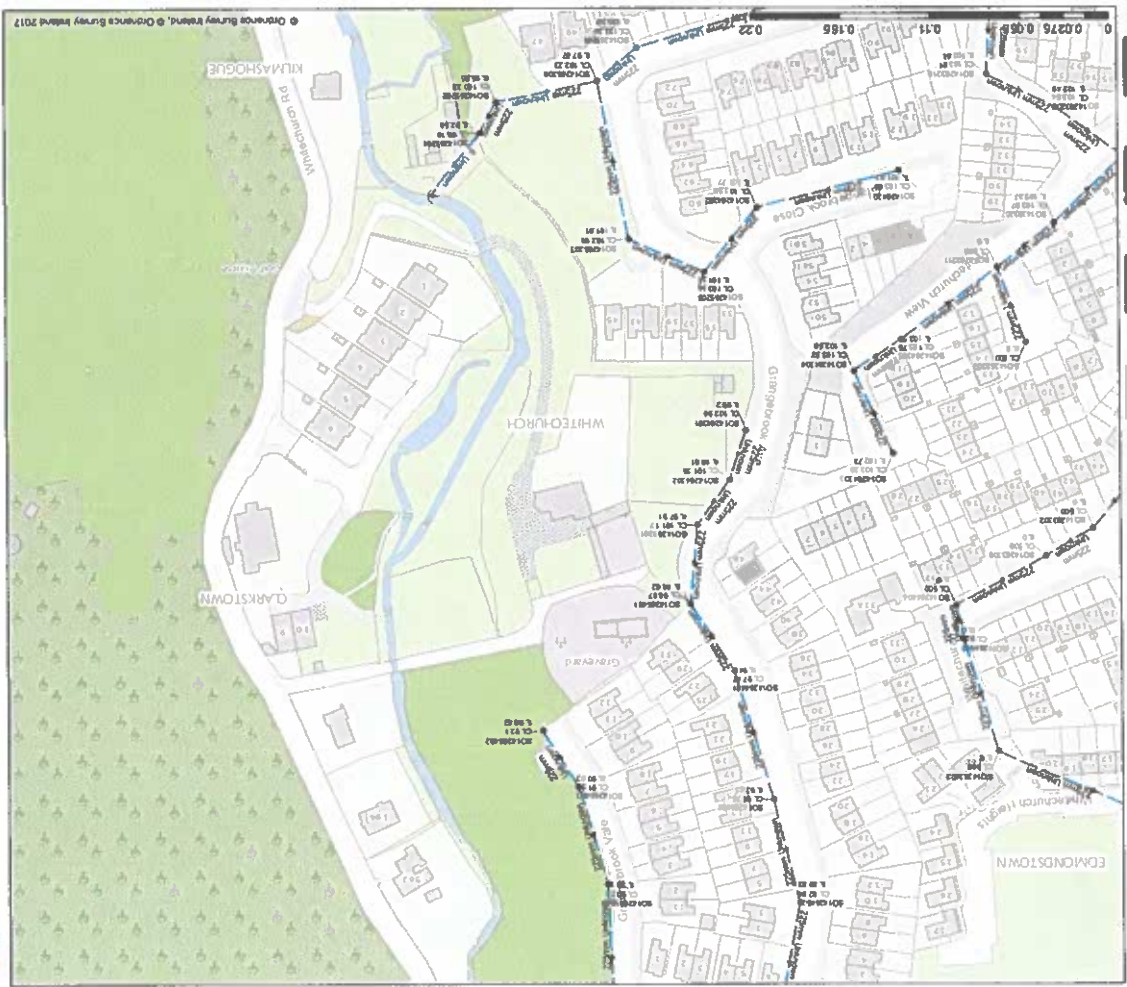
Tel: 01 494 2371 / 0077 00158  
E-mail: [info@hydrocare.com](mailto:info@hydrocare.com) / [enquiries@hydrocare.com](mailto:enquiries@hydrocare.com)

ATTENUATION SYSTEM SW LONG SECTION

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

SCALE 1:50 DATE: 12/12/2023

# Irish Water Web Map



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Symbol	Description
[Symbol]	Water Main
[Symbol]	Sanitary Sewer
[Symbol]	Storm Sewer
[Symbol]	Gas
[Symbol]	Electric
[Symbol]	Telecom
[Symbol]	Other

**Legend**

**Water Main**

- Water Main (100-150mm)
- Water Main (150-200mm)
- Water Main (200-250mm)
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- Water Main (950-1000mm)

**Sanitary Sewer**

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**Electric**

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**Telecom**

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- Telecom (895-905mm)
- Telecom (905-915mm)
- Telecom (915-925mm)
- Telecom (925-935mm)
- Telecom (935-945mm)
- Telecom (945-955mm)
- Telecom (955-965mm)
- Telecom (965-975mm)
- Telecom (975-985mm)
- Telecom (985-995mm)
- Telecom (995-1000mm)

**Other**

- Other (25-35mm)
- Other (35-45mm)
- Other (45-55mm)
- Other (55-65mm)
- Other (65-75mm)
- Other (75-85mm)
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- Other (765-775mm)
- Other (775-785mm)
- Other (785-795mm)
- Other (795-805mm)
- Other (805-815mm)
- Other (815-825mm)
- Other (825-835mm)
- Other (835-845mm)
- Other (845-855mm)
- Other (855-865mm)
- Other (865-875mm)
- Other (875-885mm)
- Other (885-895mm)
- Other (895-905mm)
- Other (905-915mm)
- Other (915-925mm)
- Other (925-935mm)
- Other (935-945mm)
- Other (945-955mm)
- Other (955-965mm)
- Other (965-975mm)
- Other (975-985mm)
- Other (985-995mm)
- Other (995-1000mm)

This map displays the location of water mains, sanitary sewers, storm sewers, gas, electric, and telecommunications lines. The map is intended for informational purposes only and does not constitute a warranty or guarantee of any kind. The location and depth of these lines are subject to change without notice. Users should exercise caution when excavating or performing any work that may affect these utilities. For more information, please contact your local utility provider.



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 designed for use as a combined drainage component and sub-base replacement system, ideal for shallow infiltration/attenuation.

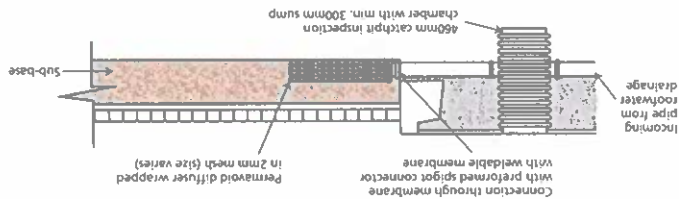


Permavoid Rainwater Diffuser Unit - Configuration Options

Width	354mm	708mm	1062mm	1416mm	2124mm
	✓	✓	✓	✓	✓
Length	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



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](mailto:civils@polypipe.com) or visit [www.polypipe.com/civils-technical-hub](http://www.polypipe.com/civils-technical-hub)

Technical Support

<b>FREE DISCHARGE</b>	Gradient (%)	0	1	2	3	4	5
	Flow rate (l/m/s)	8	13	15	17	19	21

3 units wide, 1 unit deep (1.06m x 0.15m)

HYDRAULIC PERFORMANCE

<b>ELEMENT</b>	<b>VALUE</b>
<b>PHYSICAL PROPERTIES</b>	
Weight per unit	3kg
Length	708mm
Width	354mm
Depth	150mm
<b>SHORT TERM COMPRESSIVE STRENGTH</b>	
Vertical	715kN/m <sup>2</sup>
Lateral	156kN/m <sup>2</sup>
<b>SHORT TERM DEFLECTION</b>	
Vertical	1mm per 126kN/m <sup>2</sup>
Lateral	1mm per 15kN/m <sup>2</sup>
<b>TENSILE STRENGTH</b>	
Of a single joint	42.4kN/m <sup>2</sup>
Of a single joint at (1% secant modulus)	18.8kN/m <sup>2</sup>
Bending resistance of unit	0.71kN/m
Bending resistance of single joint	0.16kN/m
<b>OTHER PROPERTIES</b>	
Volumetric void ratio	95%
Average effective perforated surface area	52%
Intrinsic permeability (k)	Minimum 1.0 x 10 <sup>-5</sup>
Permavoid Permatie	
Permavoid Shear Connector	
Ancillary	
Material	Polypropylene (PP)

# Permavoid Rainwater Diffuser Unit

Data Sheet

PRODUCT INFORMATION

P2

ISSUE 3 - JUNE 2018

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](http://www.polypipe.com/greeninfrastructure)

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[www.polypipe.com/wms](http://www.polypipe.com/wms)

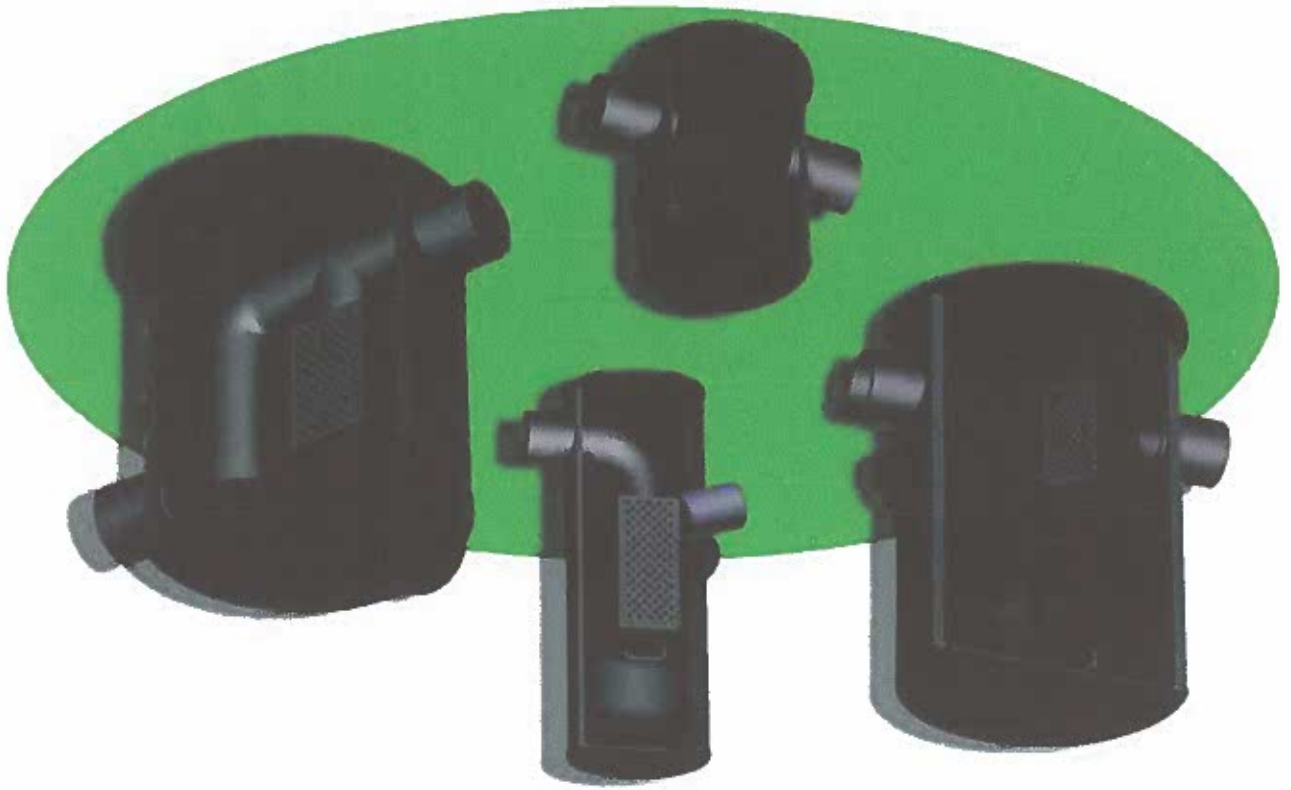
**Polypipe**

SuDS  
store

exclusively from

controlflow

[www.controlflow.com](http://www.controlflow.com)



flow controls dedicated to SuDS

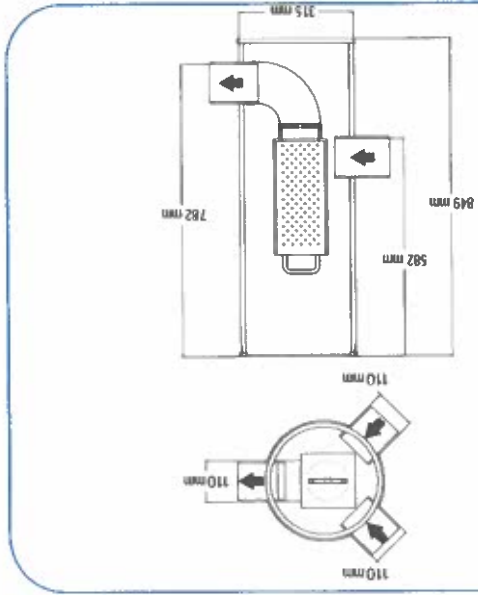
controlflow



Controlflow 300 Series Stepped Invert Protected Office

SUDS0101

**Description**  
 The Controlflow 300 Series Stepped Invert Protected Office is specifically designed for attenuation on housing developments. The standard 110mm diameter office, protected by a removable filter, allows for surface water runoff to be restricted to a flow rate of 0.2 l/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).



Designed for housing developments

Protected office

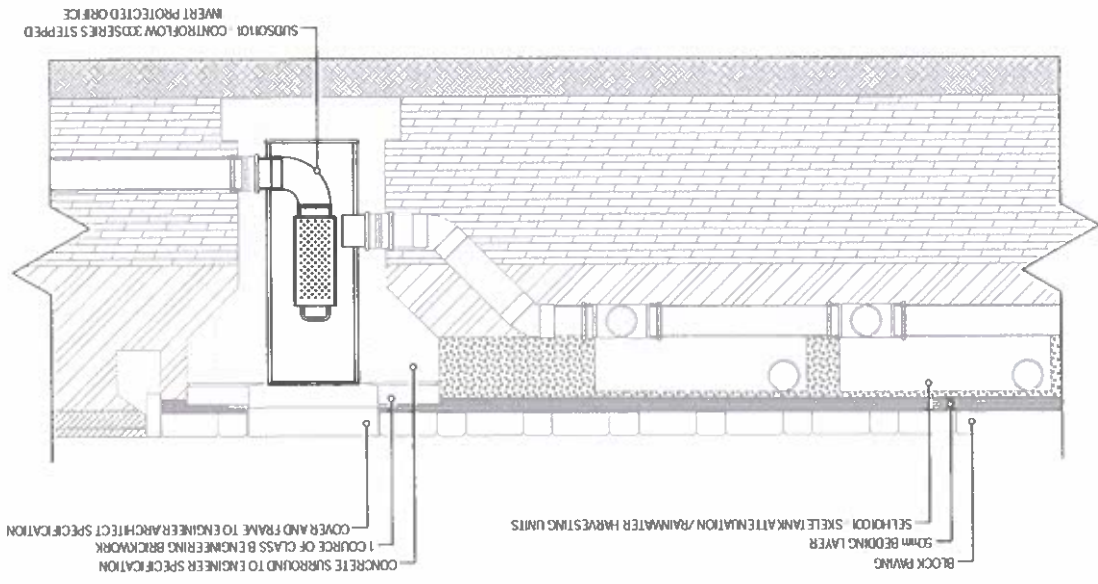
0.2 l/s restricted flow rate

**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. ø	110	mm
Outlet Spigot O.D. ø	110	mm
Maximum flow rate	0.2	l/s
Unit weight	TBC	kg
Material	HDPE	



SUBSIDIARY CONTROLFLOW 300SERIES STEPPED INVERT PROTECTED ORIFICE  
 GENERAL APPLICATION - CONTROLLING OUTLET FLOWS FROM SHALLOW RAINWATER HARVESTING TANKS

ideas taking shape

**Kilsaran**



**Clima-Pave**<sup>TM</sup>  
Permeable Paving Solutions