

PROPOSED RESIDENTIAL DEVELOPMENT

750 AND 754 BRADFORD ROAD

BATLEY

WF17 8NL

DRAINAGE REPORT



1. INTRODUCTION

This Drainage Report has been prepared to provide the background to the drainage design for this development and to provide the surface water hydraulic calculations.

2. PRE-DEVELOPMENT SITE

The pre-development site is generally an L-shaped area adjacent to Bradford Road.

The pre-development site is a brownfield site, which used to have garage buildings and hard-standing areas.

The site area is approximately 2750 sq and the location plan is shown below.



Figure 2.0 Pre-Development Plan.

3. PUBLIC SEWERAGE

An enquiry has been made to Yorkshire Water for location of public sewers within the area and the public sewer map for this area is shown below.



The public sewer records show the following:-

- A 900mm combined sewer in Bradford Road, that encroaches on to the development site.
- A 300mm foul sewer in Bradford Road and in Wensleydale Parade.
- A 300mm surface water sewer in Bradford Road and
- A combined sewer within Wensleydale Parade.

The public sewer record extract is shown below.



Figure 3.0 Public Sewer Records.

4. DRAINAGE SURVEY

To determine the actual depths of the public sewers, a drainage survey was carried out.

The details of this survey are shown below with details of the manholes and there depths.

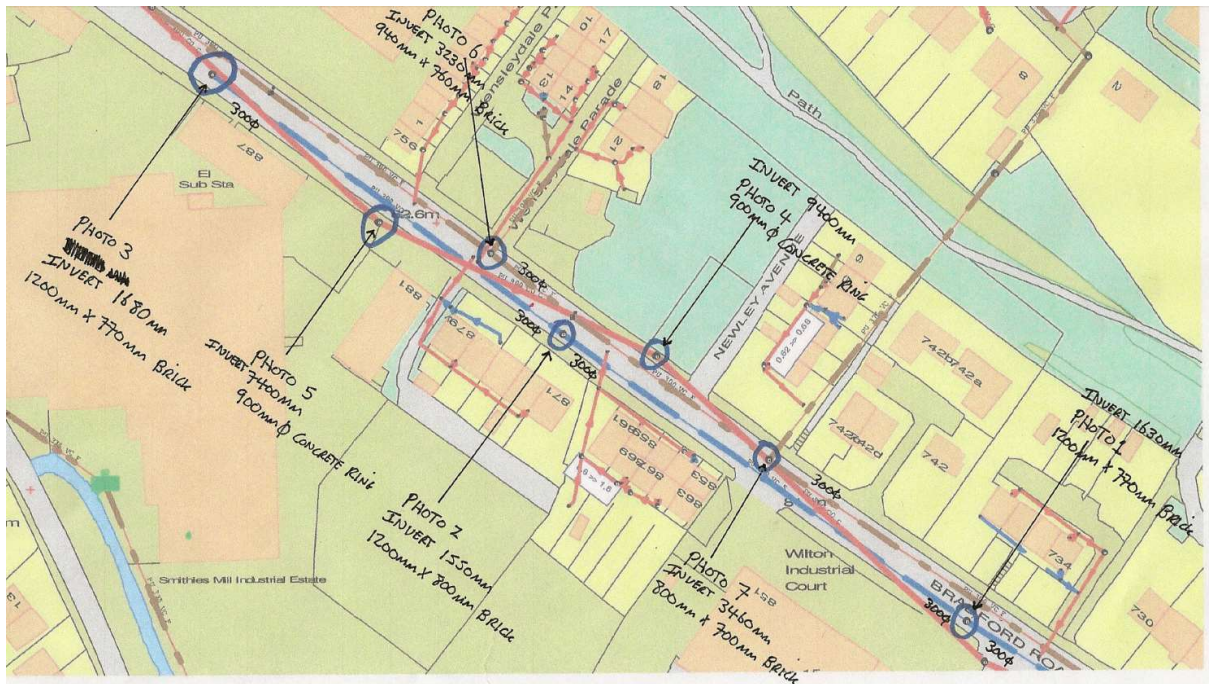


Figure 4.0 Sewer Survey Details.

The sewer survey shows the following:-

- The 900mm combined sewer in Bradford Road, that encroaches on to the development site is approximately 9.4m deep.
- The 300mm foul sewer in Bradford Road and in Wensleydale Parade is approximately 3.2m deep.
- The 300mm surface water sewer in Bradford Road is about 1.55m deep and
- No details on the combined sewer within Wensleydale Parade was obtained.

The public sewers will remain and appropriate easements to those sewers on site will be provided. The standard easement for the combined sewer and foul sewer within Wensleydale Parade should be 3m each side of the sewer centre line. The easement to the 900mm sewer, because of its depth, has been agreed with Yorkshire Water as 2.5m on the development side. All details should be agreed with Yorkshire Water.

5. POST-DEVELOPMENT SITE

The development proposal is for the construction of a new car sales building and a car servicing garage and associated hard-standing areas.

An outline plan of the post-development site is shown below.



Figure 5.0 Proposed Post-Development Site.

6. FOUL DRAINAGE DESIGN

The post-development site should be drained by a separate system of foul drainage. The outfall for the foul system should be made to the existing 300mm foul sewer in Wensleydale Parade. Agreement with Yorkshire Water should be obtained.

7. SURFACE WATER

The surface water from the development site should be disposed of strictly in accordance with the hierarchy within the building regulations. That is, by infiltration, to watercourse or to sewer, in that order.

Infiltration

The ground investigations has shown that the ground will not accept infiltration as a method of disposal of surface water. The following extract is from the ground investigation.

5.7 Surface Water Drainage

The underlying fill and natural ground are generally fine-grained and therefore relatively impermeable. Soakaways will not be suitable and therefore surface water will have to be piped off site.

Therefore, it has been agreed with Flood Management and Drainage at Kirklees Council that the best approach would be a connection to sewer for this site with an attenuated discharge of 5l/s.

Watercourse

No watercourses are available for the disposal of surface water.

Sewer

A surface water (SW) sewer exists in Bradford Road. This should be the outfall location of the surface water system.

8. SUSTAINABLE DRAINAGE SYSTEMS

This development site will be drained to the adjacent SW sewer with a restricted discharge of 5l/s and attenuation storage provided on site.

The storage is to be provided by an underground tank constructed by geo-cellular units.

9. SURFACE WATER DESIGN

The surface water design for has site will be carried out to the current standards for surface water drainage design, with the system being designed to not flood on site within the 1 in 30 year storm event and no flooding of any building or any water going off-site in the 1 in 100 year storm event plus an allowance for climate change.

The hydraulic calculations have been carried out using Microdrainage software and are appended to the rear of this report.

The site will have a total post-development impermeable area of 2387sq m.



The calculations show that the 120minute winter storm is the critical event, requiring 91.2 Cu m of surface water storage on site.

The surface water attenuation will be provided by a hydrobrake and surface water storage will be provided by geo-cellular storage under the proposed car park area.

10. CLIMATE CHANGE

The calculations of surface water drainage systems and attenuation will include an allowance for climate change. It is recommended that this allowance is an addition of 30%.

11. URBAN CREEP

The development impermeable area is almost the entire gross site area. As such, no urban creep allowance has been added to the surface water storage calculations.

12. Petrol / Oil Interceptor

As part of the surface water scheme, a petrol / oil interceptor will be included to prevent pollution of the surface water sewer.

13. MAINTENANCE

The surface water scheme on this development will be maintained for the lifetime of the development.

The surface water drainage system is low maintenance. However, it is important that the system regularly receives maintenance to ensure it remains working as designed and so that performance remains satisfactory.

The regular maintenance can be carried out in short time with minimal cost. Care should be particularly made of maintaining the oil interceptor and the removing the silt to ensure the storage system remains silt free.

The schedule below provides recommended maintenance work.

MAINTENANCE	FREQUENCY	DETAIL
REGULAR MAINTENANCE	YEARLY	• Visually inspect all surface water system at chambers. • All debris and silt to be removed from all main chambers. • Linear drainage cleaned out and sump trapped emptied.



		• Ensure that the oil interceptor is maintained and the silt trap chamber is emptied of silt. • Ensure all covers are secure. • Visual inspect for any surface anomalies on the system.
REGULAR CCTV	10 YEARLY	• As above inspections. • Full CCTV of surface water system to identify any fault within the system.
CORRECTIVE MAINTENANCE	AS REQUIRED	If the above inspections identify problems with the surface water system, then remedial action should be carried out. This could include repair/replacement to any item on the surface water drainage system.

It is recommended that a service log is maintained by the property owners to ensure that the maintenance is carried out, as per the schedule.

14. CONCLUSIONS

- This development site can be drained successfully.
- Foul water and surface water should have separate systems on site.
- Foul water flows should be connected to the foul sewer in Wensleydale Parade.
- Surface water flows connected to the public surface water sewer in Bradford Road.
- Surface water from the development will be attenuated to a peak discharge rate of 5l/s with storage on site.
- Detailed design of the surface water drainage system should be to the 1 in 100 year storm plus 30% climate change with an appropriate allowance for urban creep.

Report by



Hugh Morris BSc CEng MICE

09/03/2020

APPENDIX:

Microdrainage Calculations of Surface Water Storage.

Flow Control Details : Hydrobrake.

Surface Water Attenuation Geocellular Storage Details.



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<u>Summary of Results for 100 year Return Period (+30%)</u> Half Drain Time : 163 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>81.392</td><td>0.392</td><td>0.0</td><td>5.0</td><td>5.0</td><td>44.7</td><td>O K</td></tr><tr><td>30 min Summer</td><td>81.517</td><td>0.517</td><td>0.0</td><td>5.0</td><td>5.0</td><td>58.9</td><td>O K</td></tr><tr><td>60 min Summer</td><td>81.625</td><td>0.625</td><td>0.0</td><td>5.0</td><td>5.0</td><td>71.3</td><td>O K</td></tr><tr><td>120 min Summer</td><td>81.678</td><td>0.678</td><td>0.0</td><td>5.0</td><td>5.0</td><td>77.3</td><td>O K</td></tr><tr><td>180 min Summer</td><td>81.669</td><td>0.669</td><td>0.0</td><td>5.0</td><td>5.0</td><td>76.3</td><td>O K</td></tr><tr><td>240 min 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10080 min Summer	1.096	0.0	330.1	0																																																																																																																																																																																																																																																																																				
15 min Winter	111.102	0.0	55.8	18																																																																																																																																																																																																																																																																																				
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Date 09/03/2020 09:48 File SW STORAGE.SRCX			Designed by HM Checked by					
Micro Drainage			Source Control 2019.1					
<u>Summary of Results for 100 year Return Period (+30%)</u>								
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter		81.590	0.590	0.0	5.0	5.0	67.2	O K
60 min Winter		81.719	0.719	0.0	5.0	5.0	82.0	O K
120 min Winter		81.800	0.800	0.0	5.0	5.0	91.2	O K
180 min Winter		81.797	0.797	0.0	5.0	5.0	90.8	O K
240 min Winter		81.768	0.768	0.0	5.0	5.0	87.6	O K
360 min Winter		81.728	0.728	0.0	5.0	5.0	83.0	O K
480 min Winter		81.678	0.678	0.0	5.0	5.0	77.3	O K
600 min Winter		81.623	0.623	0.0	5.0	5.0	71.0	O K
720 min Winter		81.566	0.566	0.0	5.0	5.0	64.5	O K
960 min Winter		81.439	0.439	0.0	5.0	5.0	50.0	O K
1440 min Winter		81.191	0.191	0.0	5.0	5.0	21.8	O K
2160 min Winter		81.011	0.011	0.0	4.9	4.9	1.2	O K
2880 min Winter		81.000	0.000	0.0	4.1	4.1	0.0	O K
4320 min Winter		81.000	0.000	0.0	3.0	3.0	0.0	O K
5760 min Winter		81.000	0.000	0.0	2.4	2.4	0.0	O K
7200 min Winter		81.000	0.000	0.0	2.0	2.0	0.0	O K
8640 min Winter		81.000	0.000	0.0	1.7	1.7	0.0	O K
10080 min Winter		81.000	0.000	0.0	1.5	1.5	0.0	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter		75.769	0.0	76.1	32			
60 min Winter		49.388	0.0	98.9	60			
120 min Winter		31.072	0.0	124.8	118			
180 min Winter		23.317	0.0	140.4	170			
240 min Winter		18.865	0.0	151.4	196			
360 min Winter		13.981	0.0	168.4	272			
480 min Winter		11.291	0.0	181.3	350			
600 min Winter		9.557	0.0	191.7	428			
720 min Winter		8.335	0.0	200.7	504			
960 min Winter		6.710	0.0	215.4	654			
1440 min Winter		4.932	0.0	237.4	868			
2160 min Winter		3.615	0.0	261.3	1148			
2880 min Winter		2.896	0.0	279.1	0			
4320 min Winter		2.114	0.0	305.6	0			
5760 min Winter		1.690	0.0	325.7	0			
7200 min Winter		1.422	0.0	342.5	0			
8640 min Winter		1.235	0.0	357.0	0			
10080 min Winter		1.096	0.0	369.7	0			
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10 The Green York YO26 5LR	BRADFORD CAR BATLEY																															
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<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.800</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.322</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.239 <table> <tr> <th>Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To: (ha)</th> </tr> <tr> <td>0</td> <td>4 0.239</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	18.800	Shortest Storm (mins)	15	Ratio R	0.322	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)	Area	From:	To: (ha)	0	4 0.239
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Micro Drainage		Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 83.200

Cellular Storage Structure

Invert Level (m) 81.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	120.0	0.801	0.0	155.1
0.800	120.0	155.1			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0105-5000-1000-5000
Design Head (m) 1.000
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 105
Invert Level (m) 80.800
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0
Flush-Flo™	0.296	5.0
Kick-Flo®	0.637	4.1
Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	5.4	3.000	8.4	7.000	12.5
0.200	4.8	1.400	5.8	3.500	9.0	7.500	12.9
0.300	5.0	1.600	6.2	4.000	9.6	8.000	13.3
0.400	4.9	1.800	6.6	4.500	10.1	8.500	13.7
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.1
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.5
0.800	4.5	2.400	7.5	6.000	11.6		
1.000	5.0	2.600	7.8	6.500	12.1		

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Technical Specification

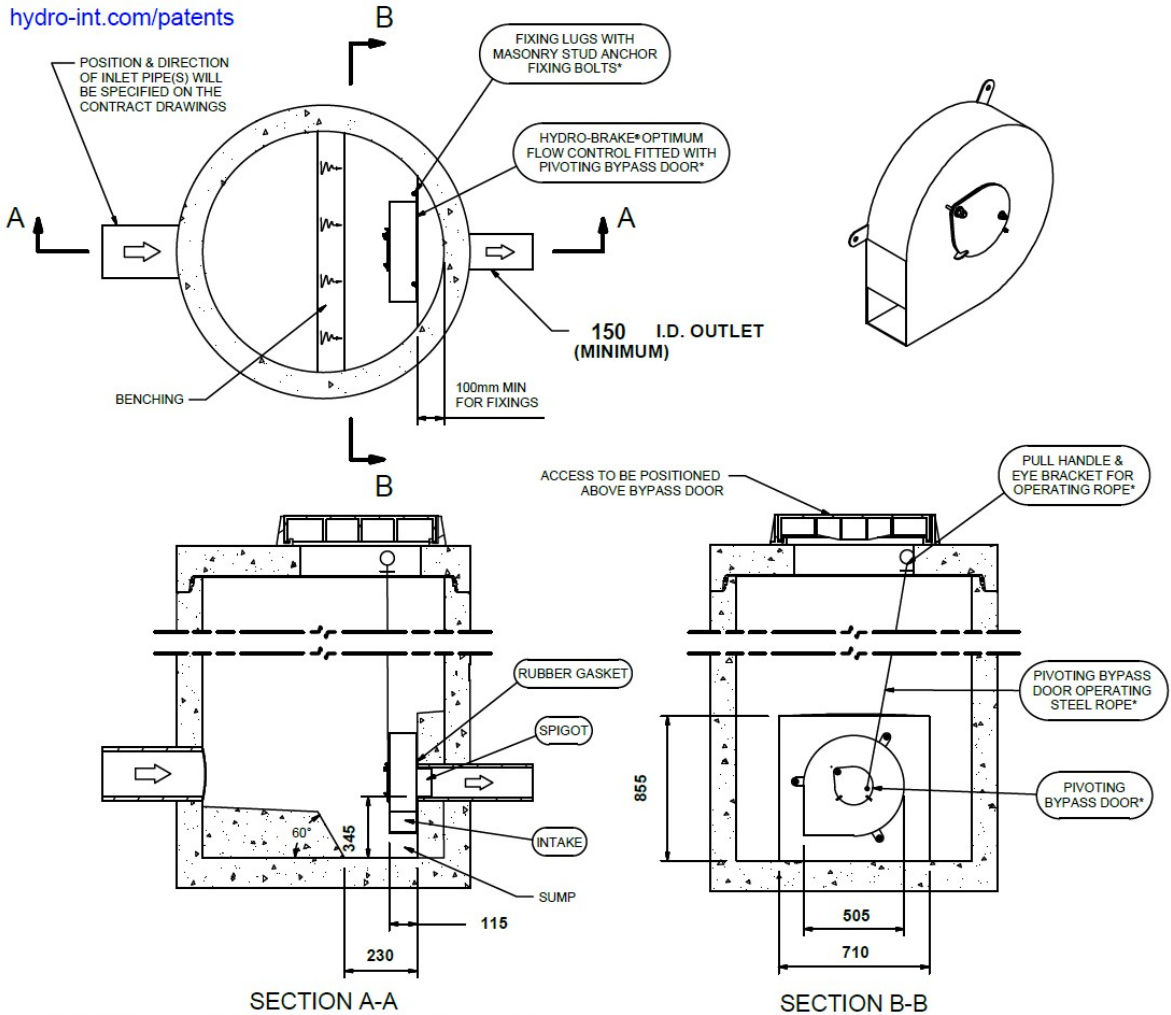
Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	5.000
Flush-Flo™	0.296	4.974
Kick-Flo®	0.637	4.060
Mean Flow		4.334

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



hydro-int.com/patents



IMPORTANT: ○ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0105-5000-1000-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International®

DATE 3/9/2020 9:44 AM

SITE Bradford Road, Batley

DESIGNER Hugh Morris

REF 1

SHE-0105-5000-1000-5000

Hydro-Brake® Optimum

© 2020 Hydro International Ltd, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD. Tel; 01275 878371 Fax; 01275 874979 Web; www.hydro-int.com Email; enquiries@hydro-int.com

HM
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Polystorm-R Modular Cell

Data Sheet

PRODUCT INFORMATION

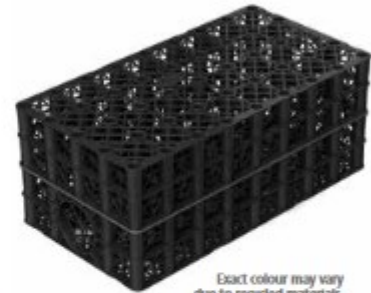
P1

ISSUE 4 - JAN 2016

Product code: PSM1A

The Polystorm-R modular cell is ideally suited for loaded applications at greater depths, such as housing, commercial and infrastructure projects and has a compressive strength of up to 61 tonnes/m². It offers all the proven performance of the Polystorm cell, with the added benefits of being manufactured from over 90% recycled material content.

Wherever performance criteria and standards allow, we will always maximise the sustainability of our products by using post consumer plastics in their manufacture. By sourcing and carefully controlling the quality of the recycled material we use our precision injection moulding. Therefore we are able to guarantee consistent quality in our recycled plastic, giving you the confidence and the performance levels you expect from the market leader.



Exact colour may vary due to recycled materials.

Key Benefits

- Made from specially selected and controlled recycled materials
- Environmentally friendly, sustainable solution
- Has undergone stringent testing to ensure product performance
- Compressive strength of 61 tonnes/m²
- Ideal for retention, attenuation and Infiltration applications with a suitable geomembrane or geotextile
- BBA approved
- Allow flexibility of shape - Ideal for shallow excavation systems, narrow strips or use in restricted areas
- Can be used as part of a value engineered hybrid system with Polystorm, Polystorm Lite and Polystorm Xtra
- Integrated inlet and outlet
- 3D flow throughout the structure
- 95% void ratio
- Light weight yet robust - excellent Health and Safety and Installation benefits
- 60 years creep limited life expectancy

Technical Support

Detailed guidance and assistance is available.

For further information, please contact our Technical Team on +44 (0) 1509 615100 or email civils@polypipe.com



ELEMENT	VALUE
PHYSICAL PROPERTIES	
Length	1m
Width	0.5m
Depth	0.4m
Total volume	0.2m ³
Unit weight	9kg (approx)
Unit storage volume	0.19m ³ (190 litres)
Void ratio	95%
SHORT TERM COMPRESSIVE STRENGTH	
Vertical	610 kN/m ² **
Lateral	63 kN/m ² **
SHORT TERM DEFLECTION	
Short-term vertical deflection	60 kN/m ² per mm
LONG TERM DEFLECTION	
Estimated long term vertical deflection (creep)	0.2798 Ln (design life in hrs) +0.485 [Based on an applied test load = 162 kN/m ²] Creep data limit 60 years
Estimated long term lateral deflection (creep)	1.0192 Ln (design life in hrs) -3.864 [Based on an applied test load = 30.8 kN/m ²] Creep data limit 60 years

Note: Polystorm-R is ideal for use in trafficked and pedestrian applications subject to a structural design check and suitable installation conditions

* Each unit includes 4 Clips and 2 Shear Connectors.

** Compressive strength at yield, maximum recommended value for design purposes.



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