JPS CIVIL + STRUCTURAL ENGINEERS

Honeycomb West,
Chester Business Park,
CH4 9QH

01244 956000
Info@jpstructural.co.uk

Our Ref: 113001

Clitheroe Carehome
Higher Standen

Date: 13/06/2025

Clitheroe Carehome Surface Drainage Verification

Introduction

In line with the stipulated planning conditions for the project a verification exercise has been carried out on the surface water system installed to date by Eric Wright Construction (EWC) including the attenuation system within the car park.

A further issue of this letter report is expected following completion of the surface water system.

Attenuation Tanks

The approved JPS drainage design and drawings allows for 301m³ of storage in a 95% void ratio tank to cater for the following criteria:
1 year critical water level 100.544m AOD
2 year critical water level 100.629m AOD
30 year critical water level 101.086m AOD
30 year +50%cc +10%uc critical water level 101.650m AOD
100 year +50%cc critical water level 101.901m AOD
100 year +50%cc +10%uc critical water level 101.907m AOD

The tank was to be installed with a cover level of +102.5m, a top of tank level of +101.9m and an invert level of +100.3m. The outlet level was set at +100.29m with the system discharging from catchpit SCP 1.5 with a vortex flow control limiting discharge to the existing drainage within the highway to 4.8l/s.

From a review of the ECW provided site photos, survey data and manufacturer design drawings **the system as installed is in line with the JPS approved design**. Associated documents are appended to this letter report.

Surface Water System Generally

A review of survey data of the as installed to date surface water drainage has been carried out against the approved JPS design drawings and other than minor differences in inlet levels to installed manholes **the system has been installed in line with the approved drainage drawings to date.**

A further dimensional survey check and CCTV survey are proposed on the completion of the surface water system.

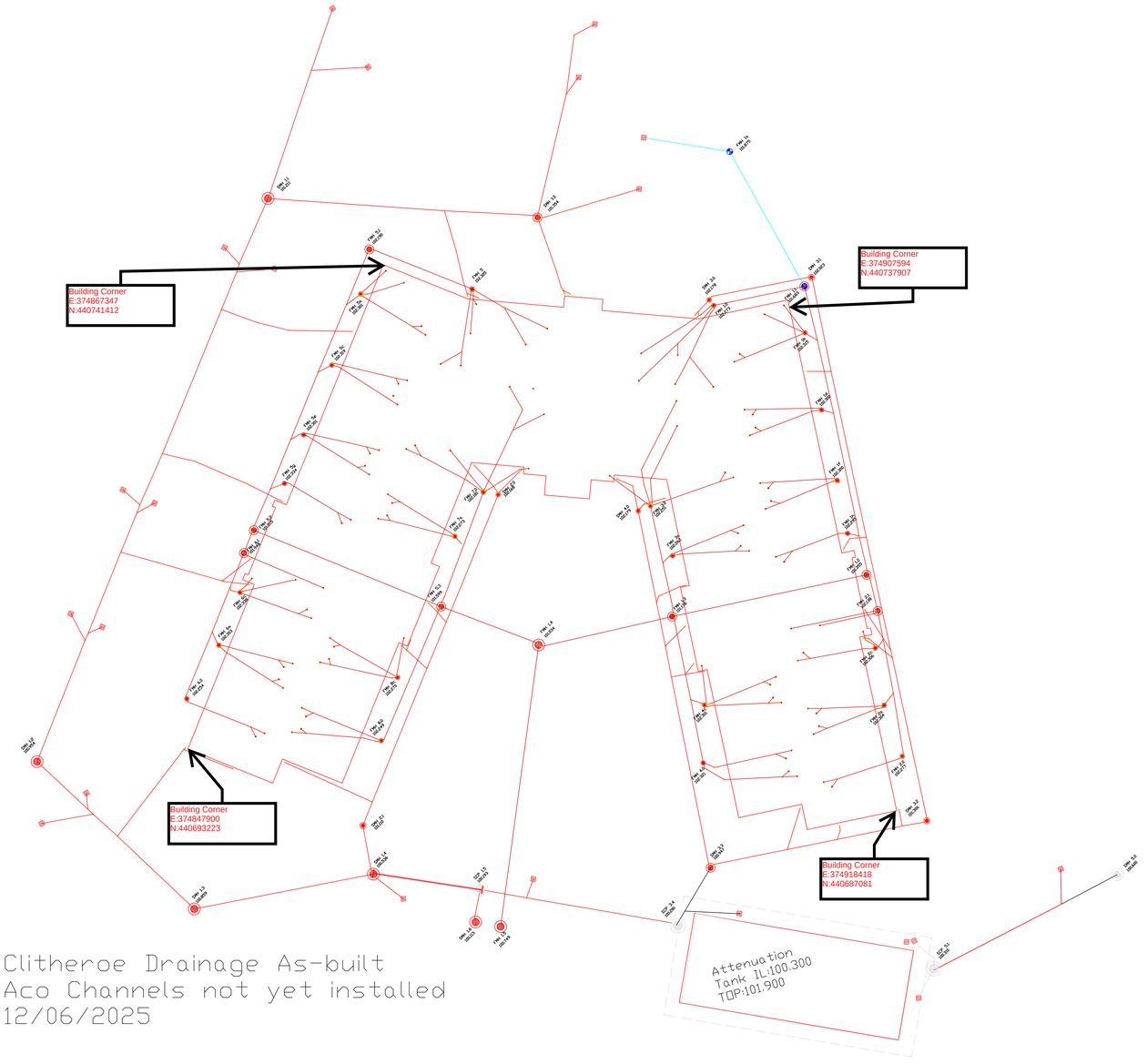
I trust that the contents of this letter report are clear but if you wish to discuss any of the above in more detail, don't hesitate to contact me on 01244 956 000.

Yours sincerely,

for and on behalf of
JP Structural Design Ltd

Mike Macdonald MEng (Hons), CEng, MICE
Operations Director
Mobile: 07854443689
www.jpstructural.co.uk

Appendix A: Site Photos, Surveys and Manufacturer's Information



Clitheroe Drainage As-built
Aco Channels not yet installed
12/06/2025

Eric Wright Construction Ltd.
Sceptre House
Sceptre Way
Bamber Bridge
Preston

Notes	Contract 220018 Clitheroe Care Home	
	Drawing Title As-Built Drainage	
	Drwg. No.	Scale
	Revision	Surveyed
	Date 12/06/2025	Drawn

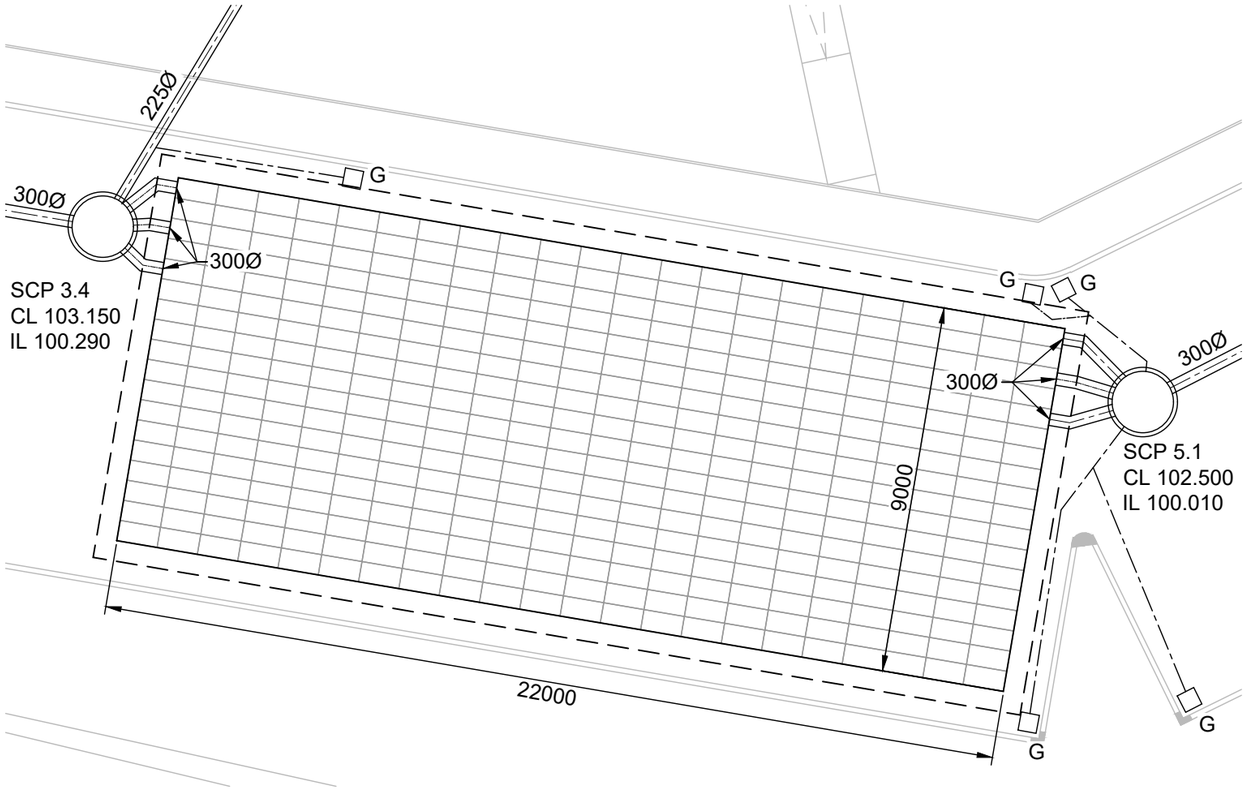
A3

22.0 x 9.0 x 1.6m deep
Total Vol = 316.80m^3
Net Vol ≈ 300.96m^3
At 95% min Void Ratio
1584 PSM1A units

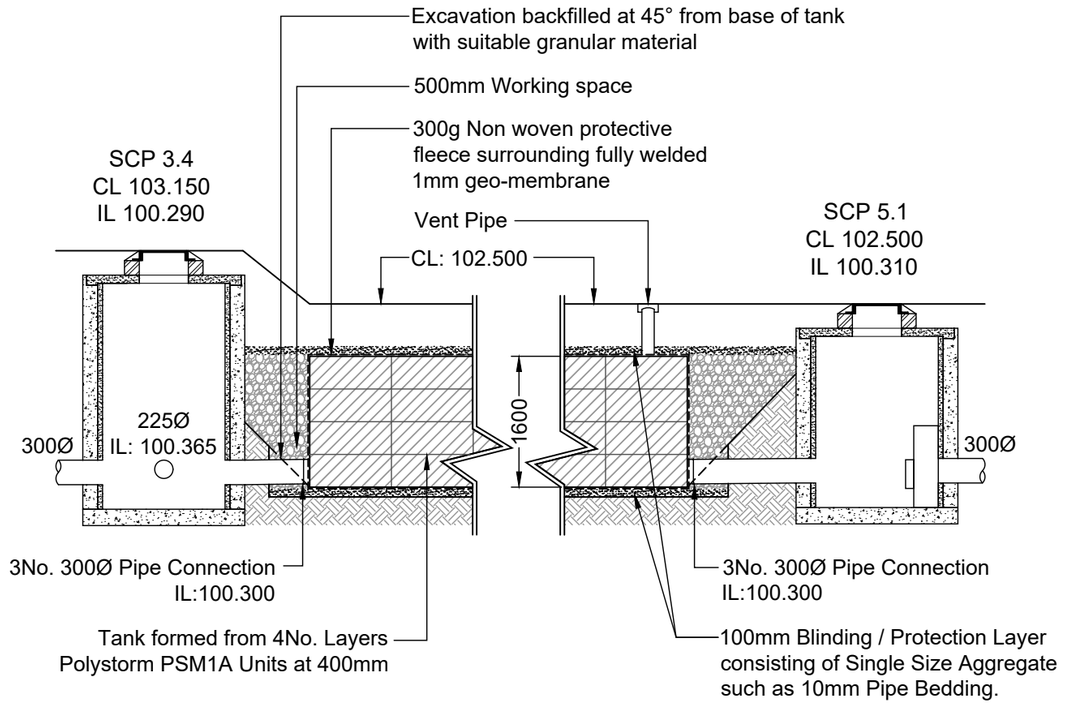
Extents of excavation to be an additional 500mm around the perimeter of the tank

NOTES

1. Hydro WMS layout.
2. All dimensions are in millimetres, all elevations in metres unless otherwise stated.
3. All temporary and enabling works by others.
4. All dimensions of fabricated items are nominal and may vary within manufacturing tolerances.



Plan
(Scale 1:150)



Section
(Scale 1:75)

REV	AMENDMENT	DATE

HydroWMS
Complete Water Management Solutions

HYDRO WMS LTD
RANDOLPH HOUSE 3
7-41 LONGSHUT LANE WEST
STOCKPORT
SK2 6RX
Tel/Fax: 0161 4563476
brian.byrne@hydro-wms.co.uk
www.hydro-wms.co.uk

CLIENT: -	STATUS: AS BUILT	DATE: 21/03/2024	DRAWN: WS	CHECKED:
JOB TITLE: Clitheroe Care Home	DRAWING TITLE: Attenuation Tank Details	SCALE: 1:150@ A3	PROJECT No:	
		DRAWING No.: 001	REV.: AB	

Structural calculations to check compliance with Ciria C680

Detailed Analysis

Project: Wrightcare Clitheroe
Customer: JLC
Contact: Lee Herbert

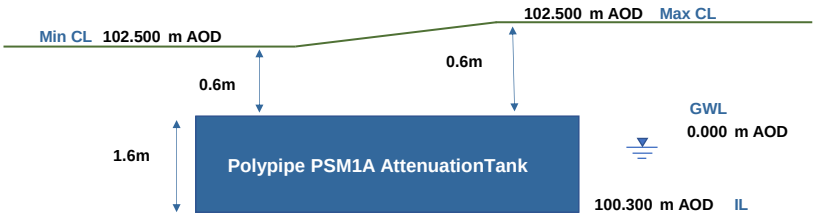
Hydro WMS Contact: Warren Gillen
Project ID:
25/03/2024

Supplier: Polypipe
Product: PSM1A

Load Classification - Cars to light vans up to 6,000kg GVW:

Accidental load check - Vehicles up to 30,000kg GVW eg 8 wheel bin lorry:

Surface Type: Asphalt



Lateral Backfill Material: Medium dense sand & gravel: AoF - 33 deg, Bulk Density - 19 kN/m3

Vertical Loads - Case 1 (shallowest cover)

Surcharge load

Depth of backfill =	0.6	m		
Bulk unit weight (averaged including weight of slab if present) =	19	kN/m^3		
Partial load factor for surcharge soil =	1.4			
Soil load = depth x weight x factor = 0.6 x 19 x 1.4 =			16.0	kN/m^2
Distrib. Load from vehicles (from table 4.2) =	5	kN/m^2		
Partial load factor for loading =	1.6			
Traffic load = load x factor = 5 x 1.6 =			8	kN/m^2
Total load = 16 + 8 =			**24.0**	kN/m^2
Material factor of safety =	2.75			
Vertical design strength of PSM1A units = 610 / 2.75 =			**221.8**	kN/m^2
Degree of utilisation			10.80%	✓

Wheel load

Wheel load classification is Cars to light vans up to 6,000kg GVW				
Wheel load 20kN on a 0.2m x 0.2m area (from Table 4.2)				
Load spread angle (a) =	26.6	degrees		
Cover depth =	0.6	m		
Tan a = Tan (26.6) =			0.500	
Loaded area = [(2xdepthxTana)+ tyre area 1] x [(2xdepthxTana)+ tyre area 2]				
= [(2 x 0.6 x 0.5) + 0.2] x [(2 x 0.6 x 0.5) + 0.2] =			0.640	m²
Distributed wheel load on top of tank will be 20 ÷ 0.64 =			31.25	kN/m²
Partial factor for loading =	1.6			
Design load = 31.25 x 1.6 =			**50.0**	kN/m^2
Material factor of safety =	2.75			
Vertical design strength of PSM1A units = 610 / 2.75 =			**221.9**	kN/m^2
Degree of utilisation			22.53%	✓

Soil load + Wheel Load

Total load could be surcharge soil load plus wheel point load				
From above, design soil load is 19 x 0.6 x 1.4 =			16.0	kN/m^2
From above, wheel point load is 31.25 x 1.6 =			50.0	kN/m^2
Total of soil load + point wheel load = 15.96 + 50 =			**66.0**	kN/m^2
Vertical design strength of PSM1A units = 610 / 2.75 =			**221.8**	kN/m^2
Degree of utilisation			29.74%	✓

Accidental Load Case Check

Point load for Vehicles up to 30,000kg GVW eg 8 wheel bin lorry is 50kN over loaded area of 0.8m2				
Total soil load + point wheel load = 15.96 + 1.6 x (50 / 0.8) =			**116.0**	kN/m^2

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37-41 Longshut Lane West
Stockport
SK2 6RX
Tel: 01614 563476

Vertical design strength of PSM1A units = 610 / 2.0 =	**305.0** kN/m^2	
Degree of utilisation	**38.02%**	✔

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Stockport
SK2 6RX
Tel: 01614 563476

Vertical Loads - Case 2 (deepest cover)

Surcharge load

Depth of backfill =	0.6	m		
Bulk unit weight (averaged including weight of slab if present) =	19	kN/m^3		
Partial load factor for surcharge soil =	1.4			
Soil load = depth x weight x factor = 0.6 x 19 x 1.4 =			16.0	kN/m^2
Distrib. Load from vehicles (from table 4.2) =	5	kN/m^2		
Partial load factor for loading =	1.6			
Traffic load = load x factor = 5 x 1.6 =			8	kN/m^2
Total load = 16 + 8 =			**24.0**	kN/m^2
Material factor of safety =	2.75			
Vertical design strength of PSM1A units = 610 / 2.75 =			**221.8**	kN/m^2
Degree of utilisation			**10.80%**	✔

Wheel load

Wheel load classification is				
Wheel load 20kN on a 0.2m x 0.2m area (from Table 4.2)				
Load spread angle (a) =	26.6	degrees		
Cover depth =	0.6	m		
Tan a = Tan (26.6) =			0.500	
Loaded area = [(2xdepthxTana)+ tyre area 1] x [(2xdepthxTana)+ tyre area 2]				
= [(2 x 0.6 x 0.5) + 0.2] x [(2 x 0.6 x 0.5) + 0.2] =			0.640	m²
Distributed wheel load on top of tank will be 20 ÷ 0.64 =			31.25	kN/m²
Partial factor for loading =	1.6			
Design load = 31.25 x 1.6 =			**50.0**	kN/m^2
Material factor of safety =	2.75			
Vertical design strength of PSM1A units = 610 / 2.75 =			**221.9**	kN/m^2
Degree of utilisation			**22.53%**	✔

Soil load + Wheel Load

Total load could be surcharge soil load plus wheel point load				
From above, design soil load is 19 x 0.6 x 1.4 =			16.0	kN/m^2
From above, wheel point load is 31.25 x 1.6 =			50.0	kN/m^2
Total of soil load + point wheel load = 15.96 + 50 =			**66.0**	kN/m^2
Vertical design strength of PSM1A units = 610 / 2.75 =			**221.8**	kN/m^2
Degree of utilisation			**29.74%**	✔

Accidental Load Case Check

Point load for Vehicles up to 30,000kg GVW eg 8 wheel bin lorry is 50kN over loaded area of 0.8m2				
Total soil load + point wheel load = 15.96 + 1.6 x (50 / 0.8) =			**116.0**	kN/m^2
Vertical design strength of PSM1A units = 610 / 2.0 =			**305.0**	kN/m^2
Degree of utilisation			**38.02%**	✔

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HydroWMS
Complete Water Management Solutions

Lateral Loads

Worst case will be with maximum depth of cover + vehicle loading

Internal angle of friction F'_{crit} =	33.00	degrees	
Active earth pressure coefficient Ka = $(1-\sin F'_{crit})/(1+\sin F'_{crit})$			
= (1-Sin 33)/(1 + Sin 33) =			0.295
Density of soil (averaged including weight of slab if present) = g_1 =	19	kN/m^3	
Calculation allows for the case where ground water level may be above the invert of the tank			
Then submerged density of soil $g_2 = g_1 - 10$ =			9 kN/m^3

Soil Load

Depth of soil for earth pressure calc = depth to invert - 200mm = 2.2 - 0.2 = Z =			2.000 m
Depth of soil for earth pressure calculation above ground water level = Z1 =			2.000 m
Depth of soil for earth pressure below ground water level = Z2 =			0.000 m
Partial load factor =	1.35		
Applied soil pressure = Ka x $(g_1Z_1 + g_2Z_2)$ x factor			
= 0.295 x (19 x 2 + 9 x 0) x 1.35 =			15.12 kN/m^2
Vehicle surcharge load = q =	5	kN/m^2	
Partial load factor =	1.35		
Applied vehicle pressure = Ka x q x factor = 0.295 x 5 x 1.35 =			1.99 kN/m^2
Total load = 15.12 + 1.99 =			**17.11** kN/m^2
Material factor of safety =	2.75		
Lateral design strength of PSM1A units = 63 / 2.75 =			**22.91** kN/m^2
Degree of utilisation			**74.70%** ✓

Hydrostatic load

Depth of water above base of tank - 0.2m			0 m
Water pressure = density (1.0) x depth of water x g =			0.0 kN/m^2
Design load = Applied pressure x Load factor =			**0.0** kN/m^2
Total lateral load = soil load + hydrostatic load =			**17.1 kN/m^2**
Lateral strength of PSM1A units =			**22.91 kN/m^2**
Degree of utilisation			**74.70%** ✓

Floatation

There are three possible scenarios: water level below, part way up or over the tank
From the data given at the head of this calculation, the case is water level below the tank

Depth of water displaced =			0 m
Uplift force = depth of water displaced x buoyancy = 0 x 10 =			0 kN/m^2
Partial factor of safety for uplift =	1.5		
Design uplift force = Uplift force x factor = (0 x 1.5) =			**0.00** kN/m^2
Weight of soil, saturated soil and concrete slab if present =			11.40 kN/m^2
Partial factor of safety for soil =	0.95		
Design pressure = weight of soil x factor = 11.4 x 0.95 =			**10.83** kN/m^2
Therefore, design pressure is greater than design uplift			
Degree of utilisation			**0.00%** ✓

Surface Deflections

Deflection of PSM1A units is 1mm for every 40kN/m2 applied pressure
From above calcs for vertical loads (at shallowest cover)

Pressure from wheel loads on the top of the tank =	31.2	kN/m^2	
For serviceability analyses the factor of safety on live loads is 1.0			
This is a live load so the design load is 31.2 x 1.0 =	31.2	kN/m^2	
Deflection of the tank = 31.2 ÷ 40 =			**0.78 mm**
Deflection of the tank from accidental load case = 62.5 ÷ 40 =			**1.56 mm**

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COTTERSinsurance

Park House
Sandy Way
Grange Park
Northampton
NN4 5EJ

T 01604 666777
F 01604 666778
E insurance@cotters.co.uk

Our Ref: 9215/Comm

22 August 2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

Re: Commercial Insurance - Hydro Water Management Solutions Ltd

We write to confirm that Liability Insurances for the above named company has been arranged on the following basis:-

Primary Liability Insurer:	Axa Insurance UK plc	
Period of Insurance:	22nd August 2023 to 21st August 2024	
Business Description:	Supply and Installation of Attenuation Tanks Installation of gas barrier liners to client's foundations.	
Policy No.:	BM CMC 6909161	
Limits of Indemnity:	Employers Liability	£10,000,000
	Public Liability	£ 5,000,000
	Product Liability	£ 5,000,000
Excess layer Public & Product Liability Insurer:	Chaucer Insurance Company DAC via MX Commercial which is a trading style of GB Underwriting Limited	
Period of Insurance:	22nd August 2023 to 21st August 2024	
Policy No.:	XSPLACH140385/2023	
Limits of Indemnity:	£5,000,000 in excess of the underlying limit of £5,000,000	
Total Public & Product Liability Limit of Indemnity	**£10,000,000**	
Professional Indemnity Insurer:	HCC International Insurance Company plc	
Period of Insurance:	22nd August 2023 to 21st August 2024	
Policy Number:	PI15H733579	
Limits of Indemnity:	£2,000,000 any one claim and in total including defence costs	

This document is for information only. This document does not make the person or organisation to which it is issued an additional Insured, nor does it modify in any manner the contract of insurance between the Insured and the Underwriters.

Should the above-mentioned contract (s) of insurance be cancelled, assigned or changed prior to or during the above policy period in such manner as to affect this document, no obligation to inform the holder of this document is accepted by the undersigned or by the Underwriters.

We trust that this is satisfactory, however, if we can be of further assistance please do not hesitate to contact us.

Yours faithfully
COTTERS INSURANCE SERVICES

Justin Smith

Justin Smith Cert CII
Commercial Account Executive
Direct Dial: 01604 666764

Hydro Water Management Solutions Ltd
Randolph House, 37-41 Longshut Lane West, Stockport, SK2 6RX
+44 (0) 161 4563 476 | sales@Hydro-wms.co.uk | www.Hydro-wms.co.uk

Hydro WMS Ltd - 300gsm Protection Geotextile Specification

Needle punched, thermally bonded non-woven Polypropylene geotextile

	Test Method	Typical Value
Mechanical Properties		
Tensile strength MD	EN ISO 10319	24 kN/m
Tensile strength CD		24 kN/m
Elongation MD	EN ISO 10319	65%
Elongation CD		75.0%
Static puncture Resistance - CBR	EN ISO 12236	3.7 kN
Dynamic perforation resistance cone drop	EN ISO 13433	15.0 mm
Protection efficiency	EN ISO 14574	300 KPA – 2.17 600 KPA – 3.98 1200 KPA – 6.89
Hydraulic Properties		
Water permeability normal to the plane	EN ISO 11058	34 $x10^{-3}$ m/s
Water flow normal to the plane	EN ISO 11058	34 $l/m^2.s$
Water flow capacity in the plane 20kPa	EN ISO 12958	8 x 10-6 m^2/s
Characteristic opening size (AO3)	EN ISO 12956	50.0µm
Physical Properties		
Thickness under 2 kPa	EN ISO 9853-1	1.25 mm
Weight	EN ISO 9864	300 g/m^2
Composition	100% Polypropylene non-woven geotextile	

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Hydro WMS Ltd - 1.0mm PE Geomembrane Specification

Properties	Test Method	Nominal Values
Thickness (mm)	ASTM D 5199/ UNE-EN ISO 1849-2	1.0
Low temperature brittleness (^{o}C)	ASTM D 746, cond B	70
Oxidative induction time (minutes)	ASTM D 3895/ EN ISO 11357-3 (200^{o}C,Pure O_2 1Atm)	100
Dimensional stability (each direction) %	ASTM D 1204 (100^{o}C 1 hour)	±2
Melt flow Index g/10 minutes	ASTM D 1238	≤1.2
Water Permeability (m^3/m^2/day)	UNE-EN 14150	$<1.1^{-6}$
Stress Crack Resistance (h)	UNE-EN 14576 ASTM D 5397	>300
		Minimum Values
Thickness (mm)	ASTM D 5199/ UNE-EN ISO 1849-2	0.91
Density (g/cm^3)	ASTM D 792/1505A/ UNE-EN ISO 1183	0.92
Tensile Strength at break (MPa)	UN-EN ISO 527-3 Type 5	30 (26)
Elongation at break (%)	UN-EN ISO 527-3 Type 5	800 (≥700)
Tear resistance (N/mm)	ASTM D 1004/ UNE-ISO 34-1	≤100
Puncture resistance (kN)	SM D 4833/ UNE-EN ISO 12236	2.5
Carbon Black content (%)	ASTM D 1603/ UNE 53375-2 ISO 18553	2.0 – 3.0

*Values shown are nominal with 95% confidence level
**pH - Resistant to all naturally occurring soil acids and alkalis
***Chemical/biological resistance - Resistance to all substances found to naturally occur in soils and rainwater. Detailed information would need to be provided to geomembrane manufacturer in instances of contaminated land.

Hydro Water Management Solutions Maintenance Requirements

Regular inspection and maintenance is required to ensure the effective long term operation of below ground modular storage systems. The following table details the recommended maintenance requirements for modular systems.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months then annually
	Debris removal from catchment surface (where may cause risk to performance)	Monthly or as required
	Remove sediment from pre-treatment structures and/or manifold connections	Monthly or as required
Remedial actions	Repair/rehabilitation of inlets/outlets, overflows and vents	Annual inspection or as required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build up and remove if necessary	Annually and after large storms

The maintenance plan and schedule should be developed during the design phase. Specific maintenance requirements should be identified based on upstream drainage sedimentation controls and the schedule developed to suit these needs.

Maintenance details should be detailed in the project Health & safety file and a risk assessment should be undertaken and recorded.

Note,
It is generally recommended that the cells be flushed through with large volumes of water under low pressure.

Certain modular units will allow higher pressure jetting to remove larger objects or heavier deposits of sediment. These modules can be accessed via integral access chambers (where applicable) and surveyed/flushed in a linear fashion or alternately water can be flushed/jetted through via the inlet/outlet pipe connections.

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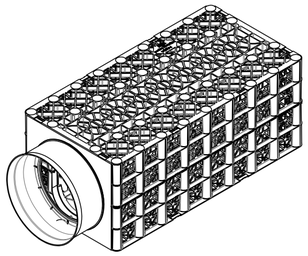
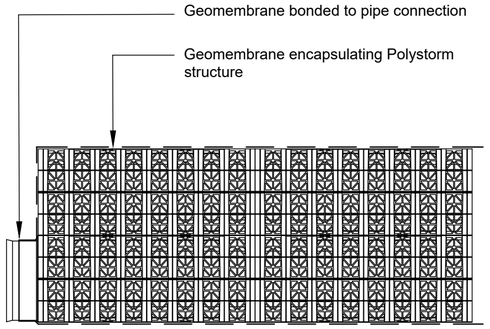
Tel: 01614 563476 Fax: 01614 565820 Email: sales@hydro-wms.co.uk

A2

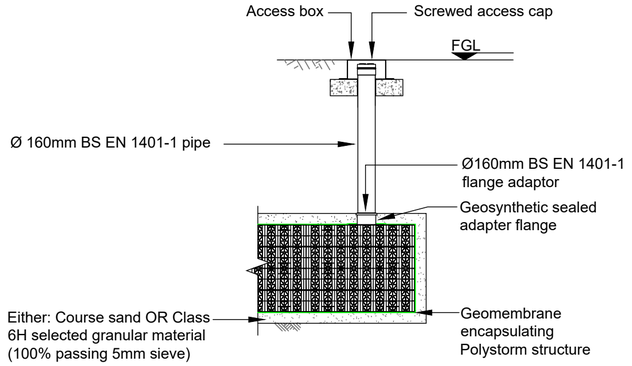
PSM4CRD Pipe Conection Unit



Isometric View (Scale 1:20)



Section View (Scale 1:20)



Ventilation System (Scale 1:40)

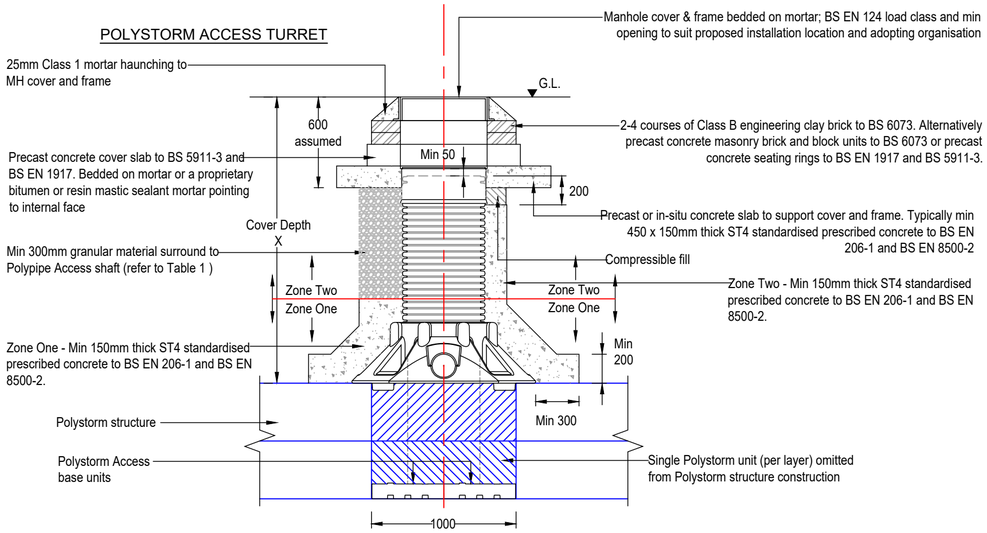
NOTES

1. Proposed Hydro WMS layout.
2. All dimensions are in millimetres, all elevations in metres unless otherwise stated.
3. All temporary and enabling works by others.
4. All dimensions of fabricated items are nominal and may vary within manufacturing tolerances.

Pipe connections and Vent Pipe seals

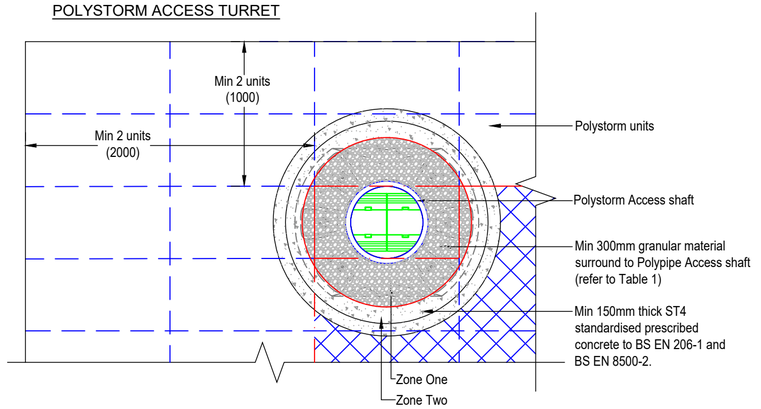
- Wherever possible low level pipe connections are fitted during installation of the first level of cellular units. Cellular units are temporarily placed where pipe connections are required, and the membrane marked to note the position of the required hole.
- An aperture 70mm less than the pipe fitting being used, is cut into the membrane and the pipe fitting cleaned around the outside where the liner is to make contact. A 50mm wide strip of BDST sealing tape is then bonded in place around the fitting.
- The membrane is then lifted, the fitting aligned with the aperture, and heat of 450°c applied for 6 seconds. The liner is then pressed over the pipe fitting, to form a 'Top Hat' style connection aided by the BDST sealing tape. Additionally, a worm-driven jubilee band is tightened over the membrane seal to further aid adhesion.
- Pipe connections at 225mm & 300mm are formed using specialised cellular connection units - (PSM4CRD225 & PSM4CRD300) as shown.
- Vent pipe and smaller connections formed using twinwall pipe are to be made using “Flange Adaptors” which should be fixed into position using self-tapping screws.
- Where connection is required using 150mm PVC pipe these can be formed by pushing a short pipe section into the “knockout” part of the Polystorm unit and sealing as described above.

POLYSTORM ACCESS TURRET



Typical Elevation(Scale 1:30)

POLYSTORM ACCESS TURRET



Plan View (Scale 1:30)

REV	AMENDMENT	DATE

HydroWMS Complete Water Management Solutions

HYDRO WMS LTD
OFFICE 13, BRACONDALE HOUSE
141 BUXTON ROAD, STOCKPORT
CHESHIRE, SK2 6EQ
Tel/Fax: 0161 4563476
brian.byrne@hydro-wms.co.uk
www.hydro-wms.co.uk

CLIENT: -	STATUS: FOR INFORMATION	DATE: 04/05/2020	DRAWN: MA	CHECKED: -	APPROVED: -
JOB TITLE: -	DRAWING TITLE: Pipe Connection Details - Polystorm	SCALE: As Ind'd @ A2	PROJECT No.: -		
		DRAWING No.: 001	REV.: -		

Construction Sequence

Installation procedures should be carried out in accordance with the Health and Safety at Work Etc. Act (1974) and any other relevant legislation. Special attention should be paid to temporary work requirements in excavations.

Excavate to the required plan dimensions and level, ensuring that the excavation orientation will allow easy installation of connecting pipework. Consideration should be given to maintaining construction plant access for reinstating around the installed Polystorm units. A minimum 300mm working space is required around the structure but 500mm is recommended for safe working practice.

Ensure that the ground bearing capacity at the formation level is sufficient for the proposed operational loads. The base of the excavation should be smooth and level, free of large stones and soft spots. Any soft spots should be excavated and replaced with suitable compacted granular material.

The type of geosynthetic material used to encapsulate the Polystorm units will determine the installation requirements. Please note the following information is generic and advice from the geosynthetic manufacturer should be sought to ensure that the appropriate protective measures are taken to comply with any proprietary requirements.

a) Attenuation Application

Place and compact a 100mm thick bedding layer of coarse sand. Line the base and sides of the excavation with a protective geotextile before placement of the impermeable geomembrane. Install the geomembrane, Hydro WMS sealing joints by wedge welding in accordance Ciria 698 site handbook for the construction of SUDS, making an allowance for the connecting pipework or adapters. To ensure that the integrity of the geomembrane has been maintained, it is recommended that an inspection of the material is carried out, and welded joints are air tested in accordance with Ciria 698.

If water is present, we recommend that the excavation depth is over dug by 200mm, with a base layer of 'TERRAM', overlaid by 150mm of compacted 'Type 1 road stone', topped off with a 50mm layer of pipe bedding.

Polystorm shear connectors are placed between all layers of Polystorm units to give structural support to the tank. Sufficient Polystorm clips are placed connecting Polystorm units to maintain rigidity of the tank prior to backfilling the sides, the adjacent units being connected with two Polystorm clips.

Place the Polystorm shear connector into the recess created by the unit columns, two number per unit. Install the next layer of Polystorm units, positioning the units in the upper layer so that they exactly mirror the position of the units in the lower layer. Repeat the above procedure until the necessary depth of Polystorm structure has been achieved.

160mm EN 1401-1 pipes connect directly into the convenient knock-out incorporated in the end of each cell. Connection to 110mm EN 1401-1 pipes or other products is accommodated through the use of standard Polypipe adapters. Specially fabricated Polystorm units are available that allow connection of 225 & 300mm Ridgidrain pipes. A Polystorm structure requires ventilation (attenuation application only) to ensure proper hydraulic performance. Consideration should be given as to how this ventilation is to be installed.

Complete the geosynthetic encapsulation of the entire Polystorm structure, forming joints where appropriate. Re-examine the geotextile for damage and joint integrity.

Contractor

Backfill around the sides of the encapsulated units, forming a thick layer of coarse sand or Class 6H selected granular material immediately adjacent to the units. Where required, remaining excavated areas around the units should be backfilled with Class 6N or 6P selected granular material, in accordance with MCHW, Volume 1, or similarly approved specification.

Above the wrapped Polystorm units, place and lightly compact a minimum 100mm thick layer of either coarse sand or Class 6H selected granular material (with 100% passing the 5mm sieve), in accordance with MCHW, Volume 1, Series 600.

Final backfilling of the installation is dependent on the expected operational loads.
(NB Compaction plant over and immediately adjacent to the Polystorm units shall not exceed 2300 kg/m width).

Field conditions (eg landscaped areas)

The backfill material that lies within 300mm above the Polystorm units should be free from particles exceeding 40mm in diameter, in accordance with Class 8 material to Series 600, Volume 1, MCHW. Final backfilling up to finished ground level may be achieved using selected as-dug material. Backfill material should be placed and compacted in layers no greater than 300mm, or in compliance with the approved specification.

Lightly trafficked (eg restricted access car park

Backfill with Class 1 or 2 material in accordance with MCHW, Volume 1, Series 600. Backfill material should be placed and compacted in layers not greater than 150mm. Where the Polystorm units are installed beneath a paved area, the pavement sub-base may form part of the backfill material provided that minimum cover depths are maintained.

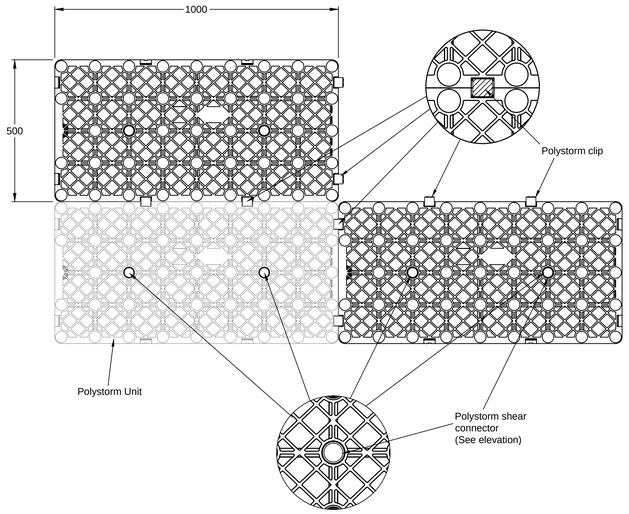
Heavily trafficked (eg service areas or roads)

Contact Hydro WMS Technical Services for further information and guidance.

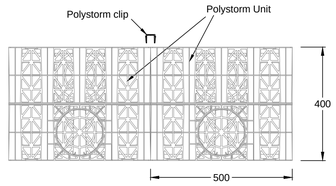
Complete pavement construction or landscaping over the Polystorm system.

It should be noted that infiltration systems are not generally installed under roads due to the reduction in load bearing capacity of saturated soils. Specialist advice should be sought where this type of installation is proposed.

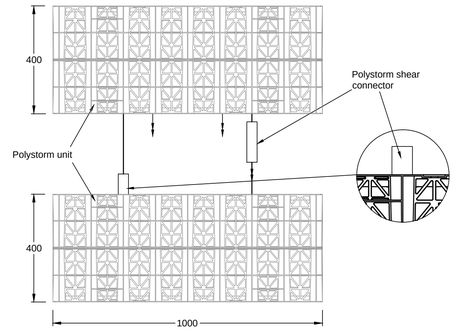
In attenuation systems, where groundwater may be present, a boyancy check should be undertaken to ensure that the imposed overburden pressure exceeds any uplift forces generated.



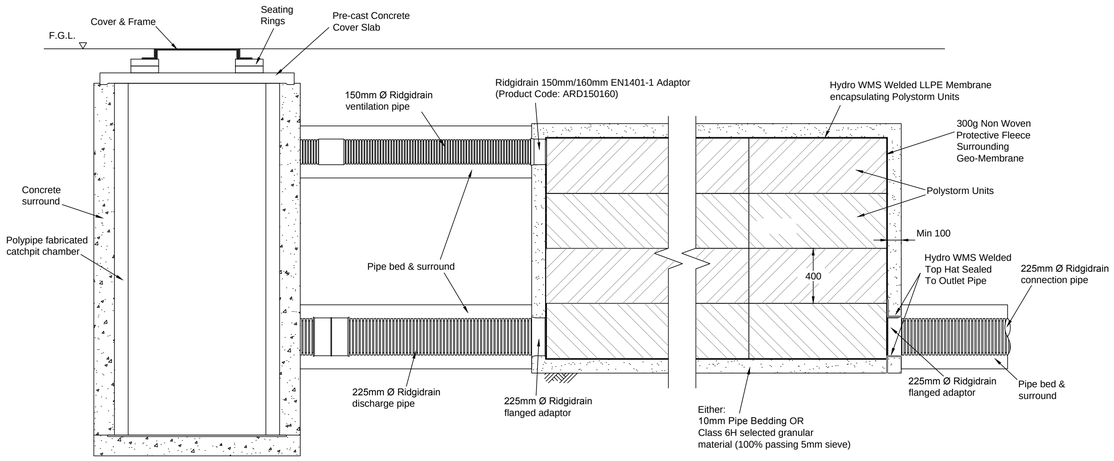
POLYSTORM CONNECTORS
PLAN VIEW
(Scale 1:10)



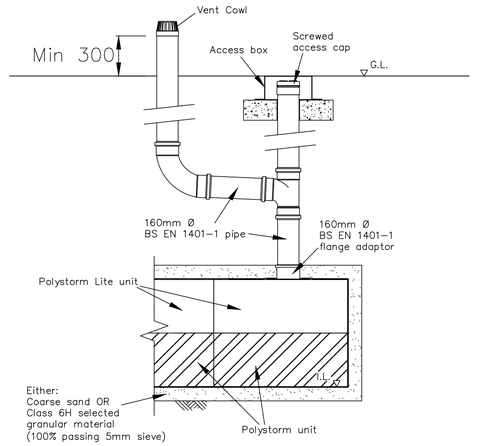
POLYSTORM CONNECTORS
END VIEW
(Scale 1:10)



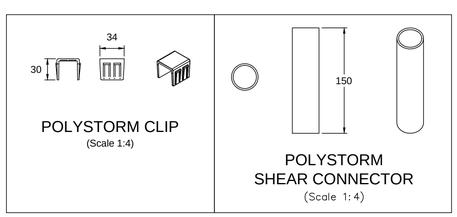
POLYSTORM CONNECTORS
ELEVATION
(Scale 1:10)



HYDRO WMS ATTENUATION
TYPICAL INSTALLATION DETAIL
(Scale 1:20)



VERTICAL VENT PIPE CONNECTION
[DETAIL 2]
(Scale 1:20)



Technical Specification Overview	
Unit Type	Polystorm-R
Product Code	PSM1A
Dimensions	(w) 1 x (d) 0.5 x (h) 0.4m
Total Volume	0.2m³
Unit Weight	9.0Kg (Approx)
Water Storage Volume	0.19m³ (190 litres)
Void Ratio	95%
Ultimate Vertical Compressive Strength	Maximum 650 kN/m²
Ultimate Lateral Compressive Strength	Maximum 63 kN/m²
Short-Term Vertical Deflection	Maximum 70.1 kN/m² per mm
Short-Term Lateral Deflection	Maximum 4.4 kN/m² per mm
Estimated Long Term Vertical Deflection (creep)	0.2798 Ln (design life in hrs)
	[Based on an applied test load = 162 kN/mm²]
	Creep data limit 60 years
Estimated Long Term Lateral Deflection (creep)	1.0192 Ln (design life in hrs)
	[Based on an applied test load = 30.8 kN/mm²]
	Creep data limit 60 years

REV	AMENDMENT	DATE

HydroWMS
Complete Water Management Solutions
HYDRO WMS LTD
OFFICE 13, BRACONDALE HOUSE
141 BUXTON ROAD, STOCKPORT
CHESHIRE, SK2 6EQ
Tel/Fax: 0161 4563476
Brian.Byrne@hydro-wms.com
Polypipe

CLIENT

JOB TITLE
POLYSTORM STORMWATER MANAGEMENT SYSTEMS

DRAWING TITLE
HYDRO WMS ATTENUATION CONSTRUCTION DETAILS

STATUS
FOR INFORMATION ONLY

SCALE	DATE	DRAWN	CHECKED
Various	20/08/15	MB	

PROJECT No.	DRAWING No.	REV

Attenuation

Installation guide for rainwater attenuation

Overview

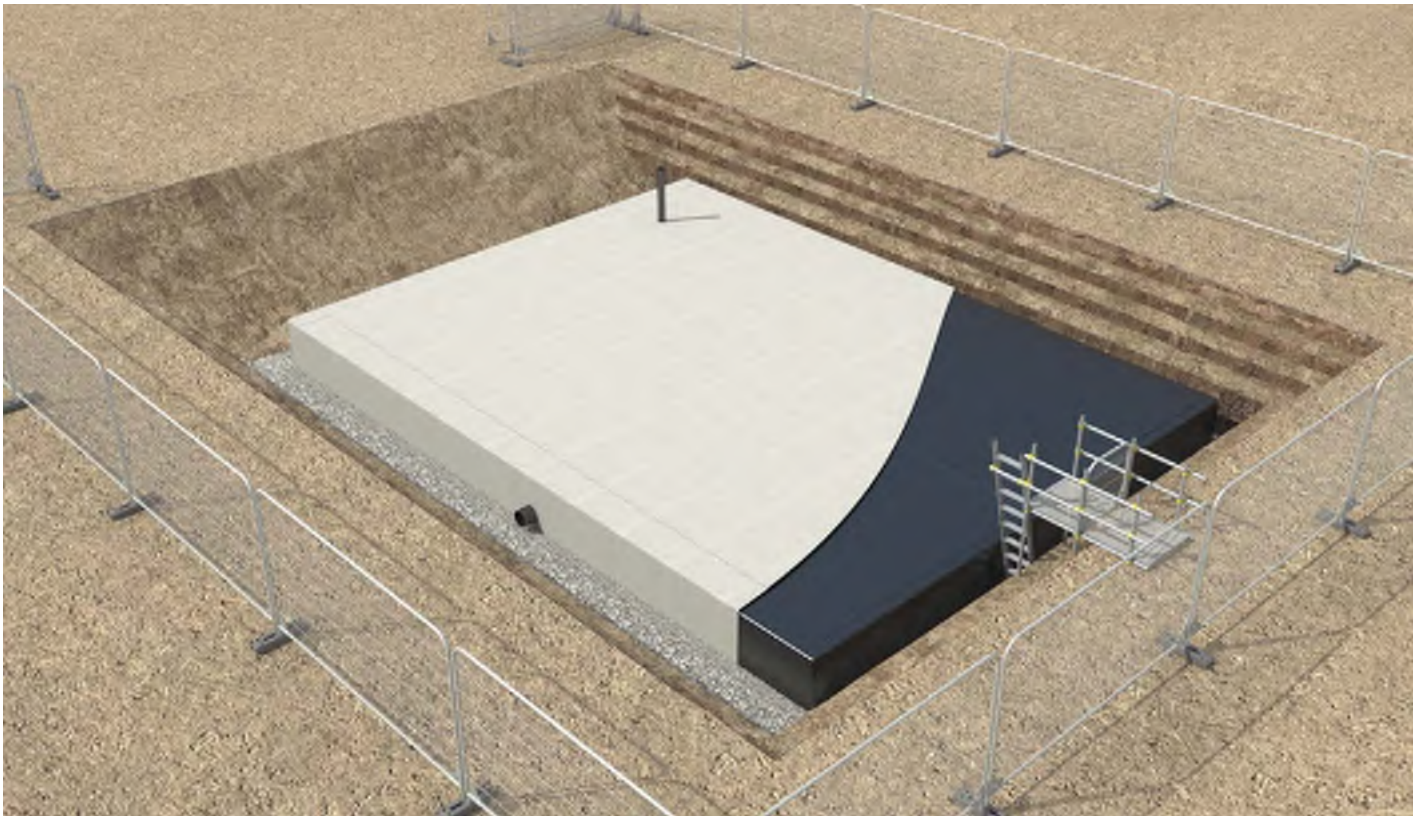
Attenuation tanks store surface water allowing it to be gradually released in a controlled way back into the environment or drainage system.

Effective water attenuation can be achieved with modular storage systems using high quality injection moulded units. We have a range of products and solutions to suit all design criteria, this includes:

- Shallow installation
- Deep installation (5m+)
- Irregular shapes
- Systems requiring inspection and maintenance

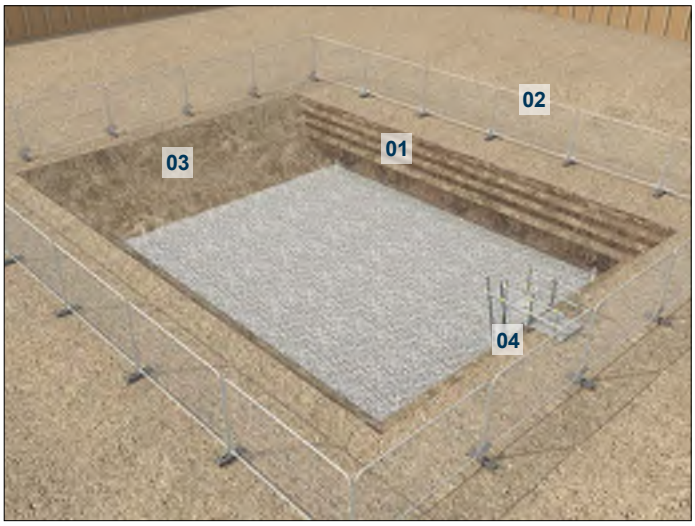
All Hydro WMS attenuation tanks are fully welded using proprietary wedge welding techniques in accordance with CIRIA guidelines.

Hydro WMS soakaways are modular systems designed and installed utilising the same high quality injection moulded units combined with a non-woven geotextile.



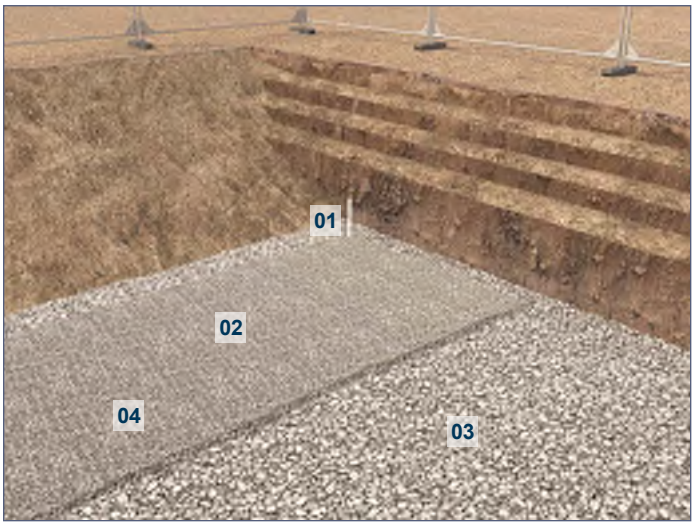
Section diagram shown in greater detail and description on page 4

Installation Steps



01

1. Excavation suitably battered
2. Safety barriers around excavation
3. First point of access/egress is a ramp into excavation
4. Second point of access/egress can be a ladder



02

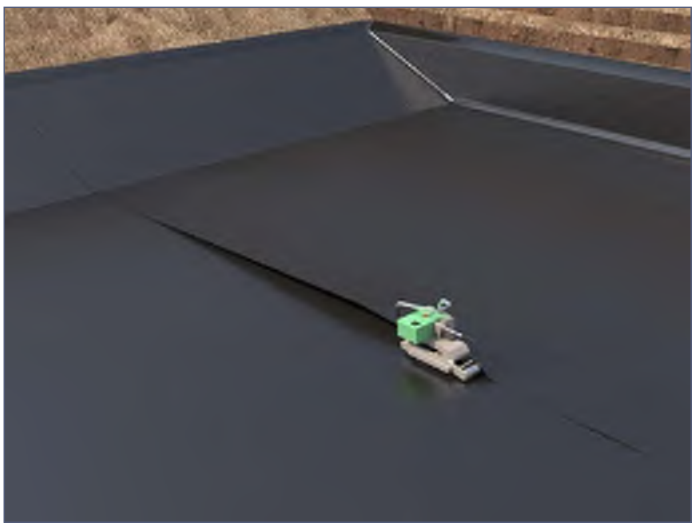
1. Corners measured and pegged with 300 - 500mm of workspace outside
2. 100mm pipe bedding or Type 6H material
3. Formation to have minimum CBR of 3 - 5%
4. Ensure blinding layer is flat and free from sharp objects
5. Soft spots to be dugout & replaced with appropriate material to give minimum CBR

03

- Attendance required to lift geo-textile protection layer into excavation using suitable mechanical lifting equipment
- Geo-textile laid with suitable overlap by Hydro WMS operatives

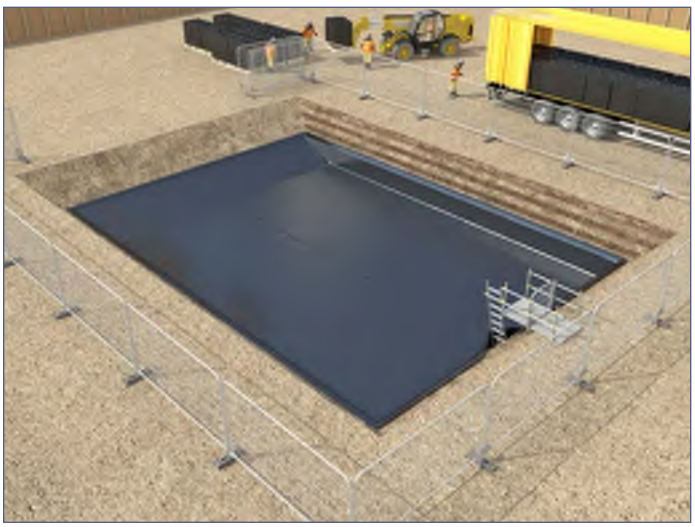
04

- Attendance required to lift rolls of geo-membrane into excavation using suitable mechanical lifting equipment
- Maximum weight not exceeding 1,300kgs
- Geo-membrane laid in excavation for welding by Hydro WMS operatives



05

- Geo-membrane wedge welded together
- Joints tested with non-destructive method

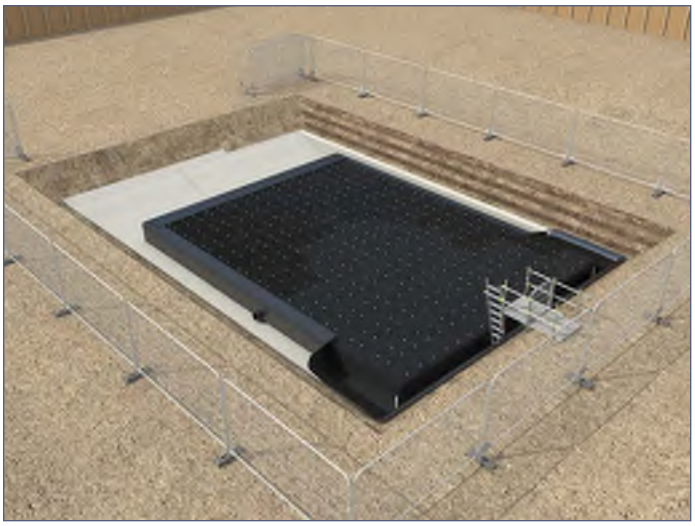


06

- Delivery by articulated curtain sided vehicle
- Ensure lift plan is in place
- Palletised cellular tank components unloaded by telehandler with forks - by contractor
- Placed beside excavation and within reach of the excavator - by contractor

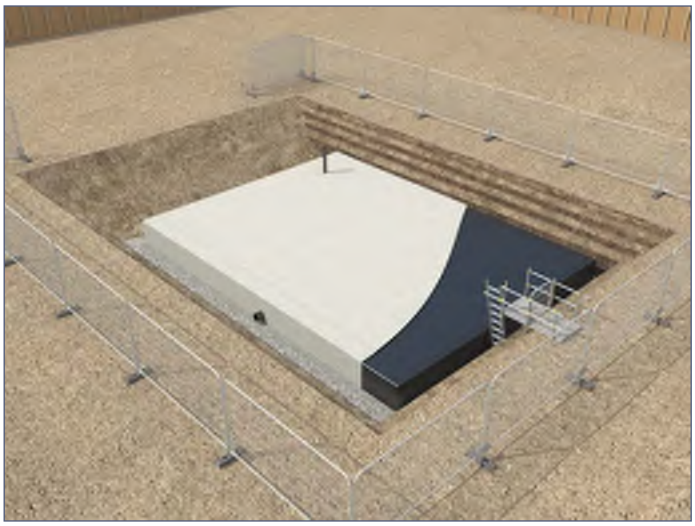
07

- Slinger banksman required to coordinate lowering cellular units into excavation
- Attendance required to lift cellular units into excavation using suitable mechanical lifting equipment
- Hydro WMS operatives to form tank



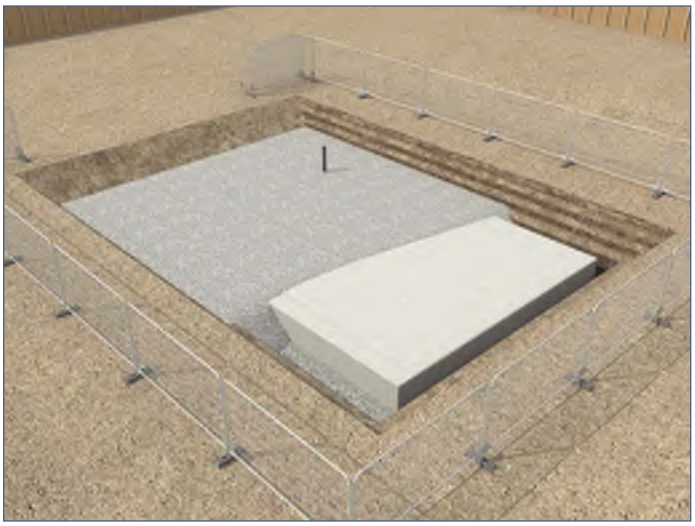
08

- Geo-membrane is folded on top of tank
- Low level pipe seal formed
- Corners trimmed and formed
- Staged backfill may be required



09

- Attendance required to lift geo-membrane and geo-textile to complete tank
- Lid of tank formed and wedge welded
- Vent pipe installed
- Geo-textile protection laid tvo top and sides of tank



10

- Minimum of 100mm protection layer over top of tank
- Suitable small particle aggregate to be used
- Contractor to backfill working space with agreed material
- Protection board may be required for larger particle sizes

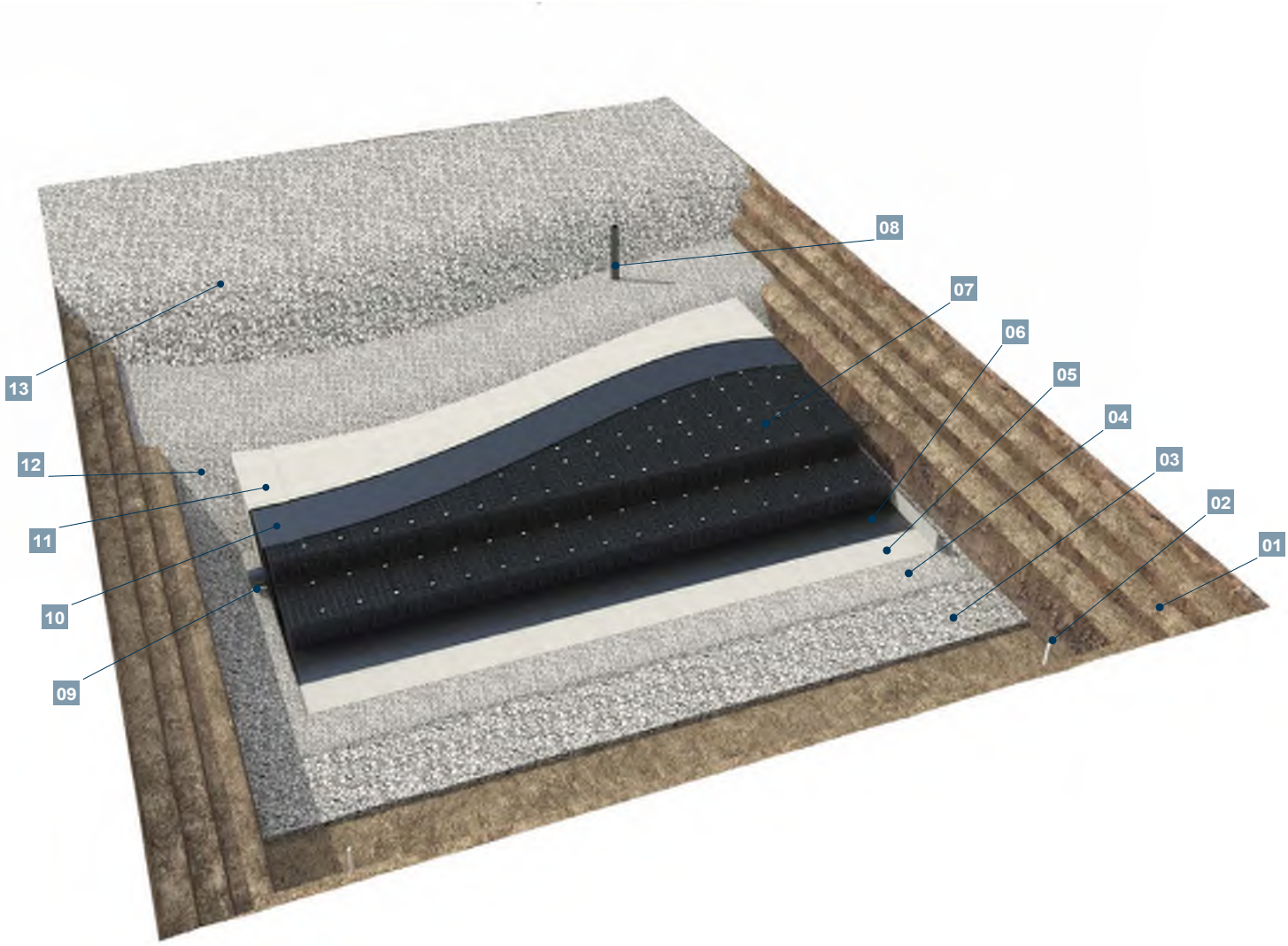
11

IMPORTANT!

The construction loads from items of plant such as excavators and rollers are typically relatively low and deflections are not a significant consideration since the surfacing will not be completed when construction traffic is passing over

It is however recommended that other construction traffic is prevented from crossing the tank and in particular that cranes and other similar items are not located on the tanks (including any part of a mobile crane such as spreaders) unless a site-specific design check for this loading has been undertaken.

For light excavators, up to 14 tonnes and small double wheeled rollers a minimum of 300mm of cover fill should be placed over the units before trafficking; this is to prevent physical damage to them. Excavators should also be prevented from slewing when over the top of the units.



Component information

1. Excavation suitably battered
2. Corners measured and pegged with 300 - 500mm of workspace outside
3. Formation / capping layer (where required)
4. Pipe bedding / 6H aggregate blinding layer
5. Geo-textile protective fleece
6. Geo-membrane welded layer
7. Cellular units
8. Air vent pipe
9. Water outlet pipe
10. Geo-membrane welded layer
11. Geo-textile protective fleece
12. Small particle aggregate protection layer
13. Sub-base aggregate / bulk backfill

Disclaimer

This illustration is intended as a guide for information only. Please refer to the site specific Method Statement and Risk assessment issued prior to installation.
Hydro Water Managment Solutions Limited reserve the right to change the specifications without prior notice.

Hydro WMS

Randolph House 37-41 Longshut Lane West
Stockport, SK2 6RX

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E: info@hydro-wms.co.uk | www.hydro-wms.co.uk

Polystorm-R Modular Cell

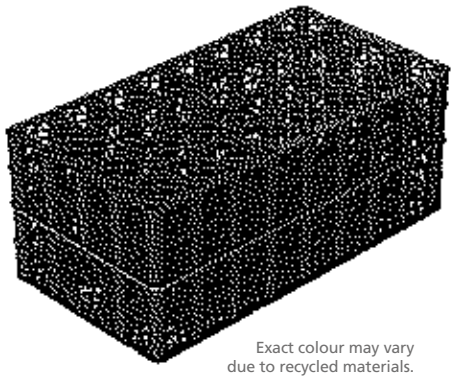
Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 4 - SEPT 2017**

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**

BBA BRITISH BOARD OF AGREMENT
CERTIFICATE No. 06/4297

ELEMENT	VALUE
PHYSICAL PROPERTIES	
Length	1m
Width	0.5m
Depth	0.4m
Total volume	0.2m³
Unit weight	9kg (approx)
Unit storage volume	0.19m³ (190 litres)
Void ratio	95%
SHORT TERM COMPRESSIVE STRENGTH	
Vertical	610 kN/m² **
Lateral	63 kN/m² **
SHORT TERM DEFLECTION	
Short-term vertical deflection	60 kN/m² 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/m²] 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/m²] 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.

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

Polystorm-R Modular Cell

Data Sheet

RECOMMENDED MAXIMUM DEPTH OF INSTALLATION (to cell invert) [m]

TYPICAL SOIL TYPE	TYPICAL ANGLE OF SHEAR RESISTANCE	SOIL WEIGHT kN/m³	WITHOUT GROUNDWATER (below base of cells) NORMAL CASE		WITH GROUNDWATER AT 1M BELOW GROUND LEVEL AND UNITS WRAPPED IN GEOMEMBRANE	
			Pedestrian	Trafficked (cars) <3000kg GVW	Pedestrian	Trafficked (cars) <3000kg GVW
Stiff over consolidated clay e.g. London clay	24	20.0	2.2	1.9	1.8	1.6
Normally consolidated silty sandy clay e.g. alluvium, made ground	26	19.0	2.4	2.2	1.9	1.7
Loose sand and gravel	30	18.0	3.0	2.7	2.0	1.9
Medium dense sand and gravel	33	19.0	3.2	2.9	2.0	1.9
Dense sand and gravel	38	20.0	3.7	3.5	2.1	2.0

Note:
1) Stated depths based on the calculation methodology detailed within CIRIA C680 (2008)
2) Assuming water density = 10.0kN/m³
3) Assumed ultimate limit state (ULS) partial factor of safety applied to: Material = 2.75 Lateral pressure = 1.35

Durability

The polymer material used in the manufacture of the Polystorm-R unit has an adequate resistance to attack from the type and quantities of chemicals that may be expected to naturally occur in uncontaminated soils and rainwater runoff. When installed in accordance with our recommendations, it is expected that the Polystorm-R unit will have a design life in excess of 60 years*. The installer of a proposed geocellular structure should ensure that an appropriate design check has been undertaken, in accordance with the recommended methodology and factors of safety given in CIRIA C680 (2008), Structural Design of Modular Geocellular Drainage Tanks, prior to the commencement of construction activities.

* Derived from long term extrapolated creep testing

Notes

1. Unless stated, all values are nominal and may vary within normal production tolerances.
2. The characteristic unit parameters stated have been based on Polypipe BBA certificate N° 06/4297, sheet 3.
3. Polypipe reserve the right to change product specifications without prior notice.
4. This document is uncontrolled and updates will not be issued automatically.

RECOMMENDED MINIMUM COVER LEVELS [m]

LIVE LOAD CONDITIONS	PEDESTRIAN	LIGHT TRAFFICKED	
		Car park with vehicle mass <GVW	
Minimum cover depth required (m)	0.50	<3000kg 0.50	<9000kg 0.65

Note
1) Stated depths based on the calculation methodology detailed within CIRIA C680 (2008)
2) Assumed serviceability limit state (SLS) partial factor of safety applied to: Material = 1.5 Live load = 1.0 Dead load = 1.0
3) Shallower minimum burial depths may be applicable subject to an assessment of the specific site conditions. For further details please consult our Technical Team on 01509 615100.

Polypipe Civils
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Tel: +44 (0) 1509 615100 Fax: +44 (0) 1509 610215 Email: civils@polypipe.com
www.polypipe.com/wms

Polypipe

JLC Groundworks Ltd
The Boathouse
Blackpool
St Michaels
Preston
PR3 0NB

Date: 7th August 2024

RE: Indemnity

Site: C/O Eric Wright Care Homes, Higher Standen, Clitheroe, BB7 1JJ

Re your order for the above which together with our quotation ref. 116678 Rev A dated 3rd May 2024 plus other relevant agreed documentation including this indemnity defines the contract between us (The Sub Contract) and refers to the site and Works above:

1 In consideration of your agreement, hereby acknowledged, not to hold retention monies on this sub contract, we hereby indemnify you for the periods and values as defined below against defects which may appear in the Subcontract Works which can be shown to be due to defects in the adequacy of the Structural Design, Materials, or Workmanship, insofar as these elements may be our responsibility under the terms of the Subcontract and insofar as the defect concerned can be shown to be due to our failure to meet the agreed requirements of The Subcontract.

This indemnity is for the Subcontract value for a period of twelve months from the 28th May 2024 [this being the anticipated dated of practical completion of the Subcontract Works] and ending on the 27th May 2025. On this date this indemnity will cease to have any effect and will become null and void.

2. For the avoidance of doubt this Indemnity is not intended to exclude or diminish or to increase any liability towards you which may arise under or for breach of the Subcontract.

For and on behalf of
Hydro Water Management Solutions Ltd

Brian Byrne
Director

Hydro Water Management Solutions Ltd
Registered in England No. 08235828
37-41 Longshut Lane West
Stockport
Cheshire SK2 6RX
Telephone +44 (0)161 456 3476
Facsimile +44 (0)161 456 5820
Email sales@hydro-wms.co.uk

WARRANTY OF GEOMEMBRANE INSTALLATION WORKS

This records that all the installation procedures have been fulfilled and passed by the Quality Engineer of Hydro Water Management Solutions Ltd and that the welds conform to IFGW / BGA standards.

Should the welded seams be proven to be of sub-standard quality (when compared to the virgin membrane) within a period of 30 years they will be repaired free of charge subject to correct backfilling procedures being carried out. No responsibility will be accepted for damage caused by incorrect backfilling/connection or other matters outside the control of Hydro Water Management Solutions Ltd.

PROJECT: Installation of Attenuation Tank = 22m x 9m x 1.6m

SITE: The Boat House, Blackpool Road, St Michaels, PR3 0NB

Relevant Insurance covers are as follows:

Insurer	**AXA Insurance PLC**	
Policy Number:	**BM CMC 6909161**	**Expiry date: 21st August 2024**
Public Liability	**£5m**	
Products Liability	**£5m**	
Employers Liability	**£10m**	

Insurer	**Chaucer Insurance Company DAC via GB Underwriting**	
Policy Number:	**XSPLACH140385/2023**	**Expiry date: 21st August 2024**

Excess Layer Public & Products £5m in excess of the underlying limit of £5m

Total Public & Product Liability Limit of Indemnity £10m

Insurer	**HCC International Insurance Company PLC**	
Policy Number:	**PI15H733579**	**Expiry date: 21st August 2024**
Professional Indemnity	**£2m**	

Business Description: Design and Installation of Water Management Systems.

Sign _____ Print: Brian Byrne

Date: 7th August 2024

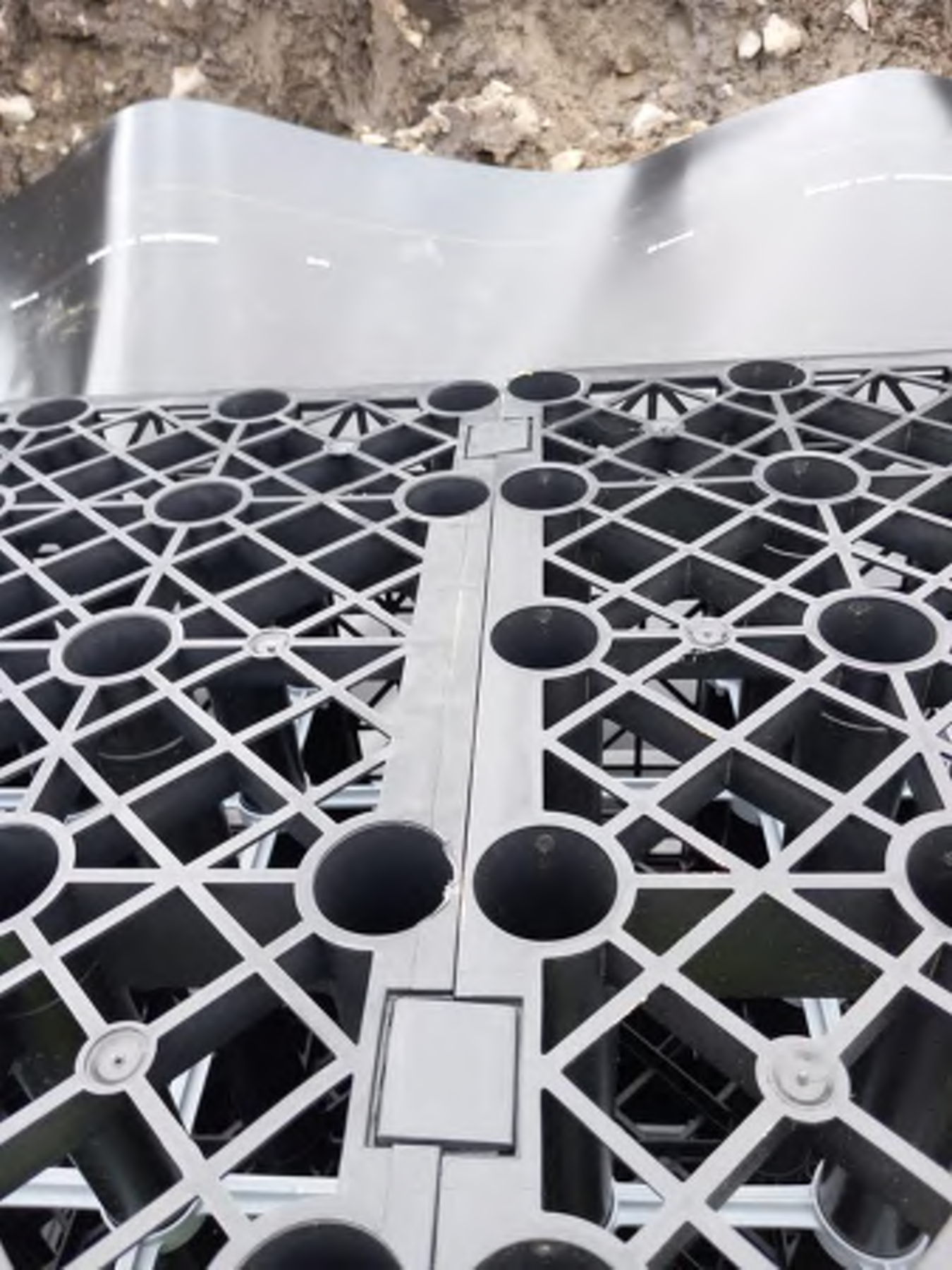
Hydro Water Management Solutions Ltd
Registered in England No. 08235828
37-41 Longshut Lane West, Stockport
Cheshire SK2 6RX
Telephone +44 (0)161 456 3476
Facsimile +44 (0)161 456 5820
Email sales@hydro-wms.co.uk

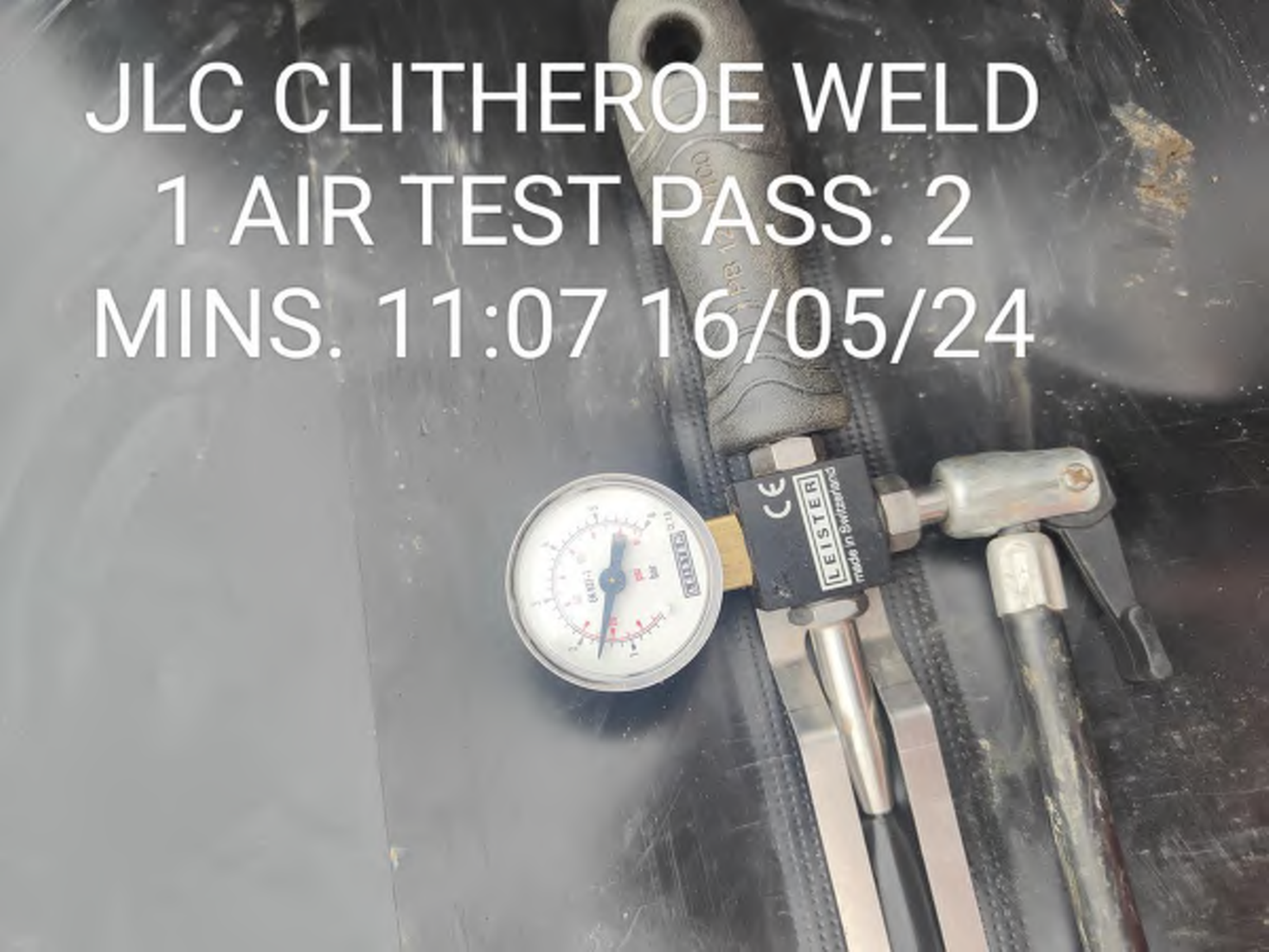

12.1


JLC


JLC


JLC
CX130D




JLC CLITHEROE WELD
1 AIR TEST PASS. 2
MINS. 11:07 16/05/24
LEISTER
made in Switzerland


JLC CLITHEROE
WELD 2 PASS. 2
MINS. 11:12
16/05/24