SHAPE
ENGINEERING

GREENBROW SOCIAL CLUB

DRAINAGE VALIDATION REPORT
REVISION A

03rd NOVEMBER 2025

HEAD OFFICE
LIVERPOOL INNOVATION PARK, EDGE LANE, LIVERPOOL L7 9NJ
T 0151 305 0700
E INFO@SHAPEENGINEERING.CO.UK

SHAPE ENGINEERING

Drainage Verification Report

DOCUMENT HISTORY

REV	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
A	03.11.2025	First Issue	Louie Regan Civil Engineer	Nick McGorry Director	Nick McGorry Director

CONTACT LIST

NAME	DESIGNATION	ORGANISATION	TEL NUMBER	EMAIL DESCRIPTION
Louie Regan	Civil Engineer	Shape Engineering	[redacted]	
Nick McGorry	Director	Shape Engineering		

SHAPE ENGINEERING IS REGISTERED IN ENGLAND AND WALES
COMPANY NO. 10275307. VAT REGISTRATION NO. 268 7266 57

CONTENTS

1.0 Introduction 3
2.0 Drainage systems and Apparatus 4
3.0 As Built Records 5
4.0 Summary 11
5.0 Appendix A – As Built Drainage Layout 12
6.0 Appendix B – Cellular Tank Specification 13
7.0 Appendix C – As Built Drainage Calcualtions 14
8.0 Appendix D – Flow Control Specification 15

1.0 INTRODUCTION

1.1 Shape Engineering have been instructed to prepare a Drainage Validation report for a proposed development at the former Greenbrow Social Club, Manchester.

1.2 This report is based on a collection of photographic evidence from site taken during construction and post-installation of drainage apparatus, contractors as built drainage records, manufacturers specifications and a comparison of this installed system against the design intent.

Scope of Report

1.3 This validation report is intended to give an overview of the drainage systems and apparatus that have been across the development and confirmation that the specifications of the design have been achieved within the construction and the systems are compliant for the lifetime of the development in terms of sustainability and safety.

1.4 Where proprietary products are specified, the manufacturer's documents have been reviewed against the design parameters

1.5 A review of the installed apparatus through photographic evidence, including a final site walk over to review inspection covers / gully gratings and their tie in with the surround land to ensure surface finishes are installed to suitable drain hardstanding areas.

1.6 The report will summarise the changes from the design intent, compliance of the as built systems and note any remedial measures to be taken, if necessary.

1.7 A post-construction site walkover survey has been carried out by the contractor, Casey, to provide further photographic evidence and a visual inspection/confirmation of the as built systems.

1.8 Hydraulic calculations have been reviewed and updated to suit the as built network and confirm compliance with the design intent.

2.0 DRAINAGE SYSTEMS AND APPARATUS

2.1 The proposed system comprises of a separate foul and surface water gravity networks. Flows in both networks are conveyed through a traditional pipe network towards the northeast where the networks combined prior to entering the existing sewer system via a backdrop into an existing manhole on site

2.2 Drainage Pipes vary in diameter from 100mm up to 225mm. The pipes are used for conveyance only and not intended to provide attenuation

2.3 Foul water pipes vary in diameter from 100mm up to 150mm. The pipes are used for conveyance only.

2.4 A series of inspection chambers have been installed throughout the network at changes in direction.

2.5 Highway gullies have been installed throughout the car parking area. With a double gully installed at the low point to mitigate ponding risk through blockages.

2.6 A cellular storage tank has been installed to the north of the development to act as an attenuation system for all storms up to and including the 100 year + Climate change event.

2.7 A catchpit manhole has been installed downstream of the cellular storage tank to mitigate the risk of sedimentation entering the tank.

2.8 A flow control unit has been installed to the final surface water manhole before discharging runoff at a restricted rate of 5.0l/s as per planning approval, into the combined sewer.

3.0 AS BUILT RECORDS

Cellular Tank

3.1 The below photographs taken during construction of the cellular storage tank indicate the bedding, linings, ventilation systems and surround and backfill through stages of the construction.

3.2 The manufacturers specification of the as built cellular tank has been provided in Appendix B. The dimensions of this tank at 23m x 3.0m x 0.8m differ from the proposed design intent of 22m x 2.5m x 1.0m.

3.3 The as built tank provides slightly more capacity than the original design and with a reduced depth, this would ensure surcharge levels within the network are lower than the original design to not exceed the design head of the flow control unit.

3.4 Hydraulic calculations have been updated to meet the above criteria to validate the suitability. The calculations included in Appendix C prove the as built tank is compliant in terms of geometry and capacities.

3.5 Shape Engineering are satisfied that the as built photographs provide sufficient evidence that the installation of the tank is compliant with the construction specifications.

Flow Control Manhole

3.6 The below photograph of the flow control manhole, show the benching arrangement and the installed flow control apparatus.

3.7 It has been noted that the flow control installed was of a different manufacturer to that of the original design. The product specification that has been supplied in Appendix D.

3.8 The installed flow control specification matches that of the design intent and therefore we consider this to be a compliant alternative.

Pipes

3.9 Upon lifting a selection of inspection covers across the site, it was evident that no blockages had occurred, which suggests the pipe network has been installed to the correct specification and no blockages exist on the line.

3.10 Photographic evidence has been provided of the installation of the pipework through the development, proving the suitable installation of junction, pipe bedding and surround and measured gradients.

Inspection Chambers

3.11 The contractor has confirmed through as built records that all inspection chambers have been installed as per the design intent.

3.12 A site walkover concluded that the inspection chambers were in the intended locations and covers had been installed appropriately to their location in landscaping / trafficked areas.

3.13 Upon lifting a selection of inspection covers across the site, it was evident that no blockages had occurred, which suggests the pipe network has been installed to the correct specification and no blockages exist on the line.

3.14 The appropriate backdrop connection has been made to the existing combined water manhole, located within the development site, as per photograph below.

Gullies

3.15 As built records and the site walk over indicate all gullies have been installed as per the design intent and to the specification of the construction details with appropriate bedding and surround and cover speciation.

3.16 A visual inspection of the surface finishes / kerbing indicates that local ground levels are falling towards the gullies, sited at low spots as per the design intent.

3.17 At the time of the site walkover, there was no evidence of gullies being visibly blocked nor debris present.

3.18 Therefore, Shape Engineering are satisfied that the gullies are compliant with the design intent.

4.0 SUMMARY

4.1 The As Built records available, provide evidence that the drainage systems have been installed to the specification and standards expected to meet guidance in Building Regulations Part H.

4.2 The As Built hydraulic calculations for the installed surface water system and apparatus confirm that the design intent is achieved with the changes implemented.

4.3 Shape Engineering therefore consider the As Built drainage to be compliant with the design intent and meets the specification standards set out in building regulations, Planning Conditions and the National Planning Policy Framework.

5.0 APPENDIX A – AS BUILT DRAINAGE LAYOUT

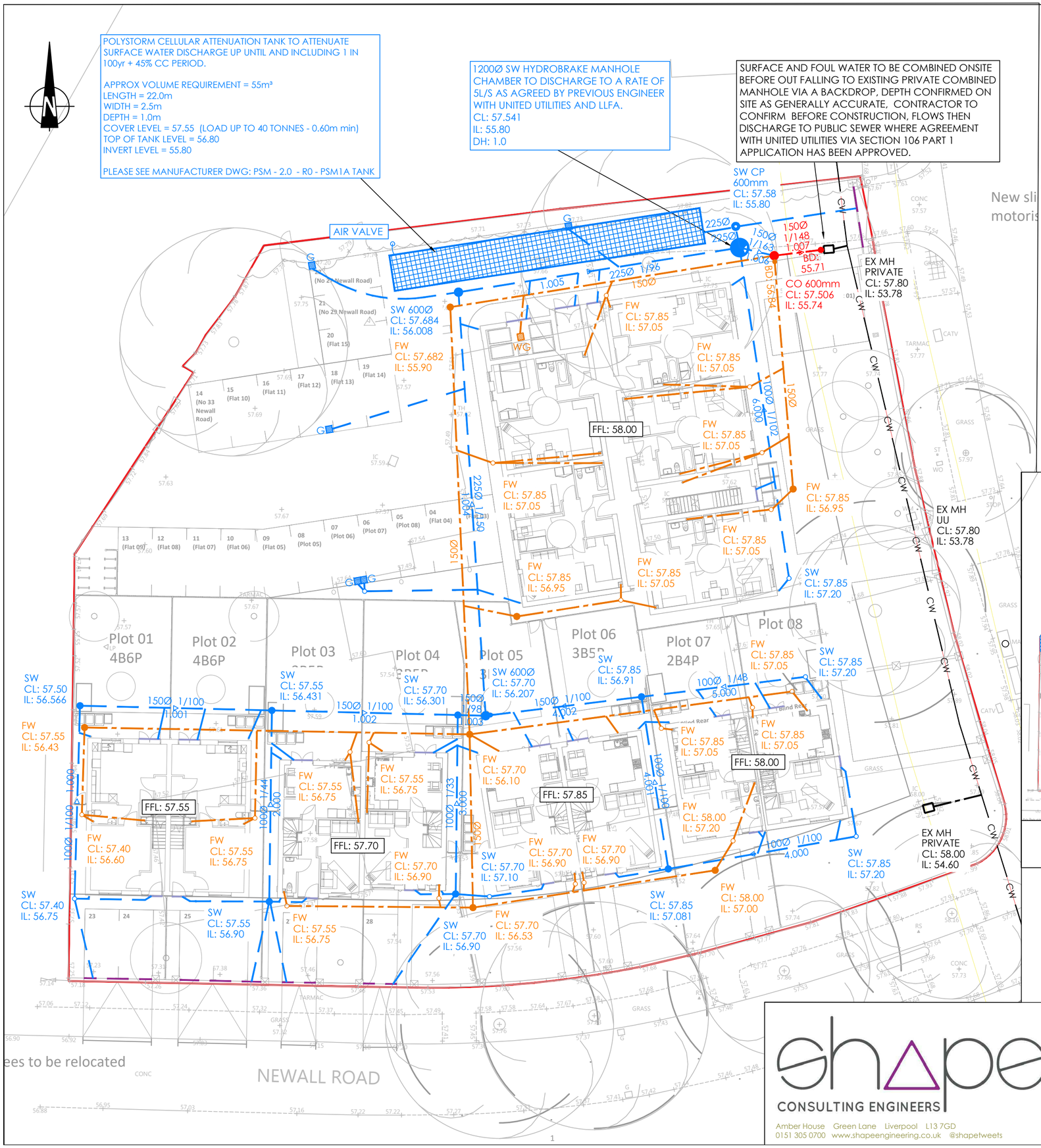
POLYSTORM CELLULAR ATTENUATION TANK TO ATTENUATE SURFACE WATER DISCHARGE UP UNTIL AND INCLUDING 1 IN 100yr + 45% CC PERIOD.

APPROX VOLUME REQUIREMENT = 55m³
LENGTH = 22.0m
WIDTH = 2.5m
DEPTH = 1.0m
COVER LEVEL = 57.55 (LOAD UP TO 40 TONNES - 0.60m min)
TOP OF TANK LEVEL = 56.80
INVERT LEVEL = 55.80

PLEASE SEE MANUFACTURER DWG: PSM - 2.0 - R0 - PSM1A TANK

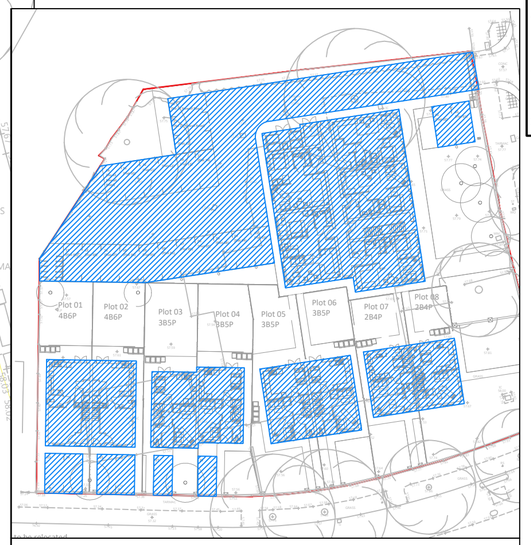
1200Ø SW HYDROBRAKE MANHOLE CHAMBER TO DISCHARGE TO A RATE OF 5L/S AS AGREED BY PREVIOUS ENGINEER WITH UNITED UTILITIES AND LLFA.
CL: 57.541
IL: 55.80
DH: 1.0

SURFACE AND FOUL WATER TO BE COMBINED ONSITE BEFORE OUT FALLING TO EXISTING PRIVATE COMBINED MANHOLE VIA A BACKDROP, DEPTH CONFIRMED ON SITE AS GENERALLY ACCURATE, CONTRACTOR TO CONFIRM BEFORE CONSTRUCTION, FLOWS THEN DISCHARGE TO PUBLIC SEWER WHERE AGREEMENT WITH UNITED UTILITIES VIA SECTION 106 PART 1 APPLICATION HAS BEEN APPROVED.



DRAINAGE KEY

- CW — EXISTING UU COMBINED WATER SEWER
- EXISTING PRIVATE COMBINED WATER SEWER
- PROPOSED PRIVATE FOUL WATER SEWER
- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED 300Ø PRIVATE FW PPIC
- PROPOSED 300Ø PRIVATE SW PPIC
- PROPOSED 450Ø PRIVATE FW PPIC UNLESS OTHERWISE STATED
- PROPOSED 450Ø PRIVATE SW PPIC UNLESS OTHERWISE STATED
- PROPOSED PRIVATE CATCH PIT
- PROPOSED SW HYDROBRAKE MANHOLE
- PROPOSED COMBINED SEWER
- PROPOSED SW GULLY
- PROPOSED SW ACO CHANNEL
- PROPOSED THRESHOLD SLOT CHANNEL
- FOUL WASH DOWN GULLY



PROPOSED IMPERMEABLE AREA 1 = 1540m²

GENERAL NOTES

THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS AND WHERE APPLICABLE LOCAL AUTHORITIES REQUIREMENTS.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ANY SERVICE/UTILITY APPARATUS IN THE VICINITY OF THE WORKS BEFORE DRAINAGE INSTALLATION HAS COMMENCED. SHAPE WILL ACCEPT NO CLAIMS WHATSOEVER IN RESPECT OF ANY LOSSES OR DAMAGE CAUSED IN RESPECT OF SUCH APPARATUS.

NOTE:

FOR INFORMATION PURPOSES THE FOLLOWING SHOULD BE ASSUMED:

ALL INDICATED SURFACE WATER SEWERS ARE 100mm IN DIAMETER AND HAVE A MINIMUM GRADIENT OF 1:100 UNLESS OTHERWISE STATED.

ALL FOUL WATER SEWERS ARE 100mm IN DIAMETER AND HAVE A MINIMUM GRADIENT OF 1:80 UNLESS OTHERWISE STATED.

ALL FOUL AND SURFACE WATER PPIC'S TO BE 450 IN DIAMETER UNLESS OTHERWISE STATED.

ALL MANHOLE AND SEWER TRENCH DEPTH SHOULD PROVIDE A MINIMUM COVER OF 1.2m TO THE SOFFIT OF THE PIPE. FURTHER LEVEL INFORMATION WILL BE CALCULATED IN DUE COURSE.

Rev	By	Description	Date
AB1	NM	As Built	03.11.2025

Revision Schedule

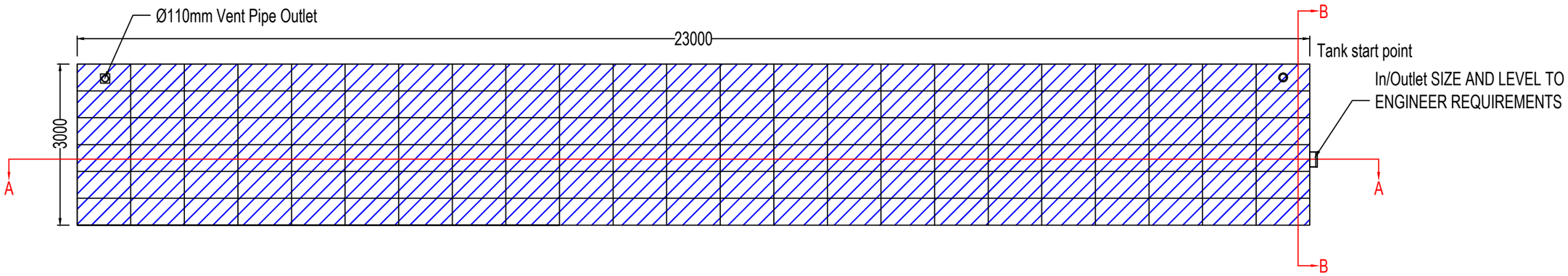
shape CONSULTING ENGINEERS
Amber House Green Lane Liverpool L13 7GD
0151 305 0700 www.shapeengineering.co.uk @shapetweets

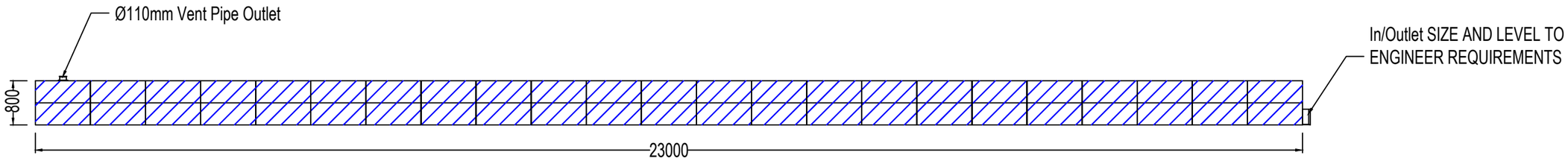
PROJECT: Greenbrow Social Club, Manchester City Council

TITLE: Drainage Strategy Plan

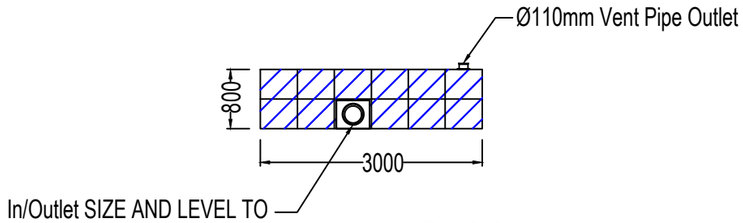
Client	Casey Group
Status	-
Purpose of Issue	As Built
Designed By	GP
Approved By	EC
Drawn By	NM
Project No.	2639
Sheet No.	C-0001
Scale (@ A2)	1:200
DATE	01.02.2024
Rev	AB1

6.0 APPENDIX B – CELLULAR TANK SPECIFICATION





SECTION A-A

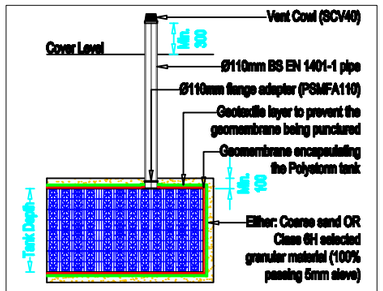


SECTION B-B

PROPOSED POLYSTORM STRUCTURE	
Plan Area	69m²
Tank Volume	55.2m³
Storage	52.44m³
Polystorm-R Units	276 (PSM1A)

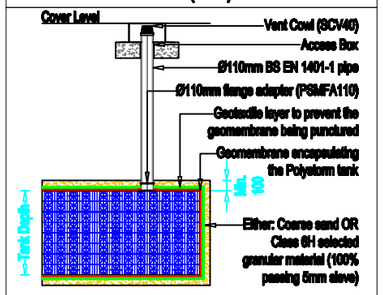
LEGEND:

Polystorm-R Units (PSM1A)



ATTENUATION TANK VENTILATION SYSTEM - OPTION 1)

Scale (N.T.S)



ATTENUATION TANK VENTILATION SYSTEM - OPTION 2)

Scale (N.T.S)

© Copyright

NOTES:-

1. THIS DRAWING DETAILS A PROPOSED POLYPIPE CIVILS & GREEN URBANISATION PRODUCT GENERAL ARRANGEMENT, REFLECTING OUR INTERPRETATION OF THE INFORMATION PROVIDED.
2. POLYPIPE CIVILS & GREEN URBANISATION (PCGU) PRODUCTS SHALL BE INSTALLED IN ACCORDANCE WITH PCGU RECOMMENDATIONS (REFER TO PCGU TECHNICAL GUIDANCE FOR FURTHER INFORMATION); GIVING DUE CONSIDERATION TO THE SITE SPECIFIC CONDITIONS AND REQUIREMENTS, IN ADDITION TO ANY REQUIREMENTS MANDATED BY THE RELEVANT APPROVING AND ULTIMATE OWNER ORGANISATION(S).
3. DO NOT SCALE, REFER TO FIGURED DIMENSIONS ONLY.
4. ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE STATED.
5. ALL DIMENSIONS ARE NOMINAL AND MAY VARY WITHIN MANUFACTURING OR CONSTRUCTION TOLERANCES.
6. ALL SITE TEMPORARY AND ENABLING WORKS BY OTHERS.
7. THIS DRAWING IS INTENDED FOR GUIDANCE ONLY. CONFIRMATION OF THE INFORMATION CONTAINED WITHIN THIS DOCUMENT SHOULD BE SOUGHT FROM THE OVERSEEING ENGINEER(S) PRIOR TO THE COMMENCEMENT OF FINAL DESIGN OR CONSTRUCTION ACTIVITIES.
8. PLEASE REFER TO POLYSTORM & POLYSTORM LITE TECHNICAL GUIDE.
9. THE PROPOSED POLYSTORM STRUCTURE GENERAL ARRANGEMENT HAS BEEN BASED ON PROVIDING THE MINIMUM STRUCTURE VOLUME STATED ONLY. NO STRUCTURAL OR HYDRAULIC ASSESSMENT HAS BEEN MADE OF THE SUITABILITY OF THE PROPOSED POLYSTORM STRUCTURE FOR THE PROPOSED APPLICATION, NOR HOW IT WILL INTEGRATES INTO THE PROPOSED DRAINAGE SYSTEM.
10. ALL MEMBRANE JOINTS TO BE WELDED RATHER THAN GLUED.

Notes :- All the Dimensions by Millimeters

KEYTEC INSTALLATION SERVICES

KEYTEC INSTALLATION SERVICES
ROYLE HOUSE
COWM TOP BUSINESS PARK
COWM TOP LANE
OL11 2PU
TEL: 01706 374416
EMAIL: TECHNICAL@KEYTEC.CO.UK

PROJECT

FORMER GREENBROW SOCIAL CLUB, WYTHENSHAWE

ATTENUATION TANK

TITLE

DETAILS OF ATTENUATION/STORAGE TANK DETAILS USING POLYSTORM PSM1A UNIT.

Scale	Drawn	Checked
N.T.S.	AY	KD
Date	**Drawing No.**	**Revision**
30/08/2024	PSM - 2.0	R0

7.0 APPENDIX C – AS BUILT DRAINAGE CALCUALTIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.377	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

1 STANDARD Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1050	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.000	1050	99.999	1350

1 STANDARD Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100	150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Depth (m)
PS1	0.005	5.00	57.400	Manhole	1 STANDARD	300	0.650
PS2	0.005	5.00	57.497	Manhole	1 STANDARD	180	0.931
PS11	0.010	5.00	57.550	Manhole	1 STANDARD	300	0.650
PS3	0.015	5.00	57.550	Manhole	1 STANDARD	450	1.119
PS12	0.010	5.00	57.550	Manhole	1 STANDARD	300	0.650
PS4	0.015	5.00	57.550	Manhole	1 STANDARD	450	1.249
PS15	0.010	5.00	57.850	Manhole	1 STANDARD	300	0.650
PS13	0.010	5.00	57.700	Manhole	1 STANDARD	450	0.619
PS16	0.010	5.00	57.850	Manhole	1 STANDARD	300	0.650
PS14	0.015	5.00	57.700	Manhole	1 STANDARD	450	0.790
PS5	0.015	5.00	57.700	Manhole	1 STANDARD	600	1.493
PS6	0.020	5.00	57.684	Manhole	1 STANDARD	600	1.676
PS17	0.014	5.00	57.568	Manhole	1 STANDARD	300	0.368
PS7			57.541	Manhole	1 STANDARD	1200	1.741
PS9			57.506	Manhole	1 STANDARD	1200	1.723
PS10			57.475	Manhole	1 STANDARD	180	1.718

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)
1.000	PS1	PS2	13.388	0.600	56.750	56.616	0.134	99.9	100	5.29
1.001	PS2	PS3	13.455	0.600	56.566	56.431	0.135	99.7	150	5.51
2.000	PS11	PS3	13.144	0.600	56.900	56.602	0.298	44.1	100	5.19
1.002	PS3	PS4	13.035	0.600	56.432	56.302	0.130	100.3	150	5.73
3.000	PS12	PS4	12.356	0.600	56.900	56.531	0.369	33.5	100	5.15
1.003	PS4	PS5	1.950	0.600	56.301	56.281	0.020	97.5	150	5.76
4.000	PS15	PS13	11.911	0.600	57.200	57.081	0.119	100.1	100	5.26
4.001	PS13	PS14	12.101	0.600	57.081	56.960	0.121	100.0	100	5.52
5.000	PS16	PS14	11.578	0.600	57.200	56.960	0.240	48.2	100	5.17
4.002	PS14	PS5	11.007	0.600	56.910	56.800	0.110	100.1	150	5.70
1.004	PS5	PS6	29.753	0.600	56.207	56.009	0.198	150.3	225	6.23
1.005	PS6	PS7	19.967	0.600	56.008	55.800	0.208	96.0	225	6.48
6.000	PS17	PS7	23.940	0.600	57.200	56.966	0.234	102.3	100	5.53
1.006	PS7	PS9	2.706	0.600	55.800	55.783	0.017	163.4	150	6.53
1.007	PS9	PS10	3.855	0.600	55.783	55.757	0.026	148.3	150	6.61

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)
1.000	PS1	PS2	0.769	6.0	0.6	0.550	0.781	0.550	0.781	0.005
1.001	PS2	PS3	1.006	17.8	1.2	0.781	0.969	0.781	0.969	0.010
2.000	PS11	PS3	1.164	9.1	1.3	0.550	0.848	0.550	0.848	0.010
1.002	PS3	PS4	1.003	17.7	4.3	0.968	1.098	0.968	1.098	0.035
3.000	PS12	PS4	1.337	10.5	1.3	0.550	0.919	0.550	0.919	0.010
1.003	PS4	PS5	1.018	18.0	7.3	1.099	1.269	1.099	1.269	0.060
4.000	PS15	PS13	0.768	6.0	1.3	0.550	0.519	0.519	0.550	0.010
4.001	PS13	PS14	0.769	6.0	2.5	0.519	0.640	0.519	0.640	0.020
5.000	PS16	PS14	1.112	8.7	1.3	0.550	0.640	0.550	0.640	0.010
4.002	PS14	PS5	1.004	17.7	5.5	0.640	0.750	0.640	0.750	0.045
1.004	PS5	PS6	1.064	42.3	14.1	1.268	1.450	1.268	1.450	0.120
1.005	PS6	PS7	1.334	53.1	16.2	1.451	1.516	1.451	1.516	0.140
6.000	PS17	PS7	0.760	6.0	1.7	0.268	0.475	0.268	0.475	0.014
1.006	PS7	PS9	0.783	13.8	17.7	1.591	1.573	1.573	1.591	0.154
1.007	PS9	PS10	0.823	14.5	17.6	1.573	1.568	1.568	1.573	0.154

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	13.388	99.9	100	57.400	56.750	0.550	57.497	56.616	0.781
1.001	13.455	99.7	150	57.497	56.566	0.781	57.550	56.431	0.969
2.000	13.144	44.1	100	57.550	56.900	0.550	57.550	56.602	0.848
1.002	13.035	100.3	150	57.550	56.432	0.968	57.550	56.302	1.098
3.000	12.356	33.5	100	57.550	56.900	0.550	57.550	56.531	0.919

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	PS1	300	Manhole	1 STANDARD	PS2	180	Manhole	1 STANDARD
1.001	PS2	180	Manhole	1 STANDARD	PS3	450	Manhole	1 STANDARD
2.000	PS11	300	Manhole	1 STANDARD	PS3	450	Manhole	1 STANDARD
1.002	PS3	450	Manhole	1 STANDARD	PS4	450	Manhole	1 STANDARD
3.000	PS12	300	Manhole	1 STANDARD	PS4	450	Manhole	1 STANDARD

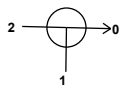
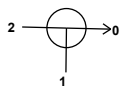
Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.003	1.950	97.5	150	57.550	56.301	1.099	57.700	56.281	1.269
4.000	11.911	100.1	100	57.850	57.200	0.550	57.700	57.081	0.519
4.001	12.101	100.0	100	57.700	57.081	0.519	57.700	56.960	0.640
5.000	11.578	48.2	100	57.850	57.200	0.550	57.700	56.960	0.640
4.002	11.007	100.1	150	57.700	56.910	0.640	57.700	56.800	0.750
1.004	29.753	150.3	225	57.700	56.207	1.268	57.684	56.009	1.450
1.005	19.967	96.0	225	57.684	56.008	1.451	57.541	55.800	1.516
6.000	23.940	102.3	100	57.568	57.200	0.268	57.541	56.966	0.475
1.006	2.706	163.4	150	57.541	55.800	1.591	57.506	55.783	1.573
1.007	3.855	148.3	150	57.506	55.783	1.573	57.475	55.757	1.568

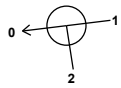
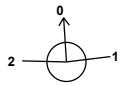
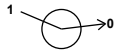
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.003	PS4	450	Manhole	1 STANDARD	PS5	600	Manhole	1 STANDARD
4.000	PS15	300	Manhole	1 STANDARD	PS13	450	Manhole	1 STANDARD
4.001	PS13	450	Manhole	1 STANDARD	PS14	450	Manhole	1 STANDARD
5.000	PS16	300	Manhole	1 STANDARD	PS14	450	Manhole	1 STANDARD
4.002	PS14	450	Manhole	1 STANDARD	PS5	600	Manhole	1 STANDARD
1.004	PS5	600	Manhole	1 STANDARD	PS6	600	Manhole	1 STANDARD
1.005	PS6	600	Manhole	1 STANDARD	PS7	1200	Manhole	1 STANDARD
6.000	PS17	300	Manhole	1 STANDARD	PS7	1200	Manhole	1 STANDARD
1.006	PS7	1200	Manhole	1 STANDARD	PS9	1200	Manhole	1 STANDARD
1.007	PS9	1200	Manhole	1 STANDARD	PS10	180	Manhole	1 STANDARD

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Node Type	Connections		Link	IL (m)	Dia (mm)
PS1	57.400	0.650	300	Manhole		0	1.000	56.750	100
PS2	57.497	0.931	180	Manhole		1	1.000	56.616	100
						0	1.001	56.566	150
PS11	57.550	0.650	300	Manhole		0	2.000	56.900	100
PS3	57.550	1.119	450	Manhole		1	2.000	56.602	100
						2	1.001	56.431	150
						0	1.002	56.432	150
PS12	57.550	0.650	300	Manhole		0	3.000	56.900	100
PS4	57.550	1.249	450	Manhole		1	3.000	56.531	100
						2	1.002	56.302	150
						0	1.003	56.301	150

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Node Type	Connections		Link	IL (m)	Dia (mm)
PS15	57.850	0.650	300	Manhole		0	4.000	57.200	100
PS13	57.700	0.619	450	Manhole		1	4.000	57.081	100
						0	4.001	57.081	100
PS16	57.850	0.650	300	Manhole		0	5.000	57.200	100
PS14	57.700	0.790	450	Manhole		1	5.000	56.960	100
						2	4.001	56.960	100
						0	4.002	56.910	150
PS5	57.700	1.493	600	Manhole		1	4.002	56.800	150
						2	1.003	56.281	150
						0	1.004	56.207	225
PS6	57.684	1.676	600	Manhole		1	1.004	56.009	225
						0	1.005	56.008	225
PS17	57.568	0.368	300	Manhole		0	6.000	57.200	100
PS7	57.541	1.741	1200	Manhole		1	6.000	56.966	100
						2	1.005	55.800	225
						0	1.006	55.800	150
PS9	57.506	1.723	1200	Manhole		1	1.006	55.783	150
						0	1.007	55.783	150
PS10	57.475	1.718	180	Manhole		1	1.007	55.757	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.377	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	45	0	0

Node PS7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	55.800	Product Number	CTL-SHE-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node PS7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	55.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	114

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	54.0	54.0	1.000	54.0	112.0	1.100	0.0	112.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	124.563	35.247	2 year 60 minute winter	36.473	14.508
2 year 15 minute winter	87.413	35.247	2 year 120 minute summer	33.870	8.951
2 year 30 minute summer	81.410	23.036	2 year 120 minute winter	22.502	8.951
2 year 30 minute winter	57.130	23.036	2 year 180 minute summer	26.086	6.713
2 year 60 minute summer	54.898	14.508	2 year 180 minute winter	16.957	6.713

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 240 minute summer	20.683	5.466	30 year 600 minute winter	12.663	5.069
2 year 240 minute winter	13.742	5.466	30 year 720 minute summer	16.453	4.410
2 year 360 minute summer	15.882	4.087	30 year 720 minute winter	11.058	4.410
2 year 360 minute winter	10.324	4.087	30 year 960 minute summer	13.432	3.537
2 year 480 minute summer	12.548	3.316	30 year 960 minute winter	8.897	3.537
2 year 480 minute winter	8.337	3.316	30 year 1440 minute summer	9.660	2.589
2 year 600 minute summer	10.303	2.818	30 year 1440 minute winter	6.492	2.589
2 year 600 minute winter	7.040	2.818	100 year +45% CC 15 minute summer	441.222	124.851
2 year 720 minute summer	9.205	2.467	100 year +45% CC 15 minute winter	309.630	124.851
2 year 720 minute winter	6.186	2.467	100 year +45% CC 30 minute summer	293.103	82.938
2 year 960 minute summer	7.594	2.000	100 year +45% CC 30 minute winter	205.686	82.938
2 year 960 minute winter	5.030	2.000	100 year +45% CC 60 minute summer	199.139	52.627
2 year 1440 minute summer	5.549	1.487	100 year +45% CC 60 minute winter	132.303	52.627
2 year 1440 minute winter	3.729	1.487	100 year +45% CC 120 minute summer	122.351	32.334
30 year 15 minute summer	235.561	66.656	100 year +45% CC 120 minute winter	81.287	32.334
30 year 15 minute winter	165.306	66.656	100 year +45% CC 180 minute summer	93.318	24.014
30 year 30 minute summer	154.999	43.859	100 year +45% CC 180 minute winter	60.659	24.014
30 year 30 minute winter	108.771	43.859	100 year +45% CC 240 minute summer	73.167	19.336
30 year 60 minute summer	104.640	27.653	100 year +45% CC 240 minute winter	48.610	19.336
30 year 60 minute winter	69.521	27.653	100 year +45% CC 360 minute summer	54.890	14.125
30 year 120 minute summer	64.149	16.953	100 year +45% CC 360 minute winter	35.680	14.125
30 year 120 minute winter	42.619	16.953	100 year +45% CC 480 minute summer	42.762	11.301
30 year 180 minute summer	48.992	12.607	100 year +45% CC 480 minute winter	28.410	11.301
30 year 180 minute winter	31.846	12.607	100 year +45% CC 600 minute summer	34.737	9.501
30 year 240 minute summer	38.508	10.176	100 year +45% CC 600 minute winter	23.735	9.501
30 year 240 minute winter	25.584	10.176	100 year +45% CC 720 minute summer	30.754	8.242
30 year 360 minute summer	29.068	7.480	100 year +45% CC 720 minute winter	20.669	8.242
30 year 360 minute winter	18.895	7.480	100 year +45% CC 960 minute summer	24.991	6.581
30 year 480 minute summer	22.740	6.010	100 year +45% CC 960 minute winter	16.555	6.581
30 year 480 minute winter	15.108	6.010	100 year +45% CC 1440 minute summer	17.850	4.784
30 year 600 minute summer	18.533	5.069	100 year +45% CC 1440 minute winter	11.996	4.784

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	PS1	11	56.775	0.025	0.8	0.0056	0.0000	OK
15 minute winter	PS2	11	56.596	0.030	1.6	0.0040	0.0000	OK
15 minute winter	PS11	10	56.929	0.029	1.6	0.0108	0.0000	OK
15 minute winter	PS3	11	56.489	0.058	5.5	0.0248	0.0000	OK
15 minute winter	PS12	10	56.927	0.027	1.6	0.0101	0.0000	OK
15 minute winter	PS4	11	56.391	0.090	9.4	0.0359	0.0000	OK
15 minute winter	PS15	10	57.235	0.035	1.6	0.0131	0.0000	OK
15 minute winter	PS13	11	57.134	0.053	3.2	0.0253	0.0000	OK
15 minute winter	PS16	10	57.229	0.029	1.6	0.0111	0.0000	OK
15 minute winter	PS14	11	56.979	0.069	7.0	0.0372	0.0000	OK
15 minute winter	PS5	11	56.315	0.108	18.6	0.0523	0.0000	OK
15 minute winter	PS6	10	56.115	0.107	21.8	0.0559	0.0000	OK
15 minute winter	PS17	11	57.242	0.042	2.2	0.0349	0.0000	OK
60 minute winter	PS7	46	56.010	0.210	12.5	11.0237	0.0000	SURCHARGED
60 minute winter	PS9	47	55.846	0.063	4.6	0.0711	0.0000	OK
60 minute winter	PS10	47	55.814	0.057	4.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	PS1	1.000	PS2	0.8	0.530	0.132	0.0201	
15 minute winter	PS2	1.001	PS3	1.6	0.369	0.090	0.0593	
15 minute winter	PS11	2.000	PS3	1.6	0.858	0.171	0.0239	
15 minute winter	PS3	1.002	PS4	5.5	0.643	0.308	0.1109	
15 minute winter	PS12	3.000	PS4	1.6	0.948	0.149	0.0204	
15 minute winter	PS4	1.003	PS5	9.4	0.933	0.520	0.0196	
15 minute winter	PS15	4.000	PS13	1.6	0.479	0.260	0.0391	
15 minute winter	PS13	4.001	PS14	3.1	0.759	0.512	0.0493	
15 minute winter	PS16	5.000	PS14	1.6	0.830	0.179	0.0218	
15 minute winter	PS14	4.002	PS5	7.0	0.917	0.394	0.0839	
15 minute winter	PS5	1.004	PS6	18.8	1.011	0.444	0.5524	
15 minute winter	PS6	1.005	PS7	22.1	1.582	0.416	0.4057	
15 minute winter	PS17	6.000	PS7	2.1	0.694	0.358	0.0738	
60 minute winter	PS7	1.006	PS9	4.6	0.624	0.330	0.0198	
60 minute winter	PS9	1.007	PS10	4.6	0.692	0.314	0.0255	17.7

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	PS1	10	56.784	0.034	1.5	0.0077	0.0000	OK
15 minute winter	PS2	10	56.607	0.041	2.9	0.0054	0.0000	OK
15 minute winter	PS11	10	56.940	0.040	3.0	0.0153	0.0000	OK
15 minute winter	PS3	10	56.513	0.082	10.4	0.0352	0.0000	OK
15 minute winter	PS12	10	56.938	0.038	3.0	0.0142	0.0000	OK
15 minute winter	PS4	11	56.457	0.156	17.7	0.0621	0.0000	SURCHARGED
15 minute winter	PS15	10	57.249	0.049	3.0	0.0187	0.0000	OK
15 minute winter	PS13	11	57.167	0.086	6.0	0.0416	0.0000	OK
15 minute winter	PS16	10	57.240	0.040	3.0	0.0152	0.0000	OK
15 minute winter	PS14	11	57.014	0.104	13.2	0.0561	0.0000	OK
15 minute winter	PS5	11	56.372	0.165	35.0	0.0800	0.0000	OK
60 minute winter	PS6	51	56.239	0.231	22.3	0.1201	0.0000	SURCHARGED
15 minute winter	PS17	11	57.262	0.062	4.2	0.0517	0.0000	OK
60 minute winter	PS7	52	56.237	0.437	24.5	22.9057	0.0000	SURCHARGED
60 minute summer	PS9	62	55.849	0.066	5.0	0.0747	0.0000	OK
60 minute summer	PS10	62	55.817	0.060	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	PS1	1.000	PS2	1.4	0.625	0.240	0.0310	
15 minute winter	PS2	1.001	PS3	2.9	0.425	0.163	0.0928	
15 minute winter	PS11	2.000	PS3	3.0	1.021	0.325	0.0382	
15 minute winter	PS3	1.002	PS4	10.2	0.718	0.576	0.1782	
15 minute winter	PS12	3.000	PS4	3.0	1.129	0.283	0.0325	
15 minute winter	PS4	1.003	PS5	17.5	1.045	0.975	0.0321	
15 minute winter	PS15	4.000	PS13	3.0	0.547	0.493	0.0655	
15 minute winter	PS13	4.001	PS14	5.9	0.851	0.972	0.0833	
15 minute winter	PS16	5.000	PS14	3.0	0.904	0.341	0.0419	
15 minute winter	PS14	4.002	PS5	13.2	1.056	0.741	0.1371	
15 minute winter	PS5	1.004	PS6	35.2	1.151	0.831	0.9169	
60 minute winter	PS6	1.005	PS7	22.3	1.204	0.421	0.7941	
15 minute winter	PS17	6.000	PS7	4.1	0.811	0.684	0.1205	
60 minute winter	PS7	1.006	PS9	5.0	0.636	0.359	0.0212	
60 minute summer	PS9	1.007	PS10	5.0	0.707	0.342	0.0271	30.6

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	PS1	13	57.040	0.290	2.8	0.0653	0.0000	SURCHARGED
15 minute winter	PS2	13	57.021	0.455	5.2	0.0605	0.0000	SURCHARGED
15 minute winter	PS11	13	57.075	0.175	5.7	0.0660	0.0000	SURCHARGED
15 minute winter	PS3	12	57.012	0.581	15.2	0.2482	0.0000	SURCHARGED
15 minute winter	PS12	12	56.976	0.076	5.7	0.0286	0.0000	OK
15 minute winter	PS4	12	56.927	0.626	25.7	0.2499	0.0000	SURCHARGED
15 minute winter	PS15	12	57.549	0.349	5.7	0.1319	0.0000	SURCHARGED
15 minute winter	PS13	12	57.466	0.385	9.6	0.1858	0.0000	FLOOD RISK
15 minute winter	PS16	11	57.260	0.060	5.7	0.0225	0.0000	OK
15 minute winter	PS14	11	57.142	0.232	22.1	0.1253	0.0000	SURCHARGED
15 minute winter	PS5	12	56.849	0.642	52.1	0.3106	0.0000	SURCHARGED
120 minute winter	PS6	114	56.812	0.804	24.6	0.4190	0.0000	SURCHARGED
15 minute winter	PS17	11	57.386	0.186	8.0	0.1545	0.0000	FLOOD RISK
120 minute winter	PS7	114	56.810	1.010	26.8	52.9427	0.0000	SURCHARGED
15 minute summer	PS9	63	55.849	0.066	5.0	0.0747	0.0000	OK
30 minute summer	PS10	113	55.817	0.060	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	PS1	1.000	PS2	2.7	0.717	0.453	0.1048	
15 minute winter	PS2	1.001	PS3	6.1	0.413	0.343	0.2369	
15 minute winter	PS11	2.000	PS3	5.4	1.116	0.590	0.1028	
15 minute winter	PS3	1.002	PS4	14.0	0.793	0.788	0.2295	
15 minute winter	PS12	3.000	PS4	5.6	1.224	0.536	0.0876	
15 minute winter	PS4	1.003	PS5	23.5	1.338	1.309	0.0343	
15 minute winter	PS15	4.000	PS13	4.6	0.593	0.769	0.0932	
15 minute winter	PS13	4.001	PS14	9.2	1.180	1.529	0.0947	
15 minute winter	PS16	5.000	PS14	5.5	0.891	0.635	0.0734	
15 minute winter	PS14	4.002	PS5	22.0	1.252	1.240	0.1881	
15 minute winter	PS5	1.004	PS6	50.7	1.276	1.199	1.1833	
120 minute winter	PS6	1.005	PS7	24.2	1.154	0.457	0.7941	
15 minute winter	PS17	6.000	PS7	7.1	0.917	1.195	0.1790	
120 minute winter	PS7	1.006	PS9	5.0	0.636	0.359	0.0212	
15 minute summer	PS9	1.007	PS10	5.0	0.707	0.342	0.0271	35.1

Flow v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

8.0 APPENDIX D – FLOW CONTROL SPECIFICATION

Registered Office
JFC PLASTICS LTD.
Goldicote Business Park,
Banbury Road, Goldicote
Stratford-Upon-Avon, CV37 7NB,
United Kingdom

Sales Office
JFC CIVILS U.K.
Units 320/321,
25 Goodlass Road, Speke,
Liverpool, L24 9HJ,
United Kingdom
T. + 44 1928 583 391
E. infouk@jfccivils.com

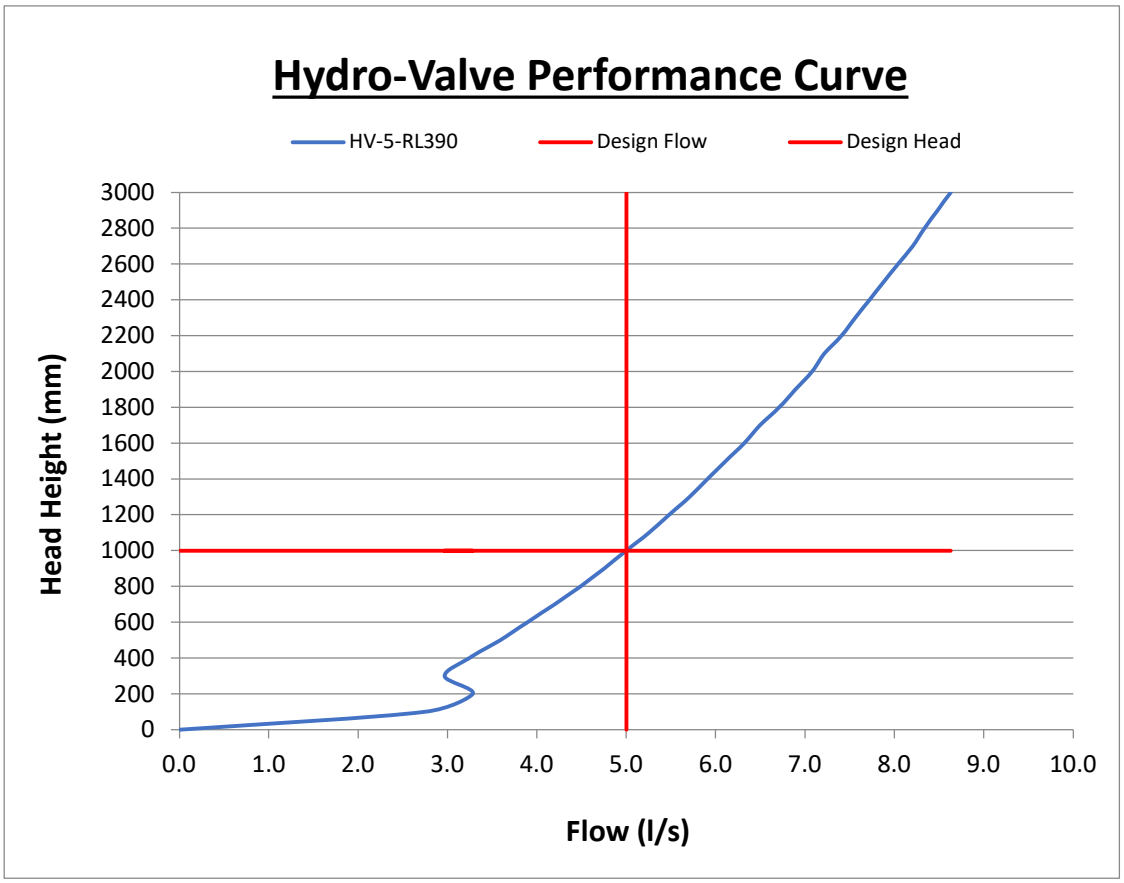
Hydro-Valve

Vortex Flow Control

JFC Reference:	HVS-U2799
Date:	23/04/2025
Client	JDP
Address:	
Site Address:	Greenbrow Social Club, Wythenshaw, Manchester
Application:	Stormwater Attenuation Control

Specification

Code:	HV-5-RL390
Design Flow:	5 l/s
Design Head:	1000 mm
Outlet Pipe Size:	110 mm (assumed)
Outlet Manhole Type:	Ø1.05m (assumed)
Minimum Sump:	300 mm
Manual By-Pass:	Yes
Overall Dimensions:	HV-II-SMBF or HV-II-SMBC



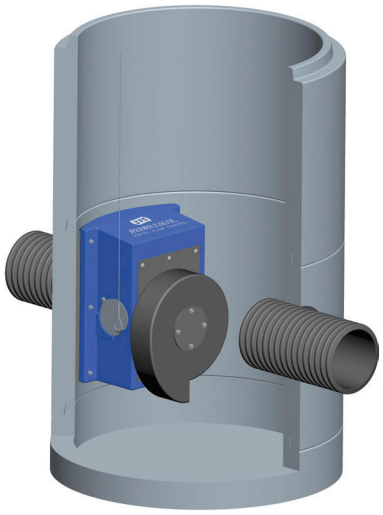
Head (mm)	Flow (l/s)
0	0.00
100	2.75
200	3.28
300	2.97
400	3.24
500	3.59
600	3.89
700	4.19
800	4.48
900	4.75
1000	5.00
1100	5.25
1200	5.48
1300	5.71
1400	5.91
1500	6.11
1600	6.32
1700	6.49
1800	6.71
1900	6.89
2000	7.08
2100	7.22
2200	7.41
2300	7.56
2400	7.72
2500	7.88
2600	8.04
2700	8.20
2800	8.34
2900	8.48
3000	8.63

This unique Hydro-Valve head/discharge curve has been derived from systematic modelling along with laboratory testing and only applies to the unit specified above. Head / discharge curve based on bottom to top modelling.

CIVILS

Quality Plastic Solutions

Hydro-Valve
Vortex Flow Control



The Hydro-Valve is a vortex flow control device for throttling the flow rate of stormwater before discharge into a local storm drain or water course.

It is available in a range of sizes with varying flow rates to suit all specifications. It is used to control the flow of stormwater from the attenuation tank preventing downstream flooding during periods of heavy rainfall. Manufactured to customer specifications in order to achieve a specified flow rate at a given head height. This self-activating device uses vortex principles to control and attenuate stormwater flow without the need for moving parts or the need for an external power source.

Features & Benefits

- Typical flow rate: 1-50L/s*
- Typical head heights: 450-3000mm*
- WRC certification
- Fast installation
- Customised specification
- 3-6 times greater oriface CSA
- Hydraulic data available

* Contact JFC for further information.

Hydro-Valve Fits The Following Manhole Types

CURVED BACK	FLAT BACK**
1200mm	1050mm
1350mm	1800mm
1500mm	2100mm
	2400mm

** Requires a concrete shuttered wall on the inside of the manhole chamber.