

List of Appendices

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- Appendix 3 Hydraulic Modelling
- Appendix 4 Polypipe Civils Tank Details and Calculations

01/04/2022

Adama Consulting Limited, Unit 34 The Enterprise Centre, Cranborne Road, Potters Bar, Hertfordshire, EN6 5DQ ·

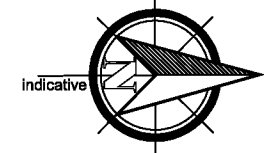
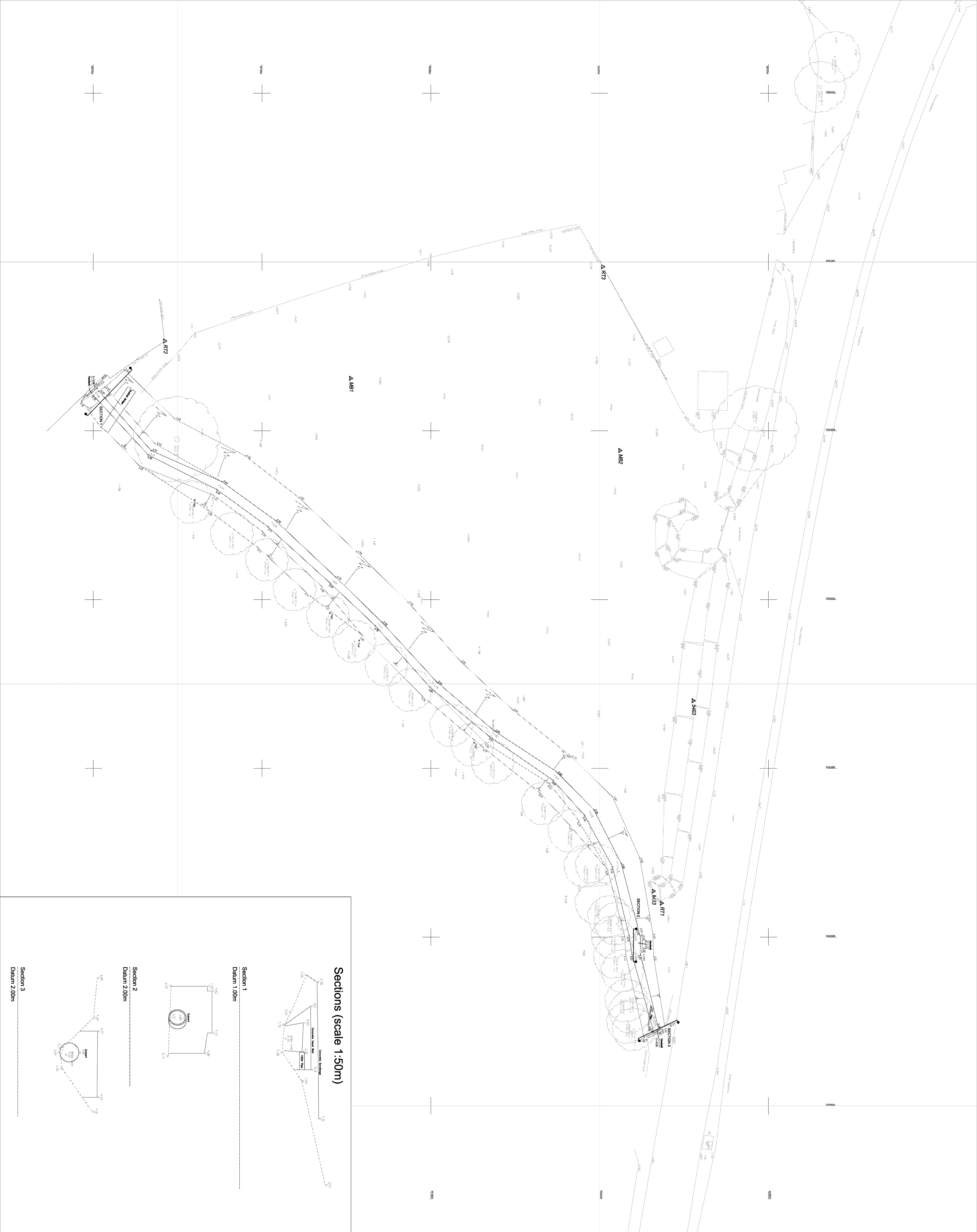
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Appendix 1

CAD Map Topographical Survey

Important Information:
All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Original Survey (by others)



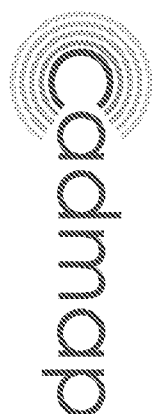
Grid: OS GPS
Levelling: OS GPS

Drawing Title: Topographical Survey

Site Address: Saffier Road
Pacham
PO21 3EE

Client: Amiga Homes

Surveyor	MB	Drawn By	AE	Verified By	MB	Date	25.03.22
CM No:	CM22032	Rev:					
Scale	1:200m @ A1	Date:	March 2022				



Cadmap Ltd
Units 1-3 Turnford Park
Surrey, GU8 8TB
E: info@cadmap.co.uk
W: www.cadmap.co.uk



Appendix 2

Below Ground Drainage Layout (Revision A)

Foul Drainage Key:

- Foul Drain (1000 Unless Noted Otherwise)
- FW Type 3F Non-Entry Access Chamber
- FW Type 4F Non-Entry Access Chamber
- Foul Water Outlet / Soil Pipe

Storm Drainage Key:

- Private storm manhole
- Private Flow Control Chamber
- Storm Drain (1000 Unless Noted Otherwise)
- SW Type 3F Non-Entry Access Chamber
- SW Type 4F Non-Entry Access Chamber
- SW Rodding Eye
- Typical Depth to Invert 0.45-0.6m (Or as specified in schedule)
- Rainwater Pipe
- Road gully
- Sump gully (Heavy duty permeable paving outfall)
- Threshold drain
- 2500 Silt trap chamber (Wavin 6LB300)
- 0.475m to invert unless noted otherwise
- Outlet Permeavoid (1000 outlet 0.45m to invert)
- Heavy duty Permeable Paving
- Finished level
- Formation Level
- SuDS Heavy Duty Permeable Block Paving
- (Type C system - 350mm attenuation sub-base 32% void ratio)
- SuDS Cellular storage tank
- SuDS Light Duty Permeable Block Paving
- (Type C system - Light duty)
- SuDS Attenuation pond
- (1 in 100 Year plus 40% CC)
- Strategic Road gully
- Rainwater Butt

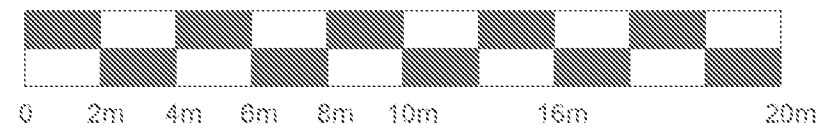
IMPORTANT NOTE ON DEEP DRAINS:

WHERE A DRAIN RUN PASSES NEAR A BUILDING WITHIN THE 45 DEGREE LOADLINE, THE DRAINAGE TRENCH SHALL BE BACKFILLED WITH CONCRETE TO THE BUILDING FOUNDATION FORMATION LEVEL.

STORM CHAMBER SCHEDULES

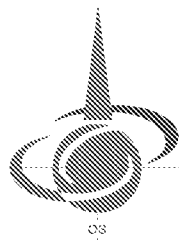
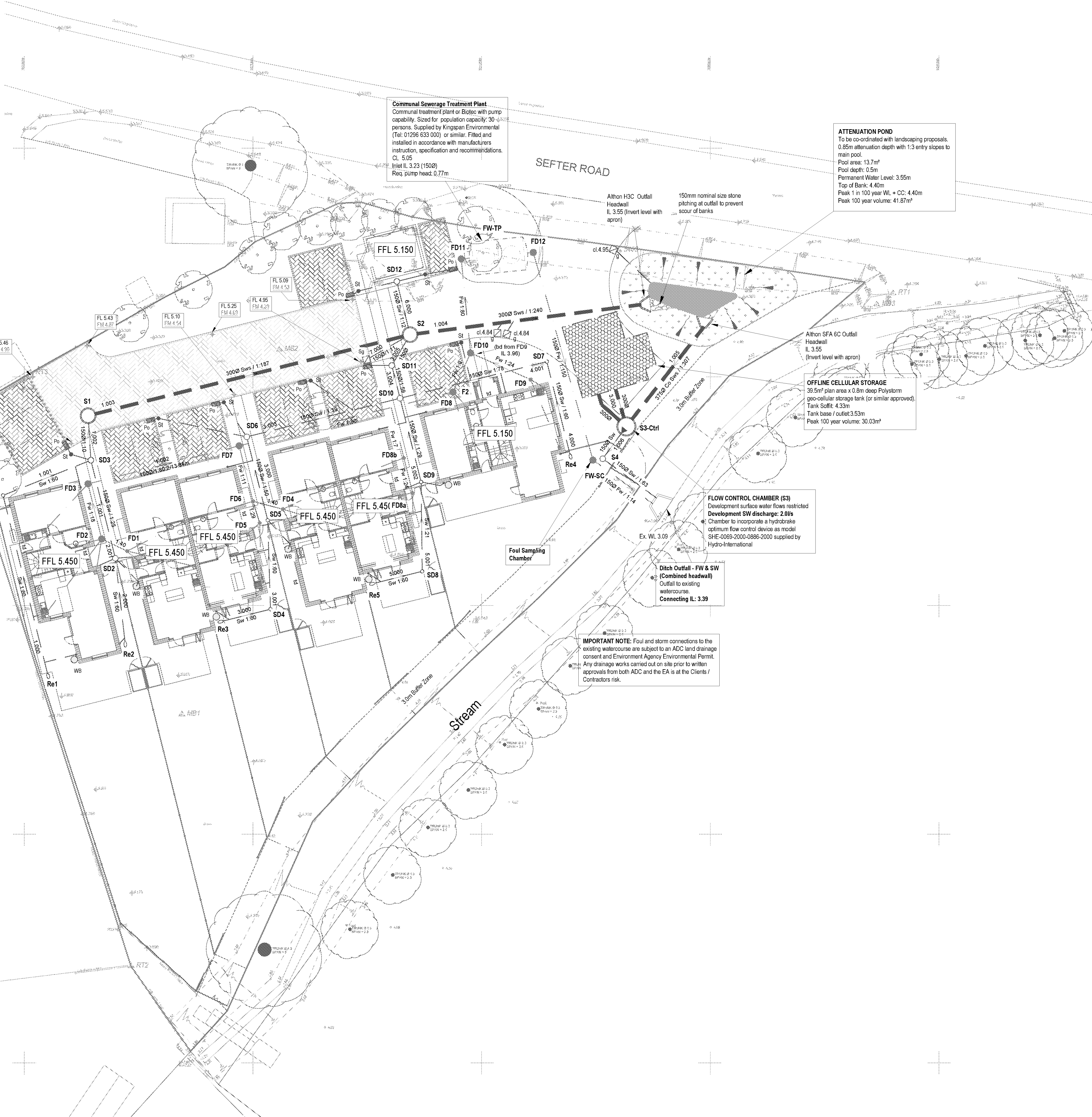
MH REF	MANHOLE TYPE	MANHOLE SIZE	COVER TYPE	COVER LEVEL	INVERT LEVEL
Re1	Rodding eye	Rodding eye	B125	5.38	4.78
SD1	4F	250	B125	5.30	4.51
Re2	Rodding eye	Rodding eye	B125	5.43	4.85
SD2	3F	450	B125	5.40	4.67
SD3	3F	450	B125	5.30	4.32
S1	MH E	1200	D400	5.29	3.79
Re3	Rodding eye	Rodding eye	B125	5.43	4.85
SD4	4F	250	B125	5.42	4.78
SD5	4F	250	B125	5.40	4.59
SD6	3F	450	B125	5.22	4.45
Re4	Rodding eye	Rodding eye	B125	5.00	4.40
SD7	4F	250	B125	5.00	4.28
Re5	Rodding eye	Rodding eye	B125	5.43	4.85
SD8	4F	250	B125	5.42	4.78
SD9	4F	250	B125	5.43	4.35
SD10	3F	450	B125	5.10	4.09
SD11	3F	450	B125	4.96	4.04
SD12	3F	450	B125	5.07	4.18
Sg	Sump gully	450 x 450	D400	4.96	4.21
S2	MH E	1200	D400	4.93	3.64
Pond	---	---	---	4.40	3.55
CS-Tank	---	---	---	4.98	3.53
S3-Ctrl	Control Chamber	1500	D400	5.17	3.52
S4	3F	450	B125	5.01	4.83
Watercourse	Outfall	Outfall	---	4.90	3.39

SCALE 1:200



FOUL CHAMBER SCHEDULES

MH REF	MANHOLE TYPE	MANHOLE SIZE	COVER TYPE	COVER LEVEL	INVERT LEVEL
FD1	4F	250	B125	5.43	4.55
FD2	3F	450	B125	5.40	4.49
FD3	3F	450	B125	5.32	4.21
FD4	4F	250	B125	5.43	4.55
FD5	4F	250	B125	5.43	4.55
FD6	4F	250	B125	5.40	4.48
FD7	3F	450	B125	5.34	4.04
FD8a	4F	250	B125	5.43	4.63
FD8b	4F	250	B125	5.40	4.50
FD8	3F	450	B125	4.99	3.80
FD9	4F	250	B125	5.00	4.20
FD10	3F	450	B125	4.93	3.40
FD11	3F	450	B125	5.03	3.25
FW-TP	T-Plant	T.B.C	T.B.C	5.05	3.23
FD12	3F	450	B125	5.05	4.00
FW-SC	Sampling cham.	450	B125	5.10	3.87
Watercourse	Outfall	Outfall	B125	3.50	3.39



The Contractor is to check and verify in conjunction with the Architects details all setting out points, building and site dimensions, levels and sewer invert levels at connection points and ensure that they are fully compliant with the contents and of requirements the site investigation report before work starts. The Contractor is to comply in all respects with current building legislation, British Standard Specifications, Building Regulations etc., whether or not specifically stated on this drawing.

This drawing is not intended to show details of ground conditions or ground contaminants. Each area of ground relied upon to support any structure depicted (including drainage) must be investigated by the Contractor any areas of formation for said structures which do not accord with the anticipated conditions as described in the site investigation report are to be immediately notified to the Engineer, where applicable. Any suspected fluid ground or ground contaminants on or within the ground should be further investigated by a suitable expert. Any weaknesses shown indicate typical slopes for guidance only and should be investigated further by a suitable geotechnical expert.

Where existing trees are shown to be retained they should be subject to a Full Arboricultural Inspection for safety. All trees are to be planted to as to ensure they are a minimum of 5 metres from buildings and 3 metres from drainage and services, where applicable. A foundation is to be provided to accommodate the proposed tree planting, where applicable.

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NOTES:

Building Drainage

- Building drainage shall comply with BS 8301 1985, BS EN 752 and The Building Regulations Part H.
- All building drainage shall be 100mm diameter unless shown otherwise.
- All SW connections to adoptable sewers shall be minimum 150mm diameter.
- All building drainage shall be clayware to BS EN 295 or UPVC to BS 4566 with Class B or Class S bedding unless shown otherwise.
- All pipes under buildings without suspended floors shall have Class S bedding.
- Concrete protection shall be provided to all UPVC pipes with less than 600mm cover and to all clay pipes with less than 300mm cover.
- Where a pipe passes through a wall an opening is to be formed through the wall to give at least 50mm clearance around the pipe. Brickwork over shall be supported by aintel. The opening is to be masked each side of the opening with rigid sheet material. Pipes embedded in walls shall have a joint formed within 150mm of each wall face. A ROCKER PIPE OF Maximum 600mm length shall be used to continue the pipework.
- Where a pipe trench is within 1m of a building it is to be filled with concrete up to a level below the building equal to the distance from the building less 150mm.
- Where the formation of a pipe trench is above original ground level levels are to be made up with well compacted DTP Type 2 material or better.
- All private drives which fall towards a public highway and exceed two parking bays in area are to be provided with a suitable gully or drainage channel to prevent water discharging onto the highway.
- Where a driveway falls towards a building it shall be provided with a suitable gully or drainage channel to prevent water damaging the building.
- The invert level of an access chamber on a foul drain from a building is to be set 600mm below finished ground level unless otherwise shown.
- The invert level of a rodding eye at the head of a surface water drain is to be set 450mm below finished ground level unless shown otherwise.
- Existing bank, base and water levels of the watercourse must be checked and verified by the Client / Contractor by way of topographical survey and findings presented to the engineer for checking.
- No connection works are permitted to the existing watercourse on-site until approval have been granted by the local drainage authority and environment agency for the proposed outfall from the sewerage treatment plant and stormwater network.
- Installation of the proposed biodesic to be strictly in accordance with the requirements of kingspan environmental. Client / contractor to liaise with kingspan technical on tel 01296 633 000.

CDM Notes:

- The attention of the client and the principal contractor is drawn to the following potential risks in conjunction with the proposed on-site and off-site works as designed for this project.
- Works in the vicinity of live services including gas, electricity and bit may be necessary and the advice of all statutory service companies must be sought before any works commence. Particular attention is drawn to the existing overhead electric line crossing the site. The client must ensure that this is diverted to the satisfaction of UKPN prior to any works on site.
- Works within and abutting the existing highway will entail traffic hazards and all appropriate safety measures including barriers, signs and lighting must be undertaken to the approval of the local authority, the highway authority and the police department.
- Hazardous materials including cement and bituminous materials are specified and the manufacturers advice on safe handling procedures must be obtained and made clear to all operatives.
- The contractor will be responsible for locating all existing services within the vicinity of the works hand dug and ensure these are protected throughout the duration of the works. All utility plant should be clearly marked on the ground prior to commencement of the works.
- The contractor must ensure all working areas are fully secure.

PRELIMINARY DRAWING

NOT FOR CONSTRUCTION
FOR PLANNING PURPOSES ONLY

Rev.	Description	Dm	Ckd	Date
A	Foul and storm outfall amended following LLFA comments and detailed watercourse survey.	JH	TL	01.04.2022

Client

Project

Land adjacent Sefter School, House, Sefter Road

Title

Below Ground Drainage Layout

ADAMA CONSULTING

Civil & Infrastructure Engineering Design

Unit 34, The Enterprise Centre, Cranborne Road, Potters Bar, EN6 3DQ

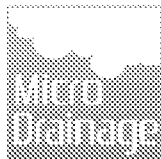
Tel: 01707 800 271 E-mail: info@adama-consulting.com

Web: www.adama-consulting.com

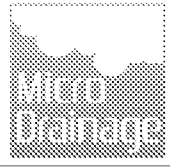
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Date	10/03/2022	Checked	TL
File	21-023-Acad-400	Drawing No	21-023-400
		Rev	A

Appendix 3

Hydraulic Modelling

Adama Consulting Ltd		Page 1								
Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	Land adj Seftor School House Surcharged Outfall - Rev A Storm Network - FEH 2013									
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX	Designed by TGL Checked by MTD									
Micro Drainage	Network 2020.1									
<u>Time Area Diagram for 21-023 SW Network - Surcharged.sws</u> <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr></thead><tbody><tr><td>0-4</td><td>0.100</td><td>4-8</td><td>0.039</td></tr></tbody></table> Total Area Contributing (ha) = 0.139 Total Pipe Volume (m³) = 7.192			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.100	4-8	0.039
Time (mins)	Area (ha)	Time (mins)	Area (ha)							
0-4	0.100	4-8	0.039							
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ						Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013						
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX						Designed by TGL Checked by MTD						
Micro Drainage						Network 2020.1						
<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Network Design Table for 21-023 SW Network - Surcharged.sws</u> # - Indicates pipe length does not match coordinates « - Indicates pipe capacity < flow												
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.000	16.291	0.272	59.9	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit		
1.001	8.273	0.138	59.9	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit		
2.000	7.578	0.126	60.1	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit		
2.001	8.841	0.354	25.0	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit		
1.002	3.899	0.376	10.4	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
1.003	29.036	0.155	187.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
3.000	4.499	0.075	60.0	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit		
3.001	7.791	0.130	59.9	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit		
3.002	7.513	0.150	50.1	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit		
3.003	13.826	0.357	38.7	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit		
4.000	8.565	0.142	60.3	0.007	5.00	0.0	0.600	o	150	Pipe/Conduit		
4.001	13.217	0.170	77.7	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit		
5.000	4.499	0.075	60.0	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit		
5.001	7.815	0.375	20.8	0.006	0.00	0.0	0.600	o	100	Pipe/Conduit		
5.002	7.548	0.262	28.8	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit		
<u>Network Results Table</u>												
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
1.000	50.00	5.27	4.780	0.005	0.0	0.0	0.0	1.00	7.8	0.7		
1.001	50.00	5.41	4.508	0.010	0.0	0.0	0.0	1.00	7.8	1.4		
2.000	50.00	5.13	4.850	0.005	0.0	0.0	0.0	0.99	7.8	0.7		
2.001	50.00	5.20	4.674	0.010	0.0	0.0	0.0	2.02	35.8	1.4		
1.002	50.00	5.43	4.320	0.023	0.0	0.0	0.0	3.15	55.6	3.1		
1.003	50.00	5.85	3.794	0.023	0.0	0.0	0.0	1.15	81.0	3.1		
3.000	50.00	5.08	4.850	0.007	0.0	0.0	0.0	1.00	7.8	0.9		
3.001	50.00	5.21	4.775	0.015	0.0	0.0	0.0	1.00	7.8	2.0		
3.002	50.00	5.29	4.595	0.023	0.0	0.0	0.0	1.42	25.2	3.1		
3.003	50.00	5.44	4.445	0.028	0.0	0.0	0.0	1.62	28.7	3.8		
4.000	50.00	5.11	4.400	0.007	0.0	0.0	0.0	1.30	22.9	0.9		
4.001	50.00	5.30	4.258	0.015	0.0	0.0	0.0	1.14	20.2	2.0		
5.000	50.00	5.08	4.850	0.006	0.0	0.0	0.0	1.00	7.8	0.8		
5.001	50.00	5.15	4.775	0.012	0.0	0.0	0.0	1.70	13.3	1.6		
5.002	50.00	5.22	4.350	0.019	0.0	0.0	0.0	1.88	33.3	2.6		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013	
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX	Designed by TGL Checked by MTD	
Micro Drainage		Network 2020.1

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for 21-023 SW Network - Surcharged.sws

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.004	2.956	0.050	59.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	☑
3.005	3.137	0.249	12.6	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	☑
6.000	4.792	0.392	12.2	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	☑
7.000	4.395	0.416	10.6	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	☑
1.004	20.374#	0.085	239.7	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	☑
1.005	11.040#	0.036	306.7	0.003	0.00	0.0	0.600	o	375	Pipe/Conduit	☑
8.000	3.390	0.015	226.0	0.000	5.00	0.0	0.600	oo	300	Double Pipe	☑
1.006	3.498	0.035	99.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	☑
1.007	5.828	0.093	62.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	☑

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.004	50.00	5.47	4.088	0.062	0.0	0.0	0.0	1.31	23.2	8.4
3.005	50.00	5.49	4.038	0.067	0.0	0.0	0.0	2.85	50.4	9.1
6.000	50.00	5.03	4.181	0.006	0.0	0.0	0.0	2.90	51.2	0.8
7.000	50.00	5.02	4.205	0.020	0.0	0.0	0.0	3.12	55.1	2.7
1.004	50.00	6.19	3.639	0.136	0.0	0.0	0.0	1.01	71.5	18.4
1.005	50.00	6.37	3.554	0.139	0.0	0.0	0.0	1.03	113.7	18.8
8.000	50.00	5.05	3.533	0.000	0.0	0.0	0.0	1.04	147.3	0.0
1.006	50.00	6.43	3.618	0.139	0.0	0.0	0.0	1.01	17.8	18.8
1.007	50.00	6.50	3.483	0.139	0.0	0.0	0.0	1.27	22.5	18.8

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<u>Online Controls for 21-023 SW Network - Surcharged.sws</u> <u>Hydro-Brake® Optimum Manhole: S3-Ctrl, DS/PN: 1.006, Volume (m³): 4.3</u> <table><tr><td>Unit Reference</td><td>MD-SHE-0069-2000-0886-2000</td></tr><tr><td>Design Head (m)</td><td>0.886</td></tr><tr><td>Design Flow (l/s)</td><td>2.0</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td></tr><tr><td>Application</td><td>Surface</td></tr><tr><td>Sump Available</td><td>Yes</td></tr><tr><td>Diameter (mm)</td><td>69</td></tr><tr><td>Invert Level (m)</td><td>3.518</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>100</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>0.886</td><td>2.0</td></tr><tr><td>Flush-Flo™</td><td>0.271</td><td>2.0</td></tr><tr><td>Kick-Flo®</td><td>0.559</td><td>1.6</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>1.8</td></tr></table> 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 <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>1.7</td><td>1.200</td><td>2.3</td><td>3.000</td><td>3.5</td><td>7.000</td><td>5.2</td></tr><tr><td>0.200</td><td>2.0</td><td>1.400</td><td>2.5</td><td>3.500</td><td>3.8</td><td>7.500</td><td>5.4</td></tr><tr><td>0.300</td><td>2.0</td><td>1.600</td><td>2.6</td><td>4.000</td><td>4.0</td><td>8.000</td><td>5.5</td></tr><tr><td>0.400</td><td>1.9</td><td>1.800</td><td>2.8</td><td>4.500</td><td>4.2</td><td>8.500</td><td>5.7</td></tr><tr><td>0.500</td><td>1.8</td><td>2.000</td><td>2.9</td><td>5.000</td><td>4.4</td><td>9.000</td><td>5.8</td></tr><tr><td>0.600</td><td>1.7</td><td>2.200</td><td>3.0</td><td>5.500</td><td>4.6</td><td>9.500</td><td>6.0</td></tr><tr><td>0.800</td><td>1.9</td><td>2.400</td><td>3.2</td><td>6.000</td><td>4.8</td><td></td><td></td></tr><tr><td>1.000</td><td>2.1</td><td>2.600</td><td>3.3</td><td>6.500</td><td>5.0</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0069-2000-0886-2000	Design Head (m)	0.886	Design Flow (l/s)	2.0	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	69	Invert Level (m)	3.518	Minimum Outlet Pipe Diameter (mm)	100	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.886	2.0	Flush-Flo™	0.271	2.0	Kick-Flo®	0.559	1.6	Mean Flow over Head Range	-	1.8	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2	0.200	2.0	1.400	2.5	3.500	3.8	7.500	5.4	0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5	0.400	1.9	1.800	2.8	4.500	4.2	8.500	5.7	0.500	1.8	2.000	2.9	5.000	4.4	9.000	5.8	0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0	0.800	1.9	2.400	3.2	6.000	4.8			1.000	2.1	2.600	3.3	6.500	5.0		
Unit Reference	MD-SHE-0069-2000-0886-2000																																																																																																														
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013																											
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX	Designed by TGL Checked by MTD																											
Micro Drainage Network 2020.1																												
<u>Storage Structures for 21-023 SW Network - Surcharged.sws</u> <u>Porous Car Park Manhole: Sg, DS/PN: 7.000</u> Infiltration Coefficient Base (m/hr) 0.00000 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 49.7 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 4.205 Width (m) 6.0 Length (m) 29.8 Slope (1:X) 80.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.350 <u>Tank or Pond Manhole: Pond, DS/PN: 1.005</u> Invert Level (m) 3.554 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>13.7</td><td>0.855</td><td>89.2</td></tr></tbody></table> <u>Cellular Storage Manhole: CS-Tank, DS/PN: 8.000</u> Invert Level (m) 3.533 Infiltration Coefficient Base (m/hr) 0.00000 Infiltration Coefficient Side (m/hr) 0.00000 Safety Factor 3.0 Porosity 0.95 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>39.5</td><td>39.5</td><td>0.801</td><td>0.0</td><td>60.1</td></tr><tr><td>0.800</td><td>39.5</td><td>60.1</td><td></td><td></td><td></td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	13.7	0.855	89.2	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	39.5	39.5	0.801	0.0	60.1	0.800	39.5	60.1			
Depth (m)	Area (m²)	Depth (m)	Area (m²)																									
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Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																							
0.000	39.5	39.5	0.801	0.0	60.1																							
0.800	39.5	60.1																										
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ		Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013			
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX		Designed by TGL Checked by MTD			
Micro Drainage		Network 2020.1			
Volume Summary (Static)					
Length Calculations based on True Length					
Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	Re1	0.029	0.126	0.000	0.155
1.001	SD1	0.039	0.062	0.000	0.101
2.000	Re2	0.028	0.057	0.000	0.085
2.001	SD2	0.115	0.148	0.000	0.264
1.002	SD3	0.156	0.054	0.000	0.210
1.003	S1	1.696	1.968	0.000	3.664
3.000	Re3	0.028	0.033	0.000	0.062
3.001	SD4	0.032	0.059	0.000	0.091
3.002	SD5	0.040	0.127	0.000	0.166
3.003	SD6	0.123	0.236	0.000	0.360
4.000	Re4	0.029	0.147	0.000	0.176
4.001	SD7	0.036	0.227	0.000	0.264
5.000	Re5	0.028	0.033	0.000	0.062
5.001	SD8	0.032	0.059	0.000	0.091
5.002	SD9	0.053	0.127	0.000	0.180
3.004	SD10	0.161	0.044	0.000	0.205
3.005	SD11	0.147	0.041	0.000	0.187
6.000	SD12	0.141	0.070	0.000	0.211
7.000	Sg	0.152	0.063	20.026	20.241
1.004	S2	1.462	1.350	0.000	2.812
1.005	Pond	1.218	1.062	38.934	41.214
8.000	CS-Tank	0.230	0.341	30.033	30.604
1.006	S3-Ctrl	2.926	0.045	0.000	2.971
1.007	S4	0.243	0.099	0.000	0.342
Total		9.147	6.580	88.992	104.719

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ		Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013					
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX		Designed by TGL Checked by MTD					
Micro Drainage		Network 2020.1					
<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws</u>							
Simulation Criteria							
Area Reduction Factor 1.000		Additional Flow - % of Total Flow 0.000					
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000					
Hot Start Level (mm) 0		Inlet Coefficient 0.800					
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000					
Foul Sewage per hectare (l/s) 0.000							
Number of Input Hydrographs 0		Number of Storage Structures 3					
Number of Online Controls 1		Number of Time/Area Diagrams 0					
Number of Offline Controls 0		Number of Real Time Controls 0					
Synthetic Rainfall Details							
Rainfall Model		FEH					
FEH Rainfall Version		2013					
Site Location GB 489700 99200 SZ 89700 99200							
Data Type		Catchment					
Cv (Summer)		0.750					
Cv (Winter)		0.840					
Margin for Flood Risk Warning (mm)		300.0					
Analysis Timestep 2.5 Second Increment (Extended)							
DTS Status		OFF					
DVD Status		ON					
Inertia Status		ON					
Profile(s)		Summer and Winter					
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440							
Return Period(s) (years)		2, 30, 100					
Climate Change (%)		0, 0, 40					
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	Re1	15 Winter	2	+0%			
1.001	SD1	15 Winter	2	+0%			
2.000	Re2	15 Winter	2	+0%			
2.001	SD2	15 Winter	2	+0%			
1.002	SD3	15 Winter	2	+0%			
1.003	S1	120 Winter	2	+0%	30/120 Winter		
3.000	Re3	15 Winter	2	+0%	100/15 Summer		
3.001	SD4	15 Winter	2	+0%	100/15 Summer		
3.002	SD5	15 Winter	2	+0%	100/15 Summer		
3.003	SD6	15 Winter	2	+0%	100/15 Summer		
4.000	Re4	15 Winter	2	+0%	100/15 Summer		
4.001	SD7	15 Winter	2	+0%	100/15 Summer		
5.000	Re5	15 Winter	2	+0%			
5.001	SD8	15 Winter	2	+0%			
5.002	SD9	15 Winter	2	+0%	100/15 Summer		
3.004	SD10	15 Winter	2	+0%	30/15 Summer		
3.005	SD11	15 Winter	2	+0%	100/15 Summer		
6.000	SD12	15 Winter	2	+0%	100/120 Winter		
7.000	Sg	15 Winter	2	+0%	100/120 Winter		
1.004	S2	120 Winter	2	+0%	30/60 Summer		
1.005	Pond	120 Winter	2	+0%	30/60 Summer	100/240 Winter	
8.000	CS-Tank	120 Winter	2	+0%	2/120 Winter		
1.006	S3-Ctrl	120 Winter	2	+0%	2/15 Summer		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013					
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX				Designed by TGL Checked by MTD					
Micro Drainage				Network 2020.1					
2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws									
PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
1.000	Re1		4.802	-0.078	0.000	0.11			0.8
1.001	SD1		4.539	-0.069	0.000	0.21			1.5
2.000	Re2		4.873	-0.077	0.000	0.12			0.8
2.001	SD2		4.695	-0.129	0.000	0.05			1.5
1.002	SD3		4.351	-0.119	0.000	0.09			3.5
1.003	S1		3.852	-0.242	0.000	0.02			1.4
3.000	Re3		4.878	-0.072	0.000	0.17			1.2
3.001	SD4		4.814	-0.061	0.000	0.32			2.3
3.002	SD5		4.635	-0.110	0.000	0.16			3.4
3.003	SD6		4.485	-0.110	0.000	0.16			4.1
4.000	Re4		4.423	-0.127	0.000	0.06			1.2
4.001	SD7		4.293	-0.115	0.000	0.12			2.3
5.000	Re5		4.876	-0.074	0.000	0.15			1.0
5.001	SD8		4.801	-0.074	0.000	0.15			1.8
5.002	SD9		4.382	-0.118	0.000	0.10			2.8
3.004	SD10		4.178	-0.060	0.000	0.66			9.3
3.005	SD11		4.096	-0.092	0.000	0.32			10.0
6.000	SD12		4.197	-0.134	0.000	0.03			1.0
7.000	Sg		4.232	-0.123	0.000	0.07		4	2.8
1.004	S2		3.852	-0.087	0.000	0.13			8.1
1.005	Pond		3.851	-0.078	0.000	0.06			5.0
8.000	CS-Tank		3.851	0.018	0.000	0.01		115	1.0
1.006	S3-Ctrl		3.851	0.183	0.000	0.17			2.0
PN	US/MH Name	Status	Level Exceeded						
1.000	Re1	OK							
1.001	SD1	OK							
2.000	Re2	OK							
2.001	SD2	OK							
1.002	SD3	OK							
1.003	S1	OK							
3.000	Re3	OK							
3.001	SD4	OK							
3.002	SD5	OK							
3.003	SD6	OK							
4.000	Re4	OK							
4.001	SD7	OK							
5.000	Re5	OK							
5.001	SD8	OK							
5.002	SD9	OK							
3.004	SD10	OK							
3.005	SD11	OK							
6.000	SD12	OK							
7.000	Sg	OK							
1.004	S2	OK							
1.005	Pond	OK							
8.000	CS-Tank	SURCHARGED							
1.006	S3-Ctrl	SURCHARGED							
1									
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013					
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX				Designed by TGL Checked by MTD					
Micro Drainage				Network 2020.1					
<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S4	120 Winter	2	+0%	2/15 Summer				3.851
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S4	0.218	0.000	0.15			2.7	SURCHARGED	
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013			
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX				Designed by TGL Checked by MTD			
Micro Drainage				Network 2020.1			
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws							
Simulation Criteria							
Area Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000	
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000	
Hot Start Level (mm)		0		Inlet Coefficient		0.800	
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000	
Foul Sewage per hectare (l/s)		0.000					
Number of Input Hydrographs		0		Number of Storage Structures		3	
Number of Online Controls		1		Number of Time/Area Diagrams		0	
Number of Offline Controls		0		Number of Real Time Controls		0	
Synthetic Rainfall Details							
Rainfall Model				FEH			
FEH Rainfall Version				2013			
Site Location GB 489700 99200 SZ 89700 99200							
Data Type				Catchment			
Cv (Summer)				0.750			
Cv (Winter)				0.840			
Margin for Flood Risk Warning (mm)				300.0			
Analysis Timestep				2.5 Second Increment (Extended)			
DTS Status				OFF			
DVD Status				ON			
Inertia Status				ON			
Profile(s)				Summer and Winter			
Duration(s) (mins)				15, 30, 60, 120, 240, 360, 480, 960, 1440			
Return Period(s) (years)				2, 30, 100			
Climate Change (%)				0, 0, 40			
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow
1.000	Re1	15 Winter	30	+0%			
1.001	SD1	15 Winter	30	+0%			
2.000	Re2	15 Winter	30	+0%			
2.001	SD2	15 Winter	30	+0%			
1.002	SD3	15 Winter	30	+0%			
1.003	S1	120 Winter	30	+0%	30/120 Winter		
3.000	Re3	15 Winter	30	+0%	100/15 Summer		
3.001	SD4	15 Winter	30	+0%	100/15 Summer		
3.002	SD5	15 Winter	30	+0%	100/15 Summer		
3.003	SD6	15 Winter	30	+0%	100/15 Summer		
4.000	Re4	15 Winter	30	+0%	100/15 Summer		
4.001	SD7	15 Winter	30	+0%	100/15 Summer		
5.000	Re5	15 Winter	30	+0%			
5.001	SD8	15 Winter	30	+0%			
5.002	SD9	15 Winter	30	+0%	100/15 Summer		
3.004	SD10	15 Winter	30	+0%	30/15 Summer		
3.005	SD11	15 Winter	30	+0%	100/15 Summer		
6.000	SD12	15 Winter	30	+0%	100/120 Winter		
7.000	Sg	15 Winter	30	+0%	100/120 Winter		
1.004	S2	120 Winter	30	+0%	30/60 Summer		
1.005	Pond	120 Winter	30	+0%	30/60 Summer	100/240 Winter	
8.000	CS-Tank	120 Winter	30	+0%	2/120 Winter		
1.006	S3-Ctrl	120 Winter	30	+0%	2/15 Summer		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013						
Date 01/04/2022				Designed by TGL						
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Micro Drainage				Network 2020.1						
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws										
PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	
1.000	Re1		4.813	-0.067	0.000	0.24			1.8	
1.001	SD1		4.559	-0.049	0.000	0.51			3.7	
2.000	Re2		4.884	-0.066	0.000	0.25			1.8	
2.001	SD2		4.708	-0.116	0.000	0.12			3.7	
1.002	SD3		4.368	-0.102	0.000	0.22			8.5	
1.003	S1		4.099	0.005	0.000	0.04			2.6	
3.000	Re3		4.892	-0.058	0.000	0.37			2.5	
3.001	SD4		4.842	-0.033	0.000	0.78			5.6	
3.002	SD5		4.661	-0.084	0.000	0.40			8.6	
3.003	SD6		4.511	-0.084	0.000	0.40			10.5	
4.000	Re4		4.435	-0.115	0.000	0.13			2.5	
4.001	SD7		4.341	-0.067	0.000	0.29			5.4	
5.000	Re5		4.889	-0.061	0.000	0.32			2.2	
5.001	SD8		4.817	-0.058	0.000	0.36			4.4	
5.002	SD9		4.401	-0.099	0.000	0.25			7.1	
3.004	SD10		4.319	-0.081	0.000	1.63			22.8	
3.005	SD11		4.140	-0.048	0.000	0.79			24.7	
6.000	SD12		4.204	-0.127	0.000	0.06			2.2	
7.000	Sg		4.248	-0.107	0.000	0.17		5	7.1	
1.004	S2		4.099	0.160	0.000	0.23			14.3	
1.005	Pond		4.099	0.170	0.000	0.11			9.2	
8.000	CS-Tank		4.107	0.274	0.000	0.02		235	1.9	
1.006	S3-Ctrl		4.135	0.467	0.000	0.17			2.0	
PN	US/MH Name	Status	Level Exceeded							
1.000	Re1	OK								
1.001	SD1	OK								
2.000	Re2	OK								
2.001	SD2	OK								
1.002	SD3	OK								
1.003	S1	SURCHARGED								
3.000	Re3	OK								
3.001	SD4	OK								
3.002	SD5	OK								
3.003	SD6	OK								
4.000	Re4	OK								
4.001	SD7	OK								
5.000	Re5	OK								
5.001	SD8	OK								
5.002	SD9	OK								
3.004	SD10	SURCHARGED								
3.005	SD11	OK								
6.000	SD12	OK								
7.000	Sg	OK								
1.004	S2	SURCHARGED								
1.005	Pond	SURCHARGED		1						
8.000	CS-Tank	SURCHARGED								
1.006	S3-Ctrl	SURCHARGED								
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013					
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX				Designed by TGL Checked by MTD					
Micro Drainage				Network 2020.1					
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S4	120 Winter	30	+0%	2/15 Summer				4.096
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S4	0.463	0.000	0.18			3.4	SURCHARGED	
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ		Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013					
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX		Designed by TGL Checked by MTD					
Micro Drainage		Network 2020.1					
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws							
Simulation Criteria							
Areal Reduction Factor 1.000		Additional Flow - % of Total Flow 0.000					
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000					
Hot Start Level (mm) 0		Inlet Coefficient 0.800					
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000					
Foul Sewage per hectare (l/s) 0.000							
Number of Input Hydrographs 0		Number of Storage Structures 3					
Number of Online Controls 1		Number of Time/Area Diagrams 0					
Number of Offline Controls 0		Number of Real Time Controls 0					
Synthetic Rainfall Details							
Rainfall Model		FEH					
FEH Rainfall Version		2013					
Site Location GB 489700 99200 SZ 89700 99200							
Data Type		Catchment					
Cv (Summer)		0.750					
Cv (Winter)		0.840					
Margin for Flood Risk Warning (mm)		300.0					
Analysis Timestep 2.5 Second Increment (Extended)							
DTS Status		OFF					
DVD Status		ON					
Inertia Status		ON					
Profile(s)		Summer and Winter					
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440							
Return Period(s) (years)		2, 30, 100					
Climate Change (%)		0, 0, 40					
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	Re1	15 Winter	100	+40%			
1.001	SD1	15 Winter	100	+40%			
2.000	Re2	15 Winter	100	+40%			
2.001	SD2	15 Winter	100	+40%			
1.002	SD3	240 Winter	100	+40%			
1.003	S1	240 Winter	100	+40%	30/120 Winter		
3.000	Re3	15 Winter	100	+40%	100/15 Summer		
3.001	SD4	15 Winter	100	+40%	100/15 Summer		
3.002	SD5	15 Winter	100	+40%	100/15 Summer		
3.003	SD6	15 Winter	100	+40%	100/15 Summer		
4.000	Re4	15 Winter	100	+40%	100/15 Summer		
4.001	SD7	15 Winter	100	+40%	100/15 Summer		
5.000	Re5	15 Winter	100	+40%			
5.001	SD8	15 Winter	100	+40%			
5.002	SD9	15 Winter	100	+40%	100/15 Summer		
3.004	SD10	15 Winter	100	+40%	30/15 Summer		
3.005	SD11	240 Winter	100	+40%	100/15 Summer		
6.000	SD12	240 Winter	100	+40%	100/120 Winter		
7.000	Sg	240 Winter	100	+40%	100/120 Winter		
1.004	S2	240 Winter	100	+40%	30/60 Summer		
1.005	Pond	240 Winter	100	+40%	30/60 Summer	100/240 Winter	
8.000	CS-Tank	240 Winter	100	+40%	2/120 Winter		
1.006	S3-Ctrl	240 Winter	100	+40%	2/15 Summer		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013						
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX				Designed by TGL Checked by MTD						
Micro Drainage				Network 2020.1						
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21-023 SW Network - Surcharged.sws										
PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	
1.000	Re1		4.825	-0.055	0.000	0.42			3.1	
1.001	SD1		4.583	-0.025	0.000	0.90			6.5	
2.000	Re2		4.897	-0.053	0.000	0.44			3.2	
2.001	SD2		4.720	-0.104	0.000	0.21			6.5	
1.002	SD3		4.412	-0.058	0.000	0.07			2.9	
1.003	S1		4.411	0.317	0.000	0.04			2.7	
3.000	Re3		5.094	0.144	0.000	0.63			4.3	
3.001	SD4		5.066	0.191	0.000	1.26			9.0	
3.002	SD5		4.875	0.130	0.000	0.62			13.4	
3.003	SD6		4.820	0.225	0.000	0.60			15.8	
4.000	Re4		4.741	0.191	0.000	0.21			4.2	
4.001	SD7		4.728	0.320	0.000	0.47			8.6	
5.000	Re5		4.904	-0.046	0.000	0.56			3.8	
5.001	SD8		4.851	-0.024	0.000	0.63			7.7	
5.002	SD9		4.727	0.227	0.000	0.40			11.6	
3.004	SD10		4.689	0.451	0.000	2.54			35.6	
3.005	SD11		4.413	0.225	0.000	0.26			8.2	
6.000	SD12		4.411	0.080	0.000	0.02			0.7	
7.000	Sg		4.412	0.057	0.000	0.06		70	2.5	
1.004	S2		4.411	0.472	0.000	0.26			16.2	
1.005	Pond		4.409	0.480	0.383	0.10			8.3	
8.000	CS-Tank		4.410	0.577	0.000	0.02		495	1.8	
1.006	S3-Ctrl		4.410	0.742	0.000	0.17			2.0	
PN	US/MH Name	Status	Level Exceeded							
1.000	Re1	OK								
1.001	SD1	OK								
2.000	Re2	OK								
2.001	SD2	OK								
1.002	SD3	OK								
1.003	S1	SURCHARGED								
3.000	Re3	SURCHARGED								
3.001	SD4	SURCHARGED								
3.002	SD5	SURCHARGED								
3.003	SD6	SURCHARGED								
4.000	Re4	FLOOD RISK								
4.001	SD7	FLOOD RISK								
5.000	Re5	OK								
5.001	SD8	OK								
5.002	SD9	SURCHARGED								
3.004	SD10	SURCHARGED								
3.005	SD11	SURCHARGED								
6.000	SD12	SURCHARGED								
7.000	Sg	SURCHARGED								
1.004	S2	SURCHARGED								
1.005	Pond	FLOOD		1						
8.000	CS-Tank	SURCHARGED								
1.006	S3-Ctrl	SURCHARGED								
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ				Land adj Sefton School House Surcharged Outfall - Rev A Storm Network - FEH 2013					
Date 01/04/2022 File 21-023 SW Network - Surcharged.MDX				Designed by TGL Checked by MTD					
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PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S4	120 Winter	100	+40%	2/15 Summer				4.400
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S4	0.767	0.000	0.24			4.5	SURCHARGED	
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Appendix 4

Polypipe Civils Tank Details and Calculations

GENERAL TOLERANCES

All dimensions in millimetres, unless otherwise stated

PIPE Ø RANGE	TOLERANCE ±
≤ 300	5
> 300 to 750	10
≥ 750 NON-RXL	20
≥ 750 RXL	+50 / -30

ANGLES	± 1°30'
TYPICAL BENCHING SLOPE	1.9° - 5.7°
EXTERNAL BASE FLANGE	50 ± 20
ALL OTHER DIMENSIONS	+50 / -30

- NOTES:
- Standard spigots in accordance with ES23
 - All dimensions annotated with * indicate points of intersection
 - If applicable, dimensions annotated with KD# are key BIM dimensions
 - Remove all burrs and break sharp edges
 - Spark test all joints that require leak-tightness
 - Team leader inspection points identified by: 1 2 3

GENERAL NOTES

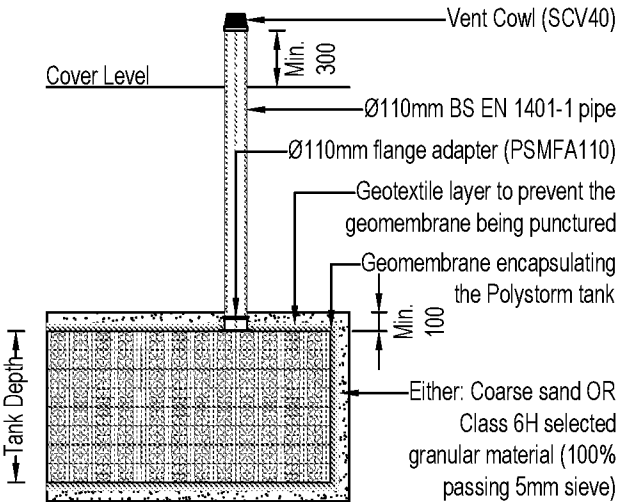
- This drawing details Polypipe Civils proposed offering, reflecting our interpretation of the information provided.
- Polypipe bespoke Ridgistorm-XL chambers are complete pre-formed units.
- Polypipe products to be installed in accordance with Polypipe Civils recommendations (refer to Polypipe technical guidance for further information), giving due consideration to the requirements of the organisation who will take ultimate ownership of the installation.
- Site conditions may require specific installation requirements. The installer should verify that the proposed installation method is acceptable, giving due consideration to the requirements of the relevant approving and adopting authorities, before construction activities commence.
- Advice on any system requirements specific to the proposed Ridgistorm XL system should be sought from Polypipe Civils.
- All PE stub connections will require adaptors (to be supplied by Contractor / Developer).

DRAWING NOTES

- Drawings should not be scaled, refer to figured dimensions only.
- All dimensions in millimetres, unless otherwise stated.
- All dimensions are nominal and may vary within manufacturing or construction tolerances.
- All site temporary and enabling works by others.
- This drawing is intended for guidance only. Confirmation of the information contained within this document should be sought from the consulting engineers before final design or construction activities commence.

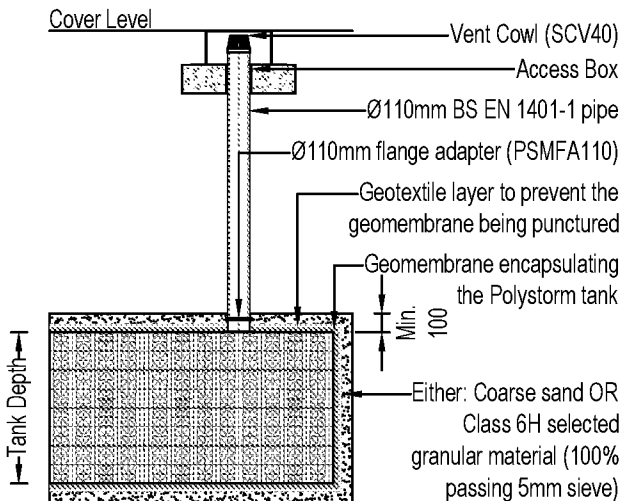
REV	AMENDMENT	DATE
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STATUS PRELIMINARY		
SHEET SIZE A3	SHEET NO. 1 of 1	DRAWN BY DR
SCALE AS SHOWN	DATE 21/03/22	
DRAWING NO. 79482_DR_D1	REV. -	



ATTENUATION TANK VENTILATION
SYSTEM - OPTION 1)

Scale (1:40)

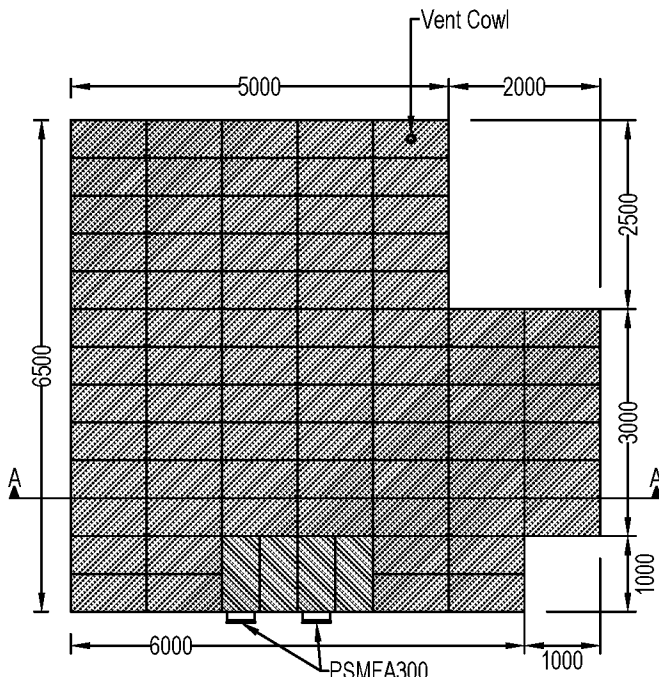


ATTENUATION TANK VENTILATION
SYSTEM - OPTION 2)

Scale (1:40)

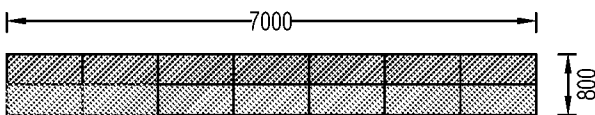
COVER SLAB THICKNESS

- Where cover slabs are applicable, the slab thickness (shown in red) has been assumed and therefore needs to be confirmed by others.



Polystorm Attenuation Tank - Plan View

Scale (1:100)



Polystorm Attenuation Tank - A-A Section

Scale (1:100)

PROPOSED POLYSTORM STRUCTURE

Plan Area	39.5m²
Tank Volume	31.6m³
Storage	30.02m³
Polystorm-R Units	79 (PSM1A)
Polystorm-Deep Units	79 (PSM5)

LEGEND:

- Polystorm-R Units (PSM1A)
- Polystorm-Deep Units (PSM5)



Polypipe Civils & Green Urbanisation

North Road, Loughborough, Leicestershire, LE11 1LE
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Fax: 01509 615215
www.polypipe.com/civils

PROJECT NAME
CO Hamilton Homes - Sefter Road, Pagham North,
Bognor Regis

PROJECT TYPE
Polystorm Attenuation Tank
- General Arrangement

STATUS PRELIMINARY		
SHEET SIZE A3	SHEET NO. 1 of 1	DRAWN BY DR
SCALE AS SHOWN	DATE 21/03/22	
DRAWING NO. 79482_DR_D1	REV. -	

Preliminary Polystorm Performance Assessment

79482 - CO Hamilton Homes - Sefter Road, Pagham North, Bognor Regis

1.0 Proposal Brief

The following section details the assumed parameters on which our proposed product offering has been based. Please refer to CIRIA Report C680 (2008; RP782) for further details on typical product testing procedures and the calculation methodology proposed

1.1 Proposed Polystorm Geocellular Unit

The Polystorm unit(s) proposed, along with the relevant unit characteristic parameters which may be used for design purposes, are given below:

Polystorm unit	- Description - Product Code	Deep PSM5	Polystorm-R PSM1A
Ultimate compressive strength [kN/m ²]	- Vertical, $X_{k;VC}$	610	610
	- Lateral, $X_{k;LC}$	146.0	63.0
Short term deflection [kN/m ² per mm]	- Vertical, $X_{k;VD}$	60	60
	- Lateral, $X_{k;LD}$	10.1	4.4
Creep equation co-efficient, x [mm] [$x \ln(\text{design life; hrs})$]	- Vertical, $X_{k;VCr}$	0.2798	0.2798
Allowable deflection [mm]	- Vertical, $\delta_{k;V}$	9.0	9.0
	- Lateral, $\delta_{k;L}$	14.0	14.0
Allowable creep deformation [mm]	- Vertical, $\epsilon_{k;V}$	9.0	9.0

1.2 Recommended Material and Partial Factor of Safety

Factor of safety	ULS	SLS
Material, $f_{m,*}$	2.75	1.5

(Polypipe recommended factor; based on the minimum values proposed in CIRIA C680; Clause 4.6)

Partial factor of safety	ULS	SLS
Variable loads, γ_Q	1.6	1.0
Permanent loads, γ_G	1.4	1.0
Lateral earth pressure, γ_e	1.35	1.0
Hydrostatic, γ_u	1.35	1.0

(Based on CIRIA C680, Clause 4.6)

1.3 Proposed Installation

Idealised details of the proposed Polystorm installation are summarised below (refer to figure 1).

Depths

Depth to structure invert, H	1.450 m
Layer 1 - Proposed unit - Depth, h_1	Deep 0.400 m
Layer 2 - Proposed unit - Depth, h_2	Polystorm-R 0.400 m
Total Polystorm structure depth ($= h_1 + h_2$)	0.800 m
Cover depth, h_c ($= H - [h_1 + h_2]$)	0.650 m

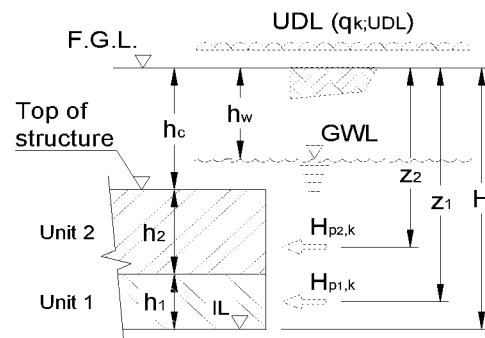


Figure 1) Idealised illustration of installation

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Preliminary Polystorm Performance Assessment

79482 - CO Hamilton Homes - Sefter Road, Pagham North, Bognor Regis

Depths

Design depth, z_1	1.250 m
$(z_1 = H - 0.2m)$	
Design depth, z_2	0.850 m
$(z_2 = H - [h_1 + 0.2m])$	

Assumed ground conditions

Based on the description given in Ashdown Site Investigation Ltd SI report Ref: P14913; BH All

Native soil

Shearing resistance, ϕ	24°	
Density, γ_k	20.0 kN/m ³	[Assumed]
Active earth pressure co-efficient, K_a	0.422	
$(= [1 - \sin \phi] / [1 + \sin \phi])$		

Ground water

Depth below FGL, h_w	0.000 m	
Density, γ_w	10.0 kN/m ³	[Assumed]

1.4 Assumed Transient (Live) Loads

For illustrative purposes, vehicle loading assumed

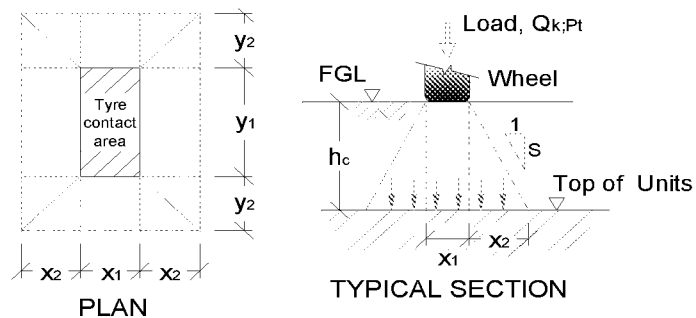


Figure 2) Concentrated load parameters

Loading classification	Landscape maintenance	[CIRIA C680; Table 4.2]
DIN 1072 classification	N/A	[CIRIA C680; Table 4.2]
Max Gross vehicle weight	N/A	[CIRIA C680; Table 4.2]
Uniformly distributed load, $q_{k;UDL}$	5.0 kN/m ²	[CIRIA C680; Table 4.2]
Concentrated wheel load, $Q_{k;Pt}$	1.4 kN	[CIRIA C680; Table 4.2]
Dynamic load factor, Φ	1.0	[Assumed]
Contact area - Length, y_1	0.150 m	[CIRIA C680; Table 4.2]
- Width, x_1	0.150 m	[CIRIA C680; Table 4.2]
Load distribution, S	1 in 2.0	[Assumed]
Additional load spread, x_2 & y_2	0.325 m	
$(= h_c / S)$		

Unfactored

Imposed load, $q_{k;Pt}$	2.2 kN/m ²	[< Uniformly distributed load]
$(= [Q_{k;Pt} \cdot \Phi] / [(x_1 + 2x_2) \times (y_1 + 2y_2)])$		

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Preliminary Polystorm Performance Assessment

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2.0 Assumed Imposed Loading

The following section illustrates how Polypipe would typically expect imposed loads on a proposed Polystorm structure to be derived; in accordance with the guidance given in CIRIA C680 (2008; RP782).

2.1 Vertical Loads Imposed on Upper Structure Face

The following section estimates the vertical imposed load at the Polystorm structure soffit. It should be noted that the lowest relevant property of the Polystorm units forming the proposed structure, has been assumed for calculation purposes; irrespective of order of layer placement.

Therefore vertical design strength has been based on the: Polystorm-R unit (PSM1A)

Unfactored

Distributed load gave worst case transient parameter; refer to Section 1.4

Live load, $q_{k,*}$	5.0 kN/m²	[* - UDL; refer to Section 1.4]
Dead load, G_k	13.0 kN/m²	[Worst case load - Ignoring ground water]
$(= [h_c \times \gamma_k])$		

Factored

ULS, $V_{d;ULS}$	26.2 kN/m²	[< 221.8 kN/m ² Therefore OK]
$(= [q_{k,*} \gamma_{Q;ULS} + [G_k] \gamma_{G;ULS}])$		
Degree of utilization, Λ_{STR}	22%	$(= X_{k;VC} / f_{m;ULS} ; \text{Refer to Section 1.0})$
SLS, $V_{d;SLS, \delta}$	2.2 kN/m²	
$(= [q_{k;PL} \gamma_{Q;SLS}])$		
SLS, $V_{d;SLS, \epsilon}$	13.0 kN/m²	
$(= [G_k] \gamma_{G;SLS})$		

2.2 Lateral Load Imposed

The following section estimates the lateral pressure imposed on the proposed Polystorm structure, at design depth z (worst case imposed load assumed to occur at the centre of the unit, due to additional support provided by the unit's external faces)

2.2.1 At Depth z_1

Unfactored

Live load, $q_{k;UDL}$	5.0 kN/m²
Dead load, $W_{Gk,z1}$	12.5 kN/m²
Hydrostatic load, $U_{k,z1}$	N/A
<u>Where $h_w \leq z_1$</u>	
$(W_{Gk} = [h_w \times \gamma_k] + [(z - h_w) \times (\gamma_k - \gamma_w)])$	
$(U_{k,z1} = [z_1 - h_w] \times \gamma_w)$	
<u>Where $h_w > z_1$</u>	
$(W_{Gk,z1} = z_1 \times \gamma_k)$	
Lateral pressure, $H_{p1;k}$	19.9 kN/m²
$(= Ka [q_k + W_{Gk,z1}] + U_{k,z1})$	

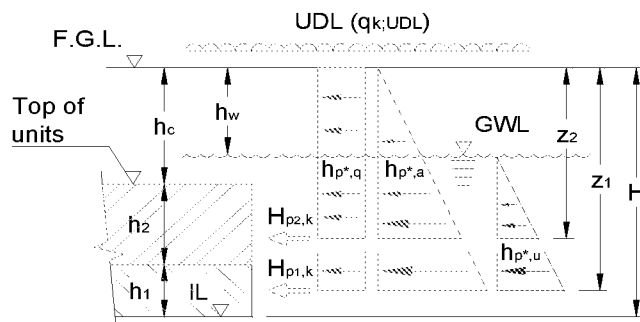


Figure 3) Idealised illustration of lateral pressure(s)

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Factored

$$\begin{aligned} \text{ULS, } H_{d1;ULS} & \quad \mathbf{26.8 \text{ kN/m}^2} & \quad [< 53.1 \text{ kN/m}^2 \quad \text{Therefore OK}] \\ & \quad (= Ka [q_k + W_{Gk,z1}] \gamma_{e; ULS} + [U_{k,z1}] \gamma_{U; ULS}) & \quad (= X_{k;LC} / f_{m;ULS} ; \text{Refer to Section 1.0}) \\ \text{SLS, } H_{d1;SLS} & \quad \mathbf{19.9 \text{ kN/m}^2} \\ & \quad (= Ka [q_k + W_{Gk,z1}] \gamma_{e; SLS} + [U_{k,z1}] \gamma_{U; SLS}) \end{aligned}$$

2.2.2 At Depth z_2

Unfactored

$$\begin{aligned} \text{Live load, } q_{k;UDL} & \quad \mathbf{5.0 \text{ kN/m}^2} \\ \text{Dead load, } W_{Gk,z2} & \quad \mathbf{8.5 \text{ kN/m}^2} & \quad \text{Where } h_w < z_2 \\ \text{Hydrostatic load, } U_{k,z2} & \quad \mathbf{N/A} & \quad (W_{Gk,z2} = [h_w \times \gamma_k] + [(z_2 - h_w) \cdot (\gamma_k - \gamma_w)]) \\ & & \quad (U_{k,z2} = [z_2 - h_w] \times \gamma_u) \\ \text{Lateral pressure, } H_{p2;k} & \quad \mathbf{14.2 \text{ kN/m}^2} & \quad \text{Where } h_w > z_2 \\ & \quad (= Ka [q_k + W_{Gk,z2}] + U_{k,z2}) & \quad (W_{Gk,z2} = z_2 \times \gamma_k) \end{aligned}$$

Factored

$$\begin{aligned} \text{ULS, } H_{d2;ULS} & \quad \mathbf{19.2 \text{ kN/m}^2} & \quad [< 22.9 \text{ kN/m}^2 \quad \text{Therefore OK}] \\ & \quad (= Ka [q_k + W_{Gk,z2}] \gamma_{e; ULS} + [U_{k,z2}] \gamma_{U; ULS}) & \quad (= X_{k;LC} / f_{m;ULS} ; \text{Refer to Section 1.0}) \\ \text{SLS, } H_{d2;SLS} & \quad \mathbf{14.2 \text{ kN/m}^2} \\ & \quad (= Ka [q_k + W_{Gk,z2}] \gamma_{e; SLS} + [U_{k,z2}] \gamma_{U; SLS}) \end{aligned}$$

3.0 Serviceability Limit State Checks (Deflection & Creep)

The serviceability of the proposed Polystorm structure (Section 1.3) may be assessed by predicting possible unit deflection (short term) and creep (long term)

3.1 Vertical Deflection Due to Expected Traffic Loading

The overseeing engineer should be consulted to ensure that the deformation predicted below, would not compromise the structural integrity of any proposed surface pavement. Where excessive deflections are predicted, protective measures may be introduced. As stated in Section 2.1, the lowest relevant parameter from the Polystorm units forming the proposed structure has been assumed for calculation purposes.

Therefore vertical unit parameters have been based on the: Polystorm-R unit (PSM1A)

$$\begin{aligned} \text{Design strength; } X_{d;VD} & \quad \mathbf{40.0 \text{ kN/m}^2 \text{ per mm}} & \quad [\text{Refer to Section 1.0}] \\ & \quad (= X_{k;VD} / f_{m;SLS}) \\ \text{SLS, } V_{d;SLS, \delta} & \quad \mathbf{2.2 \text{ kN/m}^2} \\ \text{Deflection, } \delta_V & \quad \mathbf{0.05 \text{ mm}} & \quad [< 1.0 \text{ mm} \quad \text{Typically OK}] \\ & \quad (= V_{d;SLS} / X_{d;VD}) \end{aligned}$$

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Preliminary Polystorm Performance Assessment

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3.2 Vertical Creep

The creep characteristics of the geocellular units available within the Polystorm system, differ in one or more aspects; therefore the potential creep of both proposed Polystorm unit types should be predicted. The following section assumes that imposed vertical loads are transmitted directly to the units in layer 1 without further load distribution.

Layer 1

Proposed unit	Deep	
Creep test load, $X_{d;v,cr}$	162.0 kN/m ²	
SLS, $V_{d;SLS, \epsilon}$	13.0 kN/m ²	[< 162.0 kN/m ² Therefore OK]
Degree of utilization, Λ_{STR}	8%	
Creep data limit, t	60 years	[Unit has a durability life in excess of 50yrs]
Estimated unit creep, $\epsilon_{h,c}$	3.7 mm	[< 9.0 mm Therefore OK]
	(= 0.2798 ln [design life, t_f] ; t in hours	[Refer to Section 1.1; based on test load]
Degree of utilization, Λ_{STR}	41%	

Layer 2

Proposed unit	Polystorm-R	
Creep test load, $X_{d;v,cr}$	162.0 kN/m ²	
SLS, $V_{d;SLS, \epsilon}$	13.0 kN/m ²	[< 162.0 kN/m ² Therefore OK]
Degree of utilization, Λ_{STR}	8%	
Creep data limit, t	60 years	[Unit has a durability life in excess of 60yrs]
Estimated unit creep, $\epsilon_{h,c}$	3.7 mm	[< 9.0 mm Therefore OK]
	(= 0.2798 ln [design life, t_f] ; t in hours	[Refer to Section 1.1; based on test load]
Degree of utilization, Λ_{STR}	41%	

3.3 Lateral Deflection

3.3.1 At Depth z_1

Design strength; $X_{d;LD}$	6.7 kN/m ² per mm	
	(= $X_{k;LD} / f_{m;SLS}$; refer to Section 1.0)	
SLS, $H_{d1;SLS}$	19.9 kN/m ²	
Deflection, δ_L	2.95 mm	[< 14.0 mm Therefore OK]
	(= $H_{d;SLS} / X_{d;LD}$)	[Refer to Section 1.1; based on test load]
Degree of utilization, Λ_{STR}	21%	

3.3.2 At Depth z_2

Design strength; $X_{d;LD}$	2.9 kN/m ² per mm	
	(= $X_{k;LD} / f_{m;SLS}$; refer to Section 1.0)	
SLS, $H_{d2;SLS}$	14.2 kN/m ²	
Deflection, δ_L	4.84 mm	[< 14.0 mm Therefore OK]
	(= $H_{d;SLS} / X_{d;LD}$)	[Refer to Section 1.1; based on test load]
Degree of utilization, Λ_{STR}	35%	

Note

Where ground water is expected to be present above the invert level of the proposed geocellular structure, due consideration should be given to undertaking a buoyancy (Uplift limit state, UPL) check

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Polystorm Uplift / Buoyancy Check - Based on Eurocode 7

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Design factor of safety (FoS)

Ultimate Limit State		Uplift (UPL)	
Permanent actions (G)	- Stabilising, $\gamma_{G,stb}$	0.9	[Table A.NA.15, NA to BS EN 1997-1:2004]
	- Destabilising, $\gamma_{G,dst}$	1.1	[Table A.NA.15, NA to BS EN 1997-1:2004]
Variable actions (Q)	- Stabilising, $\gamma_{Q,stb}$	0	[Table A.NA.15, NA to BS EN 1997-1:2004]
	- Destabilising, $\gamma_{Q,dst}$	1.5	[Table A.NA.15, NA to BS EN 1997-1:2004]

Assumed installation parameters

Material density	- Granular backfill, γ_{Bk}	20.0 kN/m ³	[Assumed]
	- Water, γ_{Wk}	9.8 kN/m ³	[Assumed]
	- Saturated backfill, γ'_{Bk} (= $\gamma_{Bk} - \gamma_{Wk}$)	10.2 kN/m ³	
Depths	- GL to structure IL, H	1.450 m	
	- GL to GWL, h_w	0.000 m	

Proposed Polystorm structure

Layer 1 unit type	Polystorm-R (PSM1A)
Layer 2 unit type	Deep (PSM5)
Layer 1 depth, h_1	0.400 m
Layer 2 depth, h_2	0.400 m
Total structure depth	0.800 m
Cover depth, h_c	0.650 m

Actions

Displaced water volume, Vol_{cell}	0.80 m ³ /m ²
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Characteristic destabilising

Water uplift, U_{Gk} (= $\gamma_{Wk} \times Vol_{cell}$)	7.85 kN/m ²
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Characteristic stabilising

Self weight of	- Polystorm layer 1, W_{Gk1}	0.19 kN/m ²	[Polypipe technical data]
	- Polystorm layer 2, W_{Gk1}	0.22 kN/m ²	[Polypipe technical data]
	- Backfill, W_{Gk2} (If $h_w < h_c = \gamma_{Bk} \times h_w$; else = $\gamma_{Bk} \times h_c$)	0.00 kN/m ²	
	- Saturated fill, W'_{Gk2} (= $\gamma'_{Bk} \times [h_c - h_w]$)	6.62 kN/m ²	

Effects of Actions

Destabilising design vertical actions, $V_{d,dst}$ (= $\gamma_{G,dst} \times U_{Gk}$)	8.63 kN/m ²	
Stabilising design vertical actions, $V_{d,stb}$ (= $\gamma_{G,stb} \times W_{Gk}$)	6.32 kN/m ²	
Degree of utilization, Λ_{UPL} (= $V_{d,dst} / V_{d,stb}$)	136 %	> 100%; FAILS Check

Traditional Verification of Stability Against Uplift

Traditional lumped FoS, F (= W_{Gk} / U_{Gk})	0.9
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Notes

- 1 Groundwater assumed to act as a permanent destabilising action
- 2 If uncertainty in the level of ground or free water exists, consideration should be given to the application of a safety margin to the assumed characteristic water level
- 3 The above assessment assumes that the Polystorm structure is completely flexible and that there is negligible frictional resistance between the geocellular structure and the native soil. The uplift stability verification has therefore been simplified, based on a m² (plan area) basis.

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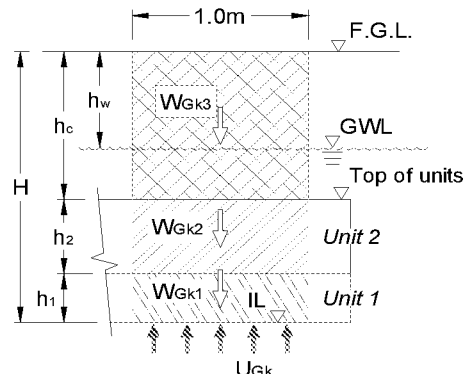


Fig 1) Definitions illustration