

Built Developments Ltd

Church Lane, Moston, Manchester Drainage Strategy

July 2024



Revision Schedule

Church Lane, Moston, Manchester
Drainage Strategy

July 2024

Doc Ref: BDL-1762-01-DS-001

Rev	Date	Status	Prepared by	Reviewed by	Approved by
-----	------	--------	-------------	-------------	-------------

-	11 July 2024	First Issue	Stephen Riley BSc CEng MICE MCIHT	Craig Russell	Lee Barnes BSc (Hons) MCIHT
P1					
P2					
P3					

Revision Notes

P1	
P2	
P3	

Inspire Design & Development Ltd
Unit 2A Church View Business Park
Coney Green Road
Chesterfield
Derbyshire
S45 9HA

Tel: 01246 864467

www.inspiredesigngroup.co.uk

This document has been prepared in accordance with the scope of Inspire Design & Development Ltd's (Inspire) appointment with its client and is subject to the terms of that appointment. It is addressed to and for the sole and confidential use and reliance of Inspire's client. Inspire accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of the Company Secretary of Inspire. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document do not provide legal or tax advice or opinion.

© Inspire Design & Development Ltd 2024

CONTENTS

1	INTRODUCTION	2
1.1	Instructions	2
2	SITE INFORMATION	3
2.1	Existing Site	3
2.2	Watercourses	3
2.3	Sewerage	3
2.4	Ground Conditions	3
2.5	Development Proposals	4
3	FLOOD RISK	5
3.1	Potential for Fluvial Flooding	5
3.2	Potential for Surface Water Flooding	5
3.3	Potential for Reservoir Flooding	6
3.4	Potential for Groundwater Flooding	6
3.5	Potential for Flooding from Sewers	6
4	Drainage Strategy	7
4.1	Surface Water Drainage	7
4.2	Foul Sewerage	9
4.3	Operations and Maintenance	9
5	CONCLUSIONS	10

APPENDICES

Appendix 1 – United Utilities Sewer Records

Appendix 2 – EA Surface Water Flood Risk Map

Appendix 3 – Hydraulic Calculations

DRAWINGS

BDL-1762-01-GA-001	Location Plan	1:2500 @ A4
010724JC-01	Site Survey	1:200 @ A0
4450-S0-105H	Proposed Site Plan	1:500 @ A2
BDL-1762-01-DR-001	Drainage Strategy	1:250 @ A1

1 INTRODUCTION

1.1 Instructions

- 1.1.1 This Drainage Strategy report is prepared in accordance with instructions from BTP Architects on behalf of Built Developments Ltd to support a planning application to Manchester City Council for residential development at Church Lane, Moston, Manchester, M9 4HX.
- 1.1.2 The purpose of the report is to determine a drainage strategy for the proposed development. It does not purport to be a detailed design for approval or construction purposes.

2 SITE INFORMATION

2.1 Existing Site

Location

- 2.1.1 The site comprises a plot of currently disused land with an area of about 9500 m² (0.95 ha) – see Drawing No BDL-1762-01-GA-001 *Location Plan*, attached.
- 2.1.2 The site is enclosed by existing residential areas at Church Lane to the north, Glenwood Drive and Mossclough Court to the east, Moss Brook Road to the south and Thorntree Close to the west.

Topography

- 2.1.3 As shown on Drawing No 010724JC-01 *Site Survey*, attached, the ground is generally level at around +72m AOD
- 2.1.4 The site is entirely vegetated and therefore may be regarded as 100% permeable

2.2 Watercourses

- 2.2.1 As shown on the United Utilities sewer records at Appendix 1, the nearest watercourse is an un-named ordinary watercourse which runs from north-west to south-east through the site in a 600mm diameter pipe culvert. The watercourse then flows in the open towards the south where it enters another 600mm diameter pipe culvert which connects to the 2700mm diameter Moston Brook culvert, a main river, about 200m south of the site. No invert levels are available for Manholes No 3302 and No 3402 on the UU records.

2.3 Sewerage

- 2.3.1 As shown on the United Utilities sewer records at Appendix 1, there is a 600mm diameter combined public sewer flowing from east to west along Church Lane just outside the northern site boundary. Manhole No 4403 is 5m deep with an invert level of 69.08m AOD and Manhole No 3401 is 3.7m deep with an invert level of 68.66m AOD.

2.4 Ground Conditions

- 2.4.1 According to BGS data, there is Manchester Maris Formation Mudstone and Collyhurst Sandstone Formation bedrock present at the site overlain by Devensian Diamicton superficial deposits of Glacial Till. Glacial Till is known to have poor permeability characteristics.

- 2.4.2 According to the LCRM Stage 1 Risk Assessment by Groundsmiths (UK) Ltd, dated May 2024, *it would be inappropriate for unstable, potentially unstable, and/or contaminated strata to receive point-source flows of water from dedicated soakaways. Based on the anticipated nature, thickness, and composition of the made ground to be encountered, it is likely that all three of these conditions could be met and that a sealed piped connection will be needed.*

2.5 Development Proposals

- 2.5.1 It is proposed to construct 39 No dwellings with car parking and an adoptable access road, as shown on Drawing No 4450-S0-105H *Proposed Site Plan*, attached.
- 2.5.2 The dwellings will have a total roof area of about 1980 m² (20% of the site area). The car park spaces and access road will create a paved area of about 3250 m² (35% of the site area), while the remaining 4270 m² (45% of the site area) will be soft landscaped private gardens and open space, making the developed site about 55% impermeable.

3 FLOOD RISK

3.1 Potential for Fluvial Flooding

- 3.1.1 The EA *Flood Map for Planning* shows the site located in Flood Zone 1 (Low Probability). Consequently, there is no significant risk of fluvial flooding and no need to consider the NPPF Sequential and Exception Tests or flood resilient construction or emergency evacuation.

3.2 Potential for Surface Water Flooding

- 3.2.1 As the site is located in Flood Zone 1 and has an area of less than 1 ha, there is no requirement in the NPPF for a site-specific flood risk assessment to accompany a planning application.

Flood Risk from Surface Water Map

- 3.2.2 The EA *Flood Risk from Surface Water* map at Long Term Flood Risk Information on the GOV.UK website is designed to show potential overland flow routes and accumulation of runoff based on topography resulting from rainstorm events, divided into low, medium and high risk scenarios. Although the EA have acknowledged that *flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast*, the map is generally a useful indicator of the risk of flooding from the accumulation of rainwater in low lying areas.
- 3.2.3 Unlike the modelling used to produce the *Flood Map for Planning*, which is based on river catchments and conveyance, that used for the *Flood Risk from Surface Water* map is based on LIDAR ground level data which identifies depressions where runoff is likely to flow or collect. Surface water flood risk indicated in this way is different from fluvial flooding, as shown on the *Flood Map for Planning*, which is water conveyed from upstream rather than being generated by local rainfall. The background to the *Flood Risk from Surface Water* map is described in the EA publication *What is the Risk of Flooding from Surface Water map?* – April 2019.
- 3.2.4 The EA *Flood Risk from Surface Water* map for this site- attached at Appendix 1 – shows areas with a Low risk of surface water flooding, but with no depth or flow velocity. At face value, therefore, these indicated flood areas may be taken to be depressions where runoff might accumulate rather than valleys where overland flow might be channelled. However, an examination of the topographical survey, which records a level site with no depressions, shows that they are neither. It must be concluded therefore that this flood map is unreliable and there is no surface water flood risk present at this location. A possible explanation for this anomaly is that the LIDAR survey analysis interpreted clearings between trees and buildings as depressions.

- 3.2.5 Nevertheless, owing to the impermeable area which will be created by the proposed development, there will be an increase in surface water flood risk in the future which will be fully mitigated by the new drainage system described in Section 4 below.

3.2 Potential for Reservoir Flooding

- 3.3.1 The EA *Flood Risk from Reservoirs* map shows no risk of reservoir flooding at or in the vicinity of the site.

3.4 Potential for Groundwater Flooding

- 3.4.1 In view of the presence of low permeability Glacial Till, flood risk from groundwater is considered to be Low.

3.5 Potential for Flooding from Sewers

- 3.5.1 Although there are sewers and a culverted watercourse present within and around site, the relative levels are such that flood risk from sewers is considered to be Low.

4 DRAINAGE STRATEGY

4.1 Surface Water Drainage

Existing Drainage

- 4.1.1 There is no known positive surface water drainage on the site.

Sustainable Drainage Systems (SuDS)

- 4.1.2 The drainage system will be based on SuDS principles for the disposal of surface water run-off, as shown on Drawing No BDL-1762-01-DR-001 *Drainage Strategy*, attached, and described below.
- 4.1.3 The first consideration in the SuDS hierarchy is infiltration to the ground which will always be the preferred option where the ground conditions are suitable. However, in this case and as described in Section 2.4 above, the presence of low permeability Glacial Till means that soakaways are unlikely to be feasible.
- 4.1.4 Furthermore and as stated in Section 2.4 above, *it would be inappropriate for unstable, potentially unstable, and/or contaminated strata to receive point-source flows of water from dedicated soakaways. Based on the anticipated nature, thickness, and composition of the made ground to be encountered, it is likely that all three of these conditions could be met and that a sealed piped connection will be needed.* Again, the conclusion is that soakaways are unlikely to be feasible.
- 4.1.5 Notwithstanding the above, BRE 365 testing will be carried out at the detailed design stage to confirm or otherwise the unsuitability of infiltration for disposal of surface water at the site
- 4.1.6 The second consideration in the SuDS hierarchy is disposal to watercourse. The nearest watercourse is the un-named ordinary watercourse which runs through the site in a 600mm diameter pipe culvert. The watercourse then flows towards the south where it connects to the large diameter Moston Brook culvert, a main river, about 200m south of the site. Consequently, disposal to watercourse within the site boundary is the preferred option.
- 4.1.7 The third consideration in the SuDS hierarchy is disposal to sewer. Although the 600mm diameter combined public sewer flowing along Church Lane would be a suitable receiving sewer for surface water, the presence of the buried watercourse on the site makes this consideration unnecessary.

Proposed Drainage

- 4.1.8 The proposed surface water drainage system will collect future runoff from the site and discharge the attenuated flow to the 600mm diameter culverted watercourse beneath the site – see Drawing No BDL-1762-01-DR-001.
- 4.1.9 The storage volume of 206 m³ provided by the proposed attenuation tanks, together with the void space in the coarse-grained aggregate subbase to the car parking spaces, will be sufficient to cater for the 1 in 100 year rainfall event with 40% climate change allowance in accordance with the EA Guidance *Flood Risk Assessments: Climate Change Allowances*, May 2022 – see FLOW hydraulic calculations at Appendix 3.
- 4.1.10 The discharge rate will be reduced to the greenfield runoff rate of 6.4 l/s, as shown by the UKSuDS calculations at Appendix 3.
- 4.1.11 The areas of open space and gardens will be soft landscaped and offer a measure of bioretention through shallow infiltration into topsoil and the evapotranspiration of the vegetation.
- 4.1.12 The proposed drainage system will ensure that there will be no significant flooding caused either within the site or in the surrounding area by future site surface water run-off.
- 4.1.13 In the unlikely event of a storm exceeding the design event, the drainage system may surcharge and cause minor local flooding on the site. Any overland flow will be directed by the ground levels away from the houses with any floodwater confined within the site.

Treatment

- 4.1.14 Surface water will be collected in the coarse-grained aggregate subbase of the car parking spaces and in channel drains and trapped gullies on the access roads and private drives, thereby providing adequate treatment prior to discharge to the buried ordinary watercourse on the site.
- 4.1.15 Areas of soft landscaping will provide a significant degree of bioretention and amenity value.

Surface Water Approvals

- 4.1.16 At the detailed design stage, application will be made to United Utilities and/or Manchester City Council under Sections 106 the Water Industry Act 1991 and/or Section 23 of the Land Drainage Act 1991 for consent to discharge surface water from the site to the buried ordinary watercourse on the site..

- 4.1.17 All relevant authorities will be kept fully informed regarding the detailed design of the surface water drainage system. It is normal practice for detailed surface water drainage design to be subject to the approval of the local planning authority subsequent to the grant of planning permission and this will be sought from Manchester City Council at the appropriate time.

4.2 Foul Sewerage

Existing Foul Sewerage

- 4.2.1 There is no known existing foul sewerage on the site.

Proposed Foul Sewerage

- 4.2.2 The foul sewerage for the proposed development will collect sewage from the dwellings to a point at the north side of the site from where it will connect to the 600mm diameter combined public sewer in Church Lane, as shown on Drawing No BDL-1762-01-DR-001.

Foul Sewerage Approvals

- 4.2.3 At the detailed design stage, application will be made to United Utilities under Section 106 the Water Industry Act 1991 for consent to discharge foul sewage from the site to the public sewer system.
- 4.2.4 All relevant authorities will be kept fully informed regarding the detailed design of the foul sewerage system. It is normal practice for detailed foul water drainage design to be subject to the approval of the local planning authority subsequent to the grant of planning permission and this will be sought from Manchester City Council at the appropriate time.

4.3 Operations and Maintenance

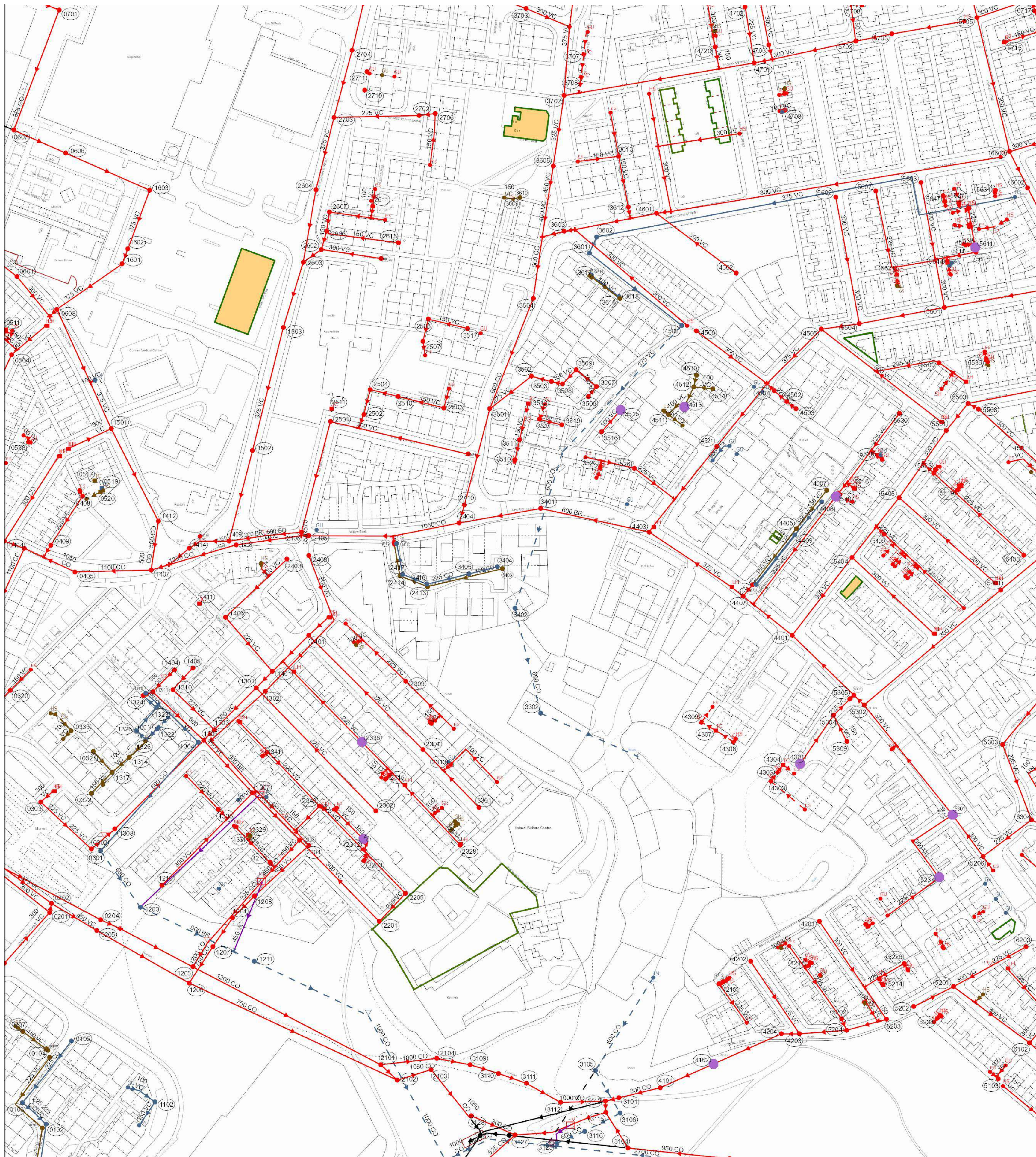
- 4.3.1 The completed development will be operated by the Applicant, Built Developments Ltd, who will have an operations and maintenance team available to operate standard procedures to ensure that all features of the drainage system are regularly and adequately managed and maintained.
- 4.3.2 In the event that the properties are transferred to private ownership, the properties will be similarly managed and maintained by the owners via a special purpose management company.
- 4.3.3 A detailed Management and Maintenance Plan may be provided at the detailed design stage, as and when required.

5 CONCLUSIONS

- 5.1.1 The site is not in a fluvial flood risk area and there is no formal need to satisfy the NPPF Sequential and Exception Tests or to consider flood resilient construction or emergency evacuation.
- 5.1.2 Indications of a Low risk of surface water flooding on the EA flood map have been shown by reference to the topographical survey as being unreliable and it is consequently considered that there is no significant surface water flood risk present at this location..
- 5.1.3 In accordance with the SuDS hierarchy, the site will be drained using SuDS techniques to the buried ordinary watercourse which crosses the site.
- 5.1.4 Climate change allowance with respect to surface water drainage has been made in accordance with the latest EA guidelines.
- 5.1.5 Following implementation of the surface water drainage system, there will be no significant risk of surface water flooding at the site.
- 5.1.6 Foul sewage will be disposed of to the public combined sewer in Church Lane.
- 5.1.7 With regard to flood risk and drainage, therefore, the site is suitable for the proposed use. Subject to the implementation of this Drainage Strategy, the development may be occupied safely and adequately drained without increasing flood risk overall.

APPENDIX 1

UNITED UTILITIES SEWER RECORDS



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Crown copyright and database rights 2023 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
3207	FO	0	70.9	225			VC	16.32435	1 in 83
3405	72.49	SW	65.54	1000			CO	16.39551	1 in 205
3110	59.75	CO	65.54	1000			VC	41.03657	
2304	70.27	CO	69.08	225			VC	6.817802	
5209		CO	69.08	225			VC	22.95442	1 in 82
6203	72.86	CO	69.08	225			VC	36.76555	1 in 87
1307	71.7	CO	69.08	225			VC	17.19691	1 in 67
5602	77.76	CO	69.08	225			VC	65.45992	1 in 54
4201	71.32	CO	69.08	225			VC	4.530675	
2411	71.99	CO	69.08	225			VC	6.571073	
5508		CO	69.08	225			VC	5.090902	
0201	70.82	CO	69.08	225			VC	1.239478	
3510		CO	69.08	225			VC	6.926277	
5708		CO	69.08	225			VC	19.17736	
2463		CO	69.08	225			VC	41.4367	1 in 126
0102	72.29	SW	69.85	300			CO	12.20566	1 in 174
1336		CO	69.85	300			VC	6.11809	1 in 309
2602	75.35	CO	69.85	300			VC	31.40064	1 in 40
3113	56.61	CO	69.85	300			VC	76.15773	
4702	78.23	CO	69.85	300			VC	20.26975	1 in 74
5705		CO	69.85	300			VC	7.598639	
2406	72	CO	69.85	300			VC	21.16413	
2312		CO	69.85	300			VC	31.1946	1 in 240
2205		CO	69.85	300			VC	59.95574	
2101	69.79	CO	69.85	300			VC	79.0929	1 in 80
3402	74.84	CO	69.85	300			VC	94.76286	
2302	72.74	CO	69.85	300			VC	7.550297	
3609		CO	69.85	300			VC	8.784559	
5208		CO	69.85	300			VC	25.43004	
1208		CO	69.85	300			VC	16.87056	
3517		CO	69.85	300			VC	6.223522	
4512		CO	69.85	300			VC	12.32426	
2201	68.25	CO	69.85	300			VC	62.30446	
6304	75.16	CO	69.85	300			VC	33.44106	1 in 28
1401	72.89	CO	69.85	300			VC	12.72792	1 in 80
1324		CO	69.85	300			VC	5.76163	
4508	75.76	SW	71.96	375			VC	96.20811	
2336		CO	71.96	375			VC	2.25941	
3615		CO	71.96	375			VC	19.47006	
2328		CO	71.96	375			VC	78.73842	
2404	72.6	CO	71.96	375			VC	63.70238	
1405	73.05	CO	71.96	375			VC	16.27882	1 in 35
1311		CO	71.96	375			VC	39.59897	1 in 47
3401	72.35	CO	71.96	375			VC	45.70558	1 in 176
2401	72.78	CO	71.96	375			VC	29.28427	1 in 123
1310	72.86	CO	71.96	375			VC	31.82786	1 in 84
2413	72.42	CO	71.96	375			VC	16.11779	1 in 103
1404	73.07	CO	71.96	375			VC	8.24611	
2414	72.43	CO	71.96	375			VC	7.85991	
1304	72.82	CO	71.96	375			VC	80.72174	1 in 33
1404	73.07	CO	71.96	375			VC	8.455291	1 in 40
2414	72.43	CO	71.96	375			VC	17.87004	1 in 69
0608	73.29	CO	71.96	375			VC	5.859594	
1408	72.71	CO	71.96	375			VC	38.60052	
4511		CO	71.96	375			VC	9.948315	
5401	77.56	CO	71.96	375			VC	98.52862	1 in 46
3508		CO	71.96	375			VC	6.320895	
0304	72.23	CO	71.96	375			VC	62.50102	1 in 347
0302	70.1	CO	71.96	375			VC	9.219544	1 in 822
2605		CO	71.96	375			VC	67.95956	
2603	75.54	CO	71.96	375			VC	37.64306	1 in 50
1410	73.05	CO	71.96	375			VC	1.21102	
0204		CO	71.96	375			VC	12.28305	
2613		CO	71.96	375			VC	40.54222	
2606		CO	71.96	375			VC	10.46668	
4505	76.63	CO	71.96	375			VC	42.42641	1 in 87
3601	75.98	CO	71.96	375			VC	54.51512	1 in 166
5614		CO	71.96	375			VC	4.79488	
0408		CO	71.96	375			VC	32.16390	
0102	71.92	CO	71.96	375			VC	67.732	1 in 65
3613		CO	71.96	375			VC	28.94337	
5601	76.12	CO	71.96	375			VC	47.85384	1 in 71
3516		CO	71.96	375			VC	15.8748	
1311	72.85	CO	71.96	375			VC	38.57943	1 in 49
3105	55.5	SW	54.2	600			CO	27.21101	
1210	66.71	CO	54.2	600			VC	71.42138	1 in 19
1407	72.54	CO	54.2	600			VC	66.2	1 in 525
0701		CO	54.2	600			VC	70.97157	
1302	72.9	CO	54.2	600			VC	80.874	1 in 323
5202	70.25	CO	54.2	600			VC	24.59675	1 in 307
3617		CO	54.2	600			VC	19.46909	
3702	76.62	CO	54.2	600			VC	39.59884	1 in 164
1314		CO	54.2	600			VC	12.41614	
1414		CO	54.2	600			VC	14.21287	
4102	64.04	CO	54.2	600			VC	32.07854	
0404	71.79	CO	54.2	600			VC	52.80151	1 in 180
1603	75.81	CO	54.2	600			VC	34.48888	1 in 58
4203	67.13	CO	54.2	600			VC	10	1 in 37
3123		CO	54.2	600			VC	1.675444	
5611		CO	54.2	600			VC	25.40411	
1502	73.63	CO	54.2	600			VC	51.86236	1 in 60
3107	58.02	CO	54.2	600			VC	64.91796	1 in 342
3104	57	CO	54.2	600			VC	23.22732	1 in 179
2303	70.44	CO	54.2	600			VC	14.86607	1 in 87
2408		CO	54.2	600			VC	67.19	
3106	55.2	SW	54.2	600			VC	21.98818	
1602	75.25	CO	54.2	600			VC	69.49109	1 in 86
3703	76.9	CO	54.2	600			VC	28	
5405	69.85	CO	54.2	600			VC	78.10249	1 in 81
5404	76.18	CO	54.2	600			VC	54.20332	1 in 38
1326		CO	54.2	600			VC	16.96951	
4202	69.44	CO	54.2	600			VC	48.59971	1 in 43
0205		CO	54.2	600			VC	58.66856	
5405	69.44	CO	54.2	600			VC	12.48976	
3112	55.75	CO	54.2	600			VC	24.90955	1 in 226
5405	77.24	CO	54.2	600			VC	42.0119	1 in 43
4521		CO	54.2	600			VC	60.206	
5703	81.14	CO	54.2	600			VC	20.39608	1 in 28
5204	66.51	CO	54.2	600			VC	26.07681	1 in 27
2503		CO	54.2	600			VC	26.19568	
2510		CO	54.2	600			VC	15.71038	
1317		CO	54.2	600			VC	16.35387	
4510		CO	54.2	600			VC	6.551605	
5201	71.17	CO	54.2	600			VC	62.20323	1 in 201
2418	72.07	CO	54.2	600			VC	1.344732	
1501	72.36	CO	54.2	600			VC	68.14	1 in 7
3612		CO	54.2	600			VC	63.70074	
1208		CO	54.2	600			VC	126.805	
3520		CO	54.2	600			VC	12.66894	
0203	69.09	CO	54.2	600			VC	22.80351	1 in 33
3109	62.5	CO	54.2	600			VC	16.22528	1 in 125
0601	73.8	CO	54.2	600			VC	28.42534	
2607		CO	54.2	600			VC	10.75163	
2408		CO	54.2	600			VC	38.2642	
0608	73.29	CO	54.2	600			VC	72.48608	1 in 65
1312	72.94	SW	54.2	600			VC	19.49443	
3116		CO	54.2	600			VC	16.76211	
0405	71.9	CO	54.2	600			VC	30.8707	1 in 343
5604	77.14	CO	54.2	600			VC	21.2132	1 in 112
5206	74.03	CO	54.2	600			VC	28.41025	1 in 79
2503		CO	54.2	600			VC	8.07776	
1325		CO	54.2	600			VC	7.25961	
0105	72.16	SW	70.15	225			VC	21.40093	1 in 1070
2703	76.71	CO	72.83	375			VC	41.23106	1 in 152
2102	69.48	CO	52.79	1050			VC	19.58559	1 in 46
2704	77.4	CO	52.79	1050			VC	38.32754	1 in 52
2601	74.75	CO	52.79	1050			VC	33.37664	1 in 124
3506		CO	52.79	1050			VC	7.887991	
3502	74.4	CO	52.79	1050			VC	29.20616	1 in 104
2611		CO	52.79	1050			VC	6.57842	
3403	72.48	CO	52.79	1050			VC	42.44529	1 in 99
2702	76.26	CO	52.79	1050			VC	47.01064	1 in 32
3505		CO	52.79	1050			VC	27.59605	
4514		CO	52.79	1050			VC	10.46235	
3404	72.47	SW	71.16	225			VC	16.07891	1 in 82
1205		CO	52.79	1050			VC	116.9743	
4502	76.57	CO	52.79	1050			VC	3.219544	1 in 16
5509		CO	52.79	1050			VC	43.56279	
0607		CO	52.79	1050			VC	31.36016	
3605	76.44	CO	52.79	1050			VC	19.23538	
2103	65.31	CO	52.79	1050			VC	35.1813	1 in 160
1307	71.7	CO	52.79	1050			VC	2.23608	
0504	73.14	CO	52.79	1050			VC	47.42362	1 in 119
1207	68.34	CO	52.79	1050			VC	23.85372	
312									

APPENDIX 2

EA SURFACE WATER FLOOD RISK MAP



Key

Surface water

● Extent

■ High risk

More than 3.3% chance each year

■ Medium risk

Between 1% and 3.3% chance each year

■ Low risk

Between 0.1% and 1% chance each year

○ Depth

○ Velocity

EA Surface Water Flood Risk Map

APPENDIX 3

HYDRAULIC CALCULATIONS

Calculated by:

Stephen Riley

Site name:

Church Lane

Site location:

Moston

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

53.50907° N

Longitude:

2.20715° W

Reference:

2372669282

Date:

Jul 11 2024 11:22

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

0.95

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	942	942
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default Edited

Q_{BAR} (l/s):	6.49	6.49
1 in 1 year (l/s):	5.65	5.65
1 in 30 years (l/s):	11.04	11.04
1 in 100 year (l/s):	13.5	13.5
1 in 200 years (l/s):	15.39	15.39

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	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)	20.000	Minimum Backdrop Height (m)	2.000
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Circular 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)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
PA1	0.008	5.00	73.350	450	386368.217	401470.475	0.800
PA2	0.007	5.00	73.350	450	386361.675	401448.446	0.800
PA3	0.007	5.00	73.150	450	386349.734	401430.578	0.800
PA4	0.006	5.00	73.450	450	386360.060	401427.460	0.800
PA5	0.011	5.00	73.450	450	386356.627	401419.122	0.800
PA6	0.007	5.00	73.150	450	386341.727	401408.580	0.800
PA7	0.007	5.00	72.700	450	386388.228	401355.967	0.800
PA8	0.014	5.00	72.700	450	386380.363	401358.813	0.800
PA9	0.019	5.00	72.500	450	386392.727	401391.561	0.800
PA10	0.008	5.00	72.650	450	386389.478	401370.756	0.800
PA11	0.016	5.00	72.700	450	386369.258	401363.072	0.800
PA12	0.012	5.00	72.550	450	386370.403	401374.023	0.800
PA13	0.018	5.00	72.550	450	386361.257	401381.942	0.800
PA14	0.007	5.00	72.650	450	386354.229	401386.834	0.800
PA15	0.019	5.00	73.350	450	386314.297	401408.215	0.700
PA16	0.013	5.00	73.050	450	386310.291	401379.017	0.800
PA17	0.013	5.00	73.050	450	386306.574	401387.212	0.800
PA18	0.014	5.00	72.750	450	386328.172	401385.705	0.800
S1	0.005	5.00	73.250	1500	386372.919	401467.772	2.000
S2	0.043	5.00	73.000	1500	386362.978	401440.459	1.806
S3	0.029	5.00	73.000	1500	386353.543	401429.192	1.835
S4	0.013	5.00	72.800	1500	386342.695	401399.387	1.697
S5	0.015	5.00	72.500	1500	386388.048	401363.358	1.818
S6	0.063	5.00	72.400	1800	386386.782	401382.027	1.700
JUNCTION	0.000		72.450		386380.930	401365.949	1.783
S7	0.083	5.00	72.450	1500	386364.549	401371.912	1.817
S8	0.000		72.500	1500	386352.309	401381.567	1.897
S9	0.027	5.00	73.200	1500	386320.317	401406.055	2.517
S10	0.018	5.00	72.900	1500	386312.495	401385.061	2.218
S11	0.000		73.000	1500	386316.409	401395.319	2.345
S12	0.021	5.00	72.500	2700	386343.238	401384.873	1.966
3302	0.000		72.500	1500	386340.958	401379.016	2.150

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)	Rain (mm/hr)
1.000	PA1	S1	5.424	0.600	72.550	71.700	0.850	6.4	150	5.05	50.0
2.000	PA2	S2	8.093	0.600	72.550	71.644	0.906	8.9	150	5.06	50.0
4.000	PA3	S3	4.053	0.600	72.350	71.615	0.735	5.5	150	5.02	50.0
3.000	PA4	S3	6.743	0.600	72.650	71.615	1.035	6.5	150	5.04	50.0
5.000	PA5	S4	24.157	0.600	72.650	71.553	1.097	22.0	150	5.25	50.0
6.000	PA6	S4	9.244	0.600	72.350	71.553	0.797	11.6	150	5.07	50.0
8.000	PA7	S5	7.393	0.600	71.900	71.132	0.768	9.6	150	5.06	50.0
10.000	PA8	JUNCTION	7.158	0.600	71.900	71.117	0.783	9.1	150	5.05	50.0
7.000	PA9	S6	11.236	0.600	71.700	71.150	0.550	20.4	150	5.09	50.0
9.000	PA10	JUNCTION	9.807	0.600	71.850	71.117	0.733	13.4	150	5.09	50.0
11.000	PA11	S7	10.016	0.600	71.900	71.083	0.817	12.3	150	5.07	50.0
12.000	PA12	S7	6.223	0.600	71.750	71.083	0.667	9.3	150	5.04	50.0
13.000	PA13	S8	8.956	0.600	71.750	71.053	0.697	12.8	150	5.07	50.0
14.000	PA14	S8	5.606	0.600	71.850	71.053	0.797	7.0	150	5.03	50.0
15.000	PA15	S9	6.396	0.600	72.650	71.133	1.517	4.2	150	5.04	50.0
16.000	PA16	S10	6.433	0.600	72.250	71.132	1.118	5.8	150	5.05	50.0
17.000	PA17	S10	6.300	0.600	72.250	71.132	1.118	5.6	150	5.04	50.0
18.000	PA18	S12	15.089	0.600	71.950	71.034	0.916	16.5	150	5.11	50.0
1.001	S1	S2	29.066	0.600	71.250	71.194	0.056	519.0	600	5.57	50.0
1.002	S2	S3	14.696	0.600	71.194	71.165	0.029	506.8	600	5.82	50.0
1.003	S3	S4	31.718	0.600	71.165	71.103	0.062	511.6	600	6.35	50.0
1.004	S4	S12	14.524	0.600	71.103	70.584	0.519	28.0	600	6.43	50.0
8.001	S5	JUNCTION	7.575	0.600	70.682	70.667	0.015	505.0	600	5.18	50.0
7.001	S6	JUNCTION	17.110	0.600	70.700	70.667	0.033	518.5	600	5.26	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	4.015	70.9	1.4	0.650	1.400	0.008	0.0	15	1.606
2.000	3.391	59.9	1.3	0.650	1.206	0.007	0.0	15	1.355
4.000	4.320	76.3	1.3	0.650	1.235	0.007	0.0	13	1.592
3.000	3.973	70.2	1.1	0.650	1.235	0.006	0.0	13	1.463
5.000	2.155	38.1	2.0	0.650	1.097	0.011	0.0	23	1.137
6.000	2.974	52.6	1.3	0.650	1.097	0.007	0.0	16	1.248
8.000	3.266	57.7	1.3	0.650	1.218	0.007	0.0	16	1.338
10.000	3.352	59.2	2.5	0.650	1.183	0.014	0.0	21	1.657
7.000	2.238	39.5	3.4	0.650	1.100	0.019	0.0	30	1.372
9.000	2.769	48.9	1.4	0.650	1.183	0.008	0.0	18	1.241
11.000	2.893	51.1	2.9	0.650	1.217	0.016	0.0	24	1.575
12.000	3.318	58.6	2.2	0.650	1.217	0.012	0.0	20	1.581
13.000	2.825	49.9	3.3	0.650	1.297	0.018	0.0	26	1.606
14.000	3.823	67.6	1.3	0.650	1.297	0.007	0.0	14	1.489
15.000	4.942	87.3	3.4	0.550	1.917	0.019	0.0	20	2.402
16.000	4.229	74.7	2.3	0.650	1.618	0.013	0.0	18	1.939
17.000	4.273	75.5	2.3	0.650	1.618	0.013	0.0	18	1.920
18.000	2.494	44.1	2.5	0.650	1.316	0.014	0.0	24	1.357
1.001	1.062	300.2	2.3	1.400	1.206	0.013	0.0	37	0.323
1.002	1.075	303.8	11.4	1.206	1.235	0.063	0.0	78	0.524
1.003	1.070	302.4	19.0	1.235	1.097	0.105	0.0	100	0.606
1.004	4.614	1304.7	24.6	1.097	1.316	0.136	0.0	56	1.849
8.001	1.077	304.4	4.0	1.218	1.183	0.022	0.0	47	0.382
7.001	1.062	300.4	14.8	1.100	1.183	0.082	0.0	89	0.561

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)	Rain (mm/hr)
7.002	JUNCTION	S7	17.433	0.600	70.667	70.633	0.034	512.7	600	5.55	50.0
7.003	S7	S8	15.590	0.600	70.633	70.603	0.030	519.7	600	5.81	50.0
7.004	S8	S12	9.655	0.600	70.603	70.584	0.019	508.2	600	5.97	50.0
15.001	S9	S11	11.425	0.600	70.683	70.655	0.028	408.0	600	5.22	50.0
16.001	S10	S11	10.979	0.600	70.682	70.655	0.027	406.6	600	5.29	50.0
15.002	S11	S12	28.791	0.600	70.655	70.584	0.071	405.5	600	5.53	50.0
1.005	S12	3302	6.285	0.600	70.534	70.350	0.184	34.2	300	6.53	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
7.002	1.068	302.1	22.8	1.183	1.217	0.126	0.0	110	0.640
7.003	1.061	300.0	42.8	1.217	1.297	0.237	0.0	152	0.762
7.004	1.073	303.4	47.3	1.297	1.316	0.262	0.0	159	0.790
15.001	1.199	339.0	8.3	1.917	1.745	0.046	0.0	64	0.515
16.001	1.201	339.6	8.0	1.618	1.745	0.044	0.0	62	0.510
15.002	1.203	340.1	16.3	1.745	1.316	0.090	0.0	88	0.631
1.005	2.699	190.8	94.5	1.666	1.850	0.523	0.0	149	2.692

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	5.424	6.4	150	Circular	73.350	72.550	0.650	73.250	71.700	1.400
2.000	8.093	8.9	150	Circular	73.350	72.550	0.650	73.000	71.644	1.206
4.000	4.053	5.5	150	Circular	73.150	72.350	0.650	73.000	71.615	1.235
3.000	6.743	6.5	150	Circular	73.450	72.650	0.650	73.000	71.615	1.235
5.000	24.157	22.0	150	Circular	73.450	72.650	0.650	72.800	71.553	1.097
6.000	9.244	11.6	150	Circular	73.150	72.350	0.650	72.800	71.553	1.097
8.000	7.393	9.6	150	Circular	72.700	71.900	0.650	72.500	71.132	1.218
10.000	7.158	9.1	150	Circular	72.700	71.900	0.650	72.450	71.117	1.183
7.000	11.236	20.4	150	Circular	72.500	71.700	0.650	72.400	71.150	1.100
9.000	9.807	13.4	150	Circular	72.650	71.850	0.650	72.450	71.117	1.183
11.000	10.016	12.3	150	Circular	72.700	71.900	0.650	72.450	71.083	1.217
12.000	6.223	9.3	150	Circular	72.550	71.750	0.650	72.450	71.083	1.217
13.000	8.956	12.8	150	Circular	72.550	71.750	0.650	72.500	71.053	1.297

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	PA1	450	Manhole	Adoptable	S1	1500	Manhole	Adoptable
2.000	PA2	450	Manhole	Adoptable	S2	1500	Manhole	Adoptable
4.000	PA3	450	Manhole	Adoptable	S3	1500	Manhole	Adoptable
3.000	PA4	450	Manhole	Adoptable	S3	1500	Manhole	Adoptable
5.000	PA5	450	Manhole	Adoptable	S4	1500	Manhole	Adoptable
6.000	PA6	450	Manhole	Adoptable	S4	1500	Manhole	Adoptable
8.000	PA7	450	Manhole	Adoptable	S5	1500	Manhole	Adoptable
10.000	PA8	450	Manhole	Adoptable	JUNCTION		Junction	
7.000	PA9	450	Manhole	Adoptable	S6	1800	Manhole	Adoptable
9.000	PA10	450	Manhole	Adoptable	JUNCTION		Junction	
11.000	PA11	450	Manhole	Adoptable	S7	1500	Manhole	Adoptable
12.000	PA12	450	Manhole	Adoptable	S7	1500	Manhole	Adoptable
13.000	PA13	450	Manhole	Adoptable	S8	1500	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
14.000	5.606	7.0	150	Circular	72.650	71.850	0.650	72.500	71.053	1.297
15.000	6.396	4.2	150	Circular	73.350	72.650	0.550	73.200	71.133	1.917
16.000	6.433	5.8	150	Circular	73.050	72.250	0.650	72.900	71.132	1.618
17.000	6.300	5.6	150	Circular	73.050	72.250	0.650	72.900	71.132	1.618
18.000	15.089	16.5	150	Circular	72.750	71.950	0.650	72.500	71.034	1.316
1.001	29.066	519.0	600	Circular	73.250	71.250	1.400	73.000	71.194	1.206
1.002	14.696	506.8	600	Circular	73.000	71.194	1.206	73.000	71.165	1.235
1.003	31.718	511.6	600	Circular	73.000	71.165	1.235	72.800	71.103	1.097
1.004	14.524	28.0	600	Circular	72.800	71.103	1.097	72.500	70.584	1.316
8.001	7.575	505.0	600	Circular	72.500	70.682	1.218	72.450	70.667	1.183
7.001	17.110	518.5	600	Circular	72.400	70.700	1.100	72.450	70.667	1.183
7.002	17.433	512.7	600	Circular	72.450	70.667	1.183	72.450	70.633	1.217
7.003	15.590	519.7	600	Circular	72.450	70.633	1.217	72.500	70.603	1.297
7.004	9.655	508.2	600	Circular	72.500	70.603	1.297	72.500	70.584	1.316
15.001	11.425	408.0	600	Circular	73.200	70.683	1.917	73.000	70.655	1.745
16.001	10.979	406.6	600	Circular	72.900	70.682	1.618	73.000	70.655	1.745
15.002	28.791	405.5	600	Circular	73.000	70.655	1.745	72.500	70.584	1.316
1.005	6.285	34.2	300	Circular	72.500	70.534	1.666	72.500	70.350	1.850

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
14.000	PA14	450	Manhole	Adoptable	S8	1500	Manhole	Adoptable
15.000	PA15	450	Manhole	Adoptable	S9	1500	Manhole	Adoptable
16.000	PA16	450	Manhole	Adoptable	S10	1500	Manhole	Adoptable
17.000	PA17	450	Manhole	Adoptable	S10	1500	Manhole	Adoptable
18.000	PA18	450	Manhole	Adoptable	S12	2700	Manhole	Adoptable
1.001	S1	1500	Manhole	Adoptable	S2	1500	Manhole	Adoptable
1.002	S2	1500	Manhole	Adoptable	S3	1500	Manhole	Adoptable
1.003	S3	1500	Manhole	Adoptable	S4	1500	Manhole	Adoptable
1.004	S4	1500	Manhole	Adoptable	S12	2700	Manhole	Adoptable
8.001	S5	1500	Manhole	Adoptable	JUNCTION		Junction	
7.001	S6	1800	Manhole	Adoptable	JUNCTION		Junction	
7.002	JUNCTION		Junction		S7	1500	Manhole	Adoptable
7.003	S7	1500	Manhole	Adoptable	S8	1500	Manhole	Adoptable
7.004	S8	1500	Manhole	Adoptable	S12	2700	Manhole	Adoptable
15.001	S9	1500	Manhole	Adoptable	S11	1500	Manhole	Adoptable
16.001	S10	1500	Manhole	Adoptable	S11	1500	Manhole	Adoptable
15.002	S11	1500	Manhole	Adoptable	S12	2700	Manhole	Adoptable
1.005	S12	2700	Manhole	Adoptable	3302	1500	Manhole	Adoptable

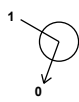
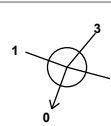
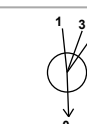
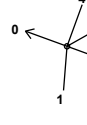
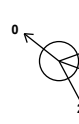
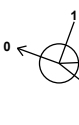
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
PA1	386368.217	401470.475	73.350	0.800	450		0	1.000	72.550	150
PA2	386361.675	401448.446	73.350	0.800	450		0	2.000	72.550	150

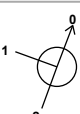
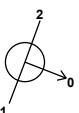
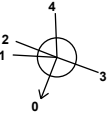
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
PA3	386349.734	401430.578	73.150	0.800	450	 0	4.000	72.350	150
PA4	386360.060	401427.460	73.450	0.800	450	 0	3.000	72.650	150
PA5	386356.627	401419.122	73.450	0.800	450	 0	5.000	72.650	150
PA6	386341.727	401408.580	73.150	0.800	450	 0	6.000	72.350	150
PA7	386388.228	401355.967	72.700	0.800	450	 0	8.000	71.900	150
PA8	386380.363	401358.813	72.700	0.800	450	 0	10.000	71.900	150
PA9	386392.727	401391.561	72.500	0.800	450	 0	7.000	71.700	150
PA10	386389.478	401370.756	72.650	0.800	450	 0	9.000	71.850	150
PA11	386369.258	401363.072	72.700	0.800	450	 0	11.000	71.900	150
PA12	386370.403	401374.023	72.550	0.800	450	 0	12.000	71.750	150
PA13	386361.257	401381.942	72.550	0.800	450	 0	13.000	71.750	150
PA14	386354.229	401386.834	72.650	0.800	450	 0	14.000	71.850	150
PA15	386314.297	401408.215	73.350	0.700	450	 0	15.000	72.650	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
PA16	386310.291	401379.017	73.050	0.800	450		0	16.000	72.250	150
PA17	386306.574	401387.212	73.050	0.800	450		0	17.000	72.250	150
PA18	386328.172	401385.705	72.750	0.800	450		0	18.000	71.950	150
S1	386372.919	401467.772	73.250	2.000	1500		1	1.000	71.700	150
S2	386362.978	401440.459	73.000	1.806	1500		0	1.001	71.250	600
							1	2.000	71.644	150
S3	386353.543	401429.192	73.000	1.835	1500		2	1.001	71.194	600
							0	1.002	71.194	600
S4	386342.695	401399.387	72.800	1.697	1500		1	4.000	71.615	150
							2	3.000	71.615	150
							3	1.002	71.165	600
							0	1.003	71.165	600
S5	386388.048	401363.358	72.500	1.818	1500		1	6.000	71.553	150
							2	5.000	71.553	150
S6	386386.782	401382.027	72.400	1.700	1800		3	1.003	71.103	600
							0	1.004	71.103	600
S5	386388.048	401363.358	72.500	1.818	1500		1	8.000	71.132	150
S6	386386.782	401382.027	72.400	1.700	1800		0	8.001	70.682	600
							1	7.000	71.150	150
JUNCTION	386380.930	401365.949	72.450	1.783			1	7.001	70.700	600
							2	10.000	71.117	150
							3	9.000	71.117	150
							4	8.001	70.667	600
							0	7.001	70.667	600
S7	386364.549	401371.912	72.450	1.817	1500		1	7.002	70.667	600
							2	12.000	71.083	150
							3	11.000	71.083	150
							0	7.002	70.633	600
S8	386352.309	401381.567	72.500	1.897	1500		1	7.003	70.633	600
							2	14.000	71.053	150
							3	13.000	71.053	150
							0	7.003	70.603	600
S9	386320.317	401406.055	73.200	2.517	1500		3	7.004	70.603	600
							1	15.000	71.133	150
							0	15.001	70.683	600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S10	386312.495	401385.061	72.900	2.218	1500		1	17.000	71.132	150
							2	16.000	71.132	150
							0	16.001	70.682	600
S11	386316.409	401395.319	73.000	2.345	1500		1	16.001	70.655	600
							2	15.001	70.655	600
							0	15.002	70.655	600
S12	386343.238	401384.873	72.500	1.966	2700		1	18.000	71.034	150
							2	15.002	70.584	600
							3	7.004	70.584	600
							4	1.004	70.584	600
							0	1.005	70.534	300
3302	386340.958	401379.016	72.500	2.150	1500		1	1.005	70.350	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Node S12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	70.534	Product Number	CTL-SHE-0106-6400-1850-6400
Design Depth (m)	1.850	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.4	Min Node Diameter (mm)	1200

Node PA1 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	72.550	Diameter (m)	0.023		

Node PA2 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	72.550	Diameter (m)	0.023		

Node PA3 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.2		
Invert Level (m)	72.350	Diameter (m)	0.025		

Node PA4 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	72.650	Diameter (m)	0.016		

Node PA5 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.1		
Invert Level (m)	72.650	Diameter (m)	0.024		

Node PA6 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.2		
Invert Level (m)	72.350	Diameter (m)	0.025		

Node PA7 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.1		
Invert Level (m)	71.900	Diameter (m)	0.024		

Node PA8 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	2.4		
Invert Level (m)	71.900	Diameter (m)	0.036		

Node PA9 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	3.0		
Invert Level (m)	71.700	Diameter (m)	0.041		

Node PA10 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.2		
Invert Level (m)	71.850	Diameter (m)	0.010		

Node PA11 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	3.5		
Invert Level (m)	71.900	Diameter (m)	0.044		

Node PA12 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.3		
Invert Level (m)	71.750	Diameter (m)	0.026		

Node PA13 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	4.5		
Invert Level (m)	71.750	Diameter (m)	0.050		

Node PA14 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.2		
Invert Level (m)	71.850	Diameter (m)	0.025		

Node PA15 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.1		
Invert Level (m)	72.650	Diameter (m)	0.024		

Node PA16 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	2.1		
Invert Level (m)	72.250	Diameter (m)	0.034		

Node PA17 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.8		
Invert Level (m)	72.250	Diameter (m)	0.021		

Node PA18 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	2.6		
Invert Level (m)	71.950	Diameter (m)	0.038		

Node PA1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.790
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	50

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	16.0	0.0	0.450	16.0	0.0	0.451	0.0	0.0

Node PA2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.790
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	42

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	12.5	0.0	0.450	12.5	0.0	0.451	0.0	0.0

Node PA3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.590
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	30

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	11.5	0.0	0.450	11.5	0.0	0.451	0.0	0.0

Node PA4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.890
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	79

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	14.0	0.0	0.450	14.0	0.0	0.451	0.0	0.0

Node PA5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.890
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	64

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	25.0	0.0	0.450	25.0	0.0	0.451	0.0	0.0

Node PA6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.590
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	30

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	11.5	0.0	0.450	11.5	0.0	0.451	0.0	0.0

Node PA7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.140
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	32

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	12.0	0.0	0.450	12.0	0.0	0.451	0.0	0.0

Node PA8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.140
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	30

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	24.0	0.0	0.450	24.0	0.0	0.451	0.0	0.0

Node PA9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.940
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	30

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	34.8	0.0	0.450	34.8	0.0	0.451	0.0	0.0

Node PA10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.090
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	36.0	0.0	0.450	36.0	0.0	0.451	0.0	0.0

Node PA11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.140
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	21

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	24.0	0.0	0.450	24.0	0.0	0.451	0.0	0.0

Node PA12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.990
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	57

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	27.0	0.0	0.450	27.0	0.0	0.451	0.0	0.0

Node PA13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.990
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	18

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	25.0	0.0	0.450	25.0	0.0	0.451	0.0	0.0

Node PA14 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.090
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	30

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	11.5	0.0	0.450	11.5	0.0	0.451	0.0	0.0

Node PA15 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.790
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	156

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	60.0	0.0	0.450	60.0	0.0	0.451	0.0	0.0

Node PA16 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.490
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	30

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	23.0	0.0	0.450	23.0	0.0	0.451	0.0	0.0

Node PA17 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.490
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	93

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	39.0	0.0	0.450	39.0	0.0	0.451	0.0	0.0

Node PA18 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.190
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	25

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	23.0	0.0	0.450	23.0	0.0	0.451	0.0	0.0

Node S6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	187.0	0.0	0.800	187.0	0.0	0.801	0.0	0.0

Node S9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	47.0	0.0	1.200	47.0	0.0	1.201	0.0	0.0

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 (m ³)	
Full Bore Velocity	✓		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	PA1	22	72.810	0.260	1.3	0.1394	0.0000	SURCHARGED
15 minute summer	PA2	13	72.799	0.249	1.3	0.0767	0.0000	SURCHARGED
15 minute summer	PA3	13	72.593	0.243	1.3	0.0514	0.0000	SURCHARGED
30 minute summer	PA4	23	72.914	0.264	1.0	0.1463	0.0000	SURCHARGED
30 minute summer	PA5	22	72.925	0.275	1.8	0.3080	0.0000	SURCHARGED
15 minute summer	PA6	13	72.593	0.243	1.3	0.0514	0.0000	SURCHARGED
15 minute summer	PA7	13	72.146	0.246	1.3	0.0639	0.0000	SURCHARGED
15 minute summer	PA8	13	72.163	0.263	2.5	0.2077	0.0000	SURCHARGED
15 minute summer	PA9	13	71.968	0.268	3.4	0.3371	0.0000	SURCHARGED
120 minute summer	PA10	84	72.137	0.287	0.6	0.5606	0.0000	SURCHARGED
15 minute summer	PA11	12	72.151	0.251	2.9	0.1251	0.0000	SURCHARGED
30 minute summer	PA12	22	72.023	0.273	1.9	0.3138	0.0000	SURCHARGED
15 minute summer	PA13	12	71.997	0.247	3.2	0.0951	0.0000	SURCHARGED
15 minute summer	PA14	13	72.093	0.243	1.3	0.0514	0.0000	SURCHARGED
30 minute winter	PA15	27	72.849	0.199	2.5	1.0941	0.0000	SURCHARGED
15 minute summer	PA16	13	72.511	0.261	2.3	0.1868	0.0000	SURCHARGED
30 minute summer	PA17	24	72.532	0.282	2.1	0.5467	0.0000	SURCHARGED
15 minute summer	PA18	13	72.207	0.257	2.5	0.1647	0.0000	SURCHARGED
15 minute summer	S1	11	71.279	0.029	1.4	0.0509	0.0000	OK
15 minute summer	S2	11	71.269	0.075	9.3	0.1328	0.0000	OK
15 minute summer	S3	11	71.254	0.089	14.8	0.1568	0.0000	OK
15 minute summer	S4	11	71.152	0.049	18.1	0.0858	0.0000	OK
120 minute winter	S5	104	71.085	0.403	1.2	0.7114	0.0000	OK
120 minute summer	S6	102	71.084	0.384	22.0	7.5136	0.0000	OK
120 minute winter	JUNCTION	104	71.084	0.417	7.1	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)
30 minute summer	PA1	Orifice	S1	0.6				
15 minute summer	PA2	Orifice	S2	0.5				
15 minute summer	PA3	Orifice	S3	0.6				
30 minute summer	PA4	Orifice	S3	0.3				
30 minute summer	PA5	Orifice	S4	0.6				
15 minute summer	PA6	Orifice	S4	0.6				
15 minute summer	PA7	Orifice	S5	0.6				
15 minute summer	PA8	Orifice	JUNCTION	1.3				
15 minute summer	PA9	Orifice	S6	1.7				
120 minute summer	PA10	Orifice	JUNCTION	0.1				
15 minute summer	PA11	Orifice	S7	1.9				
30 minute summer	PA12	Orifice	S7	0.7				
15 minute summer	PA13	Orifice	S8	2.5				
15 minute summer	PA14	Orifice	S8	0.6				
30 minute winter	PA15	Orifice	S9	0.5				
15 minute summer	PA16	Orifice	S10	1.2				
30 minute summer	PA17	Orifice	S10	0.5				
15 minute summer	PA18	Orifice	S12	1.5				
15 minute summer	S1	1.001	S2	1.3	0.153	0.004	0.3654	
15 minute summer	S2	1.002	S3	9.1	0.394	0.030	0.3392	
15 minute summer	S3	1.003	S4	14.7	0.827	0.049	0.5792	
15 minute summer	S4	1.004	S12	17.9	0.781	0.014	1.5878	
120 minute winter	S5	8.001	JUNCTION	0.9	0.095	0.003	1.5542	
120 minute summer	S6	7.001	JUNCTION	-18.5	0.240	-0.062	3.4169	
120 minute winter	JUNCTION	7.002	S7	-6.5	0.217	-0.022	3.8104	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	S7	102	71.085	0.452	9.1	0.7990	0.0000	OK
120 minute winter	S8	102	71.085	0.482	9.9	0.8523	0.0000	OK
120 minute summer	S9	104	71.086	0.403	11.3	4.7917	0.0000	OK
120 minute summer	S10	94	71.086	0.404	2.7	0.7147	0.0000	OK
120 minute summer	S11	94	71.086	0.431	14.0	0.7617	0.0000	OK
120 minute winter	S12	102	71.085	0.551	18.0	3.1569	0.0000	SURCHARGED
15 minute summer	3302	1	70.350	0.000	5.9	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)
120 minute winter	S7	7.003	S8	8.6	0.301	0.029	3.6688	
120 minute winter	S8	7.004	S12	9.4	0.351	0.031	2.3865	
120 minute summer	S9	15.001	S11	-9.6	0.254	-0.028	2.3882	
120 minute summer	S10	16.001	S11	2.3	0.186	0.007	2.2991	
120 minute summer	S11	15.002	S12	-13.1	0.318	-0.039	6.7358	
120 minute winter	S12	Hydro-Brake®	3302	5.9				83.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	PA1	24	72.973	0.423	3.1	0.9493	0.0000	SURCHARGED
30 minute summer	PA2	23	72.972	0.422	2.7	0.7533	0.0000	SURCHARGED
30 minute summer	PA3	23	72.766	0.416	2.7	0.6765	0.0000	SURCHARGED
60 minute summer	PA4	45	73.085	0.435	1.7	0.8884	0.0000	SURCHARGED
30 minute winter	PA5	27	73.082	0.432	3.5	1.5109	0.0000	SURCHARGED
30 minute summer	PA6	23	72.766	0.416	2.7	0.6765	0.0000	SURCHARGED
30 minute summer	PA7	23	72.320	0.420	2.7	0.7155	0.0000	SURCHARGED
30 minute summer	PA8	23	72.326	0.426	5.5	1.4103	0.0000	SURCHARGED
30 minute summer	PA9	23	72.126	0.426	7.4	2.0152	0.0000	SURCHARGED
120 minute winter	PA10	118	72.275	0.425	1.0	2.0752	0.0000	SURCHARGED
30 minute summer	PA11	22	72.313	0.413	6.3	1.3179	0.0000	SURCHARGED
30 minute summer	PA12	25	72.179	0.429	4.7	1.6015	0.0000	SURCHARGED
15 minute summer	PA13	13	72.157	0.407	7.9	1.3208	0.0000	SURCHARGED
30 minute summer	PA14	23	72.266	0.416	2.7	0.6765	0.0000	SURCHARGED
60 minute winter	PA15	57	72.999	0.349	4.0	3.8302	0.0000	SURCHARGED
30 minute summer	PA16	23	72.674	0.424	5.1	1.3435	0.0000	SURCHARGED
60 minute summer	PA17	48	72.677	0.427	3.8	2.2600	0.0000	SURCHARGED
30 minute summer	PA18	22	72.368	0.418	5.5	1.3015	0.0000	SURCHARGED
240 minute winter	S1	236	71.429	0.179	1.0	0.3162	0.0000	OK
240 minute winter	S2	240	71.429	0.235	4.7	0.4155	0.0000	OK
240 minute winter	S3	240	71.429	0.264	7.7	0.4667	0.0000	OK
240 minute winter	S4	236	71.429	0.326	9.8	0.5768	0.0000	OK
240 minute winter	S5	236	71.429	0.747	1.7	1.3201	0.0000	SURCHARGED
240 minute winter	S6	236	71.429	0.729	23.7	72.8877	0.0000	SURCHARGED
240 minute winter	JUNCTION	236	71.429	0.762	18.9	0.0000	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	PA1	Orifice	S1	0.7				
30 minute summer	PA2	Orifice	S2	0.7				
30 minute summer	PA3	Orifice	S3	0.8				
60 minute summer	PA4	Orifice	S3	0.3				
30 minute winter	PA5	Orifice	S4	0.8				
30 minute summer	PA6	Orifice	S4	0.8				
30 minute summer	PA7	Orifice	S5	0.8				
30 minute summer	PA8	Orifice	JUNCTION	1.7				
30 minute summer	PA9	Orifice	S6	2.2				
120 minute winter	PA10	Orifice	JUNCTION	0.1				
30 minute summer	PA11	Orifice	S7	2.5				
30 minute summer	PA12	Orifice	S7	0.9				
15 minute summer	PA13	Orifice	S8	3.2				
30 minute summer	PA14	Orifice	S8	0.8				
60 minute winter	PA15	Orifice	S9	0.7				
30 minute summer	PA16	Orifice	S10	1.5				
60 minute summer	PA17	Orifice	S10	0.6				
30 minute summer	PA18	Orifice	S12	1.9				
240 minute winter	S1	1.001	S2	0.9	0.128	0.003	2.5090	
240 minute winter	S2	1.002	S3	4.7	0.336	0.016	1.6297	
240 minute winter	S3	1.003	S4	7.7	0.658	0.025	4.3776	
240 minute winter	S4	1.004	S12	9.5	0.574	0.007	3.1830	
240 minute winter	S5	8.001	JUNCTION	1.6	0.093	0.005	2.1337	
240 minute winter	S6	7.001	JUNCTION	-17.5	0.232	-0.058	4.8195	
240 minute winter	JUNCTION	7.002	S7	-16.7	0.225	-0.055	4.9105	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	S7	236	71.429	0.796	17.7	1.4065	0.0000	SURCHARGED
240 minute winter	S8	240	71.429	0.826	10.1	1.4596	0.0000	SURCHARGED
240 minute winter	S9	236	71.430	0.747	9.5	21.5325	0.0000	SURCHARGED
240 minute winter	S10	236	71.429	0.747	2.9	1.3208	0.0000	SURCHARGED
240 minute winter	S11	236	71.429	0.774	9.8	1.3684	0.0000	SURCHARGED
240 minute winter	S12	240	71.429	0.895	15.5	5.1250	0.0000	SURCHARGED
15 minute summer	3302	1	70.350	0.000	5.9	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)
240 minute winter	S7	7.003	S8	-9.5	0.318	-0.032	4.3913	
240 minute winter	S8	7.004	S12	-8.2	0.355	-0.027	2.7196	
240 minute winter	S9	15.001	S11	-7.2	0.186	-0.021	3.2182	
240 minute winter	S10	16.001	S11	2.9	0.188	0.008	3.0925	
240 minute winter	S11	15.002	S12	-8.0	0.272	-0.024	8.1098	
240 minute winter	S12	Hydro-Brake®	3302	5.9				150.7

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	PA1	44	73.291	0.741	4.3	2.2826	0.0000	FLOOD RISK
60 minute summer	PA2	42	73.305	0.755	3.7	1.8112	0.0000	FLOOD RISK
30 minute summer	PA3	24	73.105	0.755	5.0	1.6761	0.0000	FLOOD RISK
60 minute winter	PA4	51	73.408	0.758	2.3	2.0148	0.0000	FLOOD RISK
60 minute winter	PA5	48	73.433	0.783	4.3	3.5070	0.0000	FLOOD RISK
30 minute summer	PA6	24	73.105	0.755	5.0	1.6761	0.0000	FLOOD RISK
30 minute summer	PA7	25	72.655	0.755	5.0	1.7437	0.0000	FLOOD RISK
30 minute summer	PA8	24	72.686	0.786	10.1	3.3721	0.0000	FLOOD RISK
30 minute summer	PA9	25	72.418	0.718	13.6	4.8227	0.0000	FLOOD RISK
240 minute winter	PA10	240	72.513	0.663	1.1	4.6846	0.0000	FLOOD RISK
30 minute summer	PA11	23	72.669	0.769	11.5	3.3695	0.0000	FLOOD RISK
60 minute winter	PA12	48	72.470	0.720	4.6	3.7676	0.0000	FLOOD RISK
30 minute summer	PA13	23	72.477	0.727	12.9	3.4980	0.0000	FLOOD RISK
30 minute summer	PA14	24	72.605	0.755	5.0	1.6761	0.0000	FLOOD RISK
120 minute winter	PA15	96	73.334	0.684	4.5	8.2268	0.0000	FLOOD RISK
30 minute summer	PA16	24	72.992	0.742	9.3	3.2299	0.0000	FLOOD RISK
60 minute winter	PA17	59	72.918	0.668	5.0	5.1177	0.0000	FLOOD RISK
30 minute summer	PA18	24	72.691	0.741	10.1	3.2297	0.0000	FLOOD RISK
360 minute winter	S1	352	72.387	1.137	3.6	2.0098	0.0000	SURCHARGED
360 minute winter	S2	352	72.387	1.193	5.2	2.1088	0.0000	SURCHARGED
360 minute winter	S3	352	72.387	1.222	7.8	2.1600	0.0000	SURCHARGED
360 minute winter	S4	352	72.387	1.284	9.8	2.2696	0.0000	SURCHARGED
360 minute winter	S5	352	72.387	1.705	2.1	3.0135	0.0000	FLOOD RISK
360 minute winter	S6	352	72.387	1.687	27.0	154.0815	0.0000	FLOOD RISK
360 minute winter	JUNCTION	352	72.387	1.720	19.0	0.0000	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	PA1	Orifice	S1	0.9				
60 minute summer	PA2	Orifice	S2	1.0				
30 minute summer	PA3	Orifice	S3	1.1				
60 minute winter	PA4	Orifice	S3	0.5				
60 minute winter	PA5	Orifice	S4	1.1				
30 minute summer	PA6	Orifice	S4	1.1				
30 minute summer	PA7	Orifice	S5	1.0				
30 minute summer	PA8	Orifice	JUNCTION	2.4				
30 minute summer	PA9	Orifice	S6	2.9				
240 minute winter	PA10	Orifice	JUNCTION	0.2				
30 minute summer	PA11	Orifice	S7	3.5				
60 minute winter	PA12	Orifice	S7	1.2				
30 minute summer	PA13	Orifice	S8	4.4				
30 minute summer	PA14	Orifice	S8	1.1				
120 minute winter	PA15	Orifice	S9	1.0				
30 minute summer	PA16	Orifice	S10	2.1				
60 minute winter	PA17	Orifice	S10	0.7				
30 minute summer	PA18	Orifice	S12	2.6				
360 minute winter	S1	1.001	S2	-2.8	0.123	-0.009	8.1872	
360 minute winter	S2	1.002	S3	4.7	0.336	0.016	4.1395	
360 minute winter	S3	1.003	S4	7.7	0.610	0.026	8.9342	
360 minute winter	S4	1.004	S12	9.3	0.654	0.007	4.0911	
360 minute winter	S5	8.001	JUNCTION	1.9	0.089	0.006	2.1337	
360 minute winter	S6	7.001	JUNCTION	-18.9	0.234	-0.063	4.8195	
360 minute winter	JUNCTION	7.002	S7	-15.7	0.228	-0.052	4.9105	

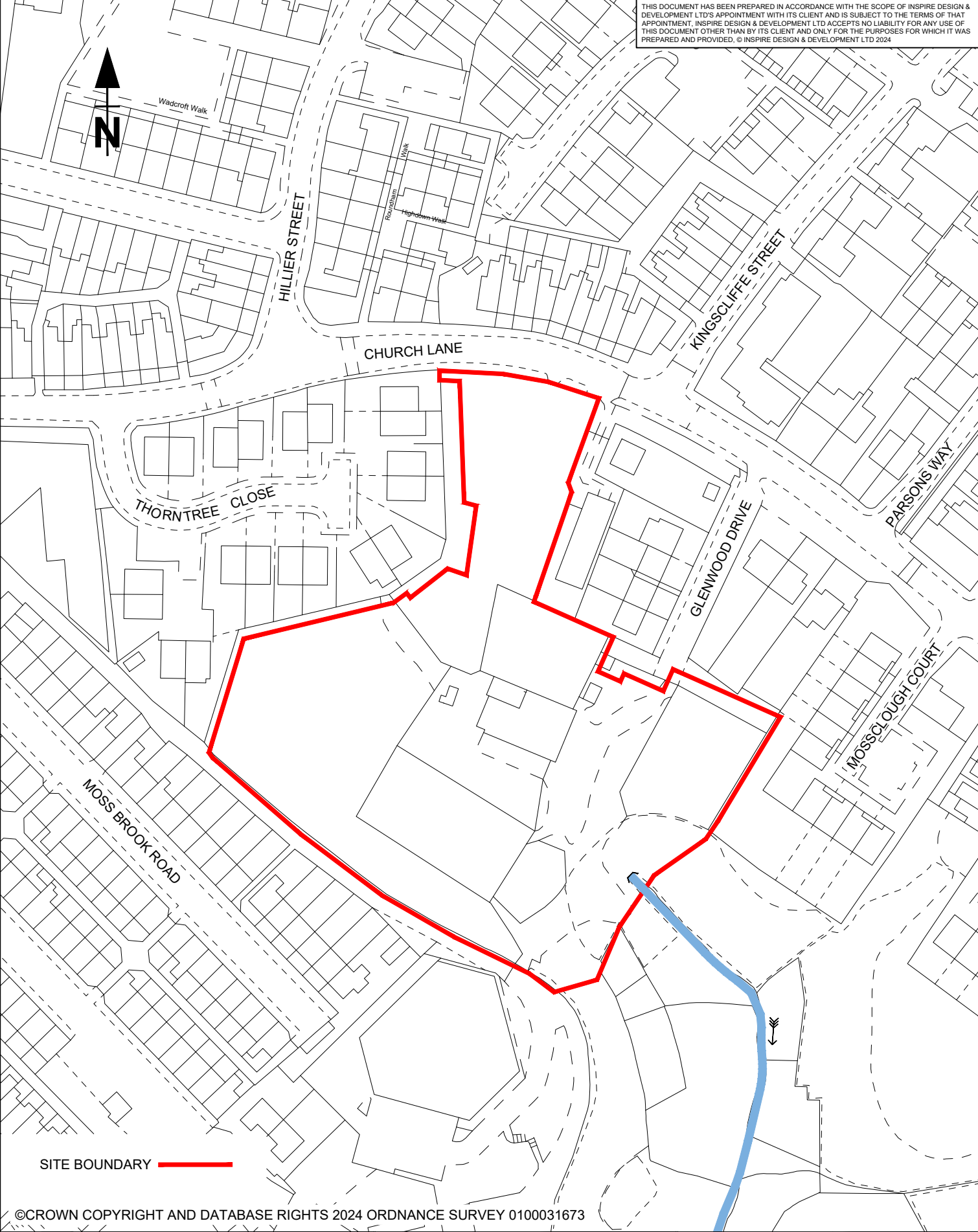
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S7	352	72.387	1.754	16.5	3.1001	0.0000	FLOOD RISK
360 minute winter	S8	352	72.387	1.784	8.4	3.1531	0.0000	FLOOD RISK
360 minute winter	S9	352	72.387	1.704	9.4	59.4587	0.0000	SURCHARGED
360 minute winter	S10	352	72.387	1.705	3.6	3.0135	0.0000	SURCHARGED
360 minute winter	S11	352	72.387	1.732	8.6	3.0612	0.0000	SURCHARGED
360 minute winter	S12	352	72.387	1.853	14.4	10.6126	0.0000	FLOOD RISK
15 minute summer	3302	1	70.350	0.000	5.9	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)
360 minute winter	S7	7.003	S8	-8.1	0.300	-0.027	4.3913	
360 minute winter	S8	7.004	S12	7.3	0.337	0.024	2.7196	
360 minute winter	S9	15.001	S11	-7.6	0.193	-0.022	3.2182	
360 minute winter	S10	16.001	S11	3.4	0.186	0.010	3.0925	
360 minute winter	S11	15.002	S12	-7.2	0.294	-0.021	8.1098	
360 minute winter	S12	Hydro-Brake®	3302	6.4				200.0

DRAWINGS

THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF INSPIRE DESIGN & DEVELOPMENT LTD'S APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. INSPIRE DESIGN & DEVELOPMENT LTD ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED. © INSPIRE DESIGN & DEVELOPMENT LTD 2024



©CROWN COPYRIGHT AND DATABASE RIGHTS 2024 ORDNANCE SURVEY 0100031673

DATE: 05/07/2024	DRAWING TITLE:		REV	DATE	NAME	CHK	NOTES
DRAWN: NGP	LOCATION PLAN		DRAWING STATUS:				
CHECKED: SR	PROJECT:	CLIENT:	FOR APPROVAL				
APPROVED: CR	CHURCH LANE, MOSTON	BUILT DEVELOPMENTS LTD	DRAWING No:		REVISION No:		
SCALE @ A4: 1:1250			BDL-1762-01-GA-001				



Station	Easting	Northing	Level
1	386395.959	401485.717	73.027
2	386374.106	401482.999	73.027

Abbreviations/Symbols (Measured Building Surveys):

C:	Window Cill Height
H:	Window Head Height
DH:	Door Head Height
COL:	Column
SVP:	Soil Vent Pipe
FL:	Floor Level
TH:	Threshold Level
FC:	Floor to Ceiling Height
VC:	Vaulted Ceiling

Line types

---	Hedge Lines
- - -	Drainage Runs
- - -	Overhead Electricity Cables
- - -	Overhead Telephone Cables

Symbols

	Tree/Bush		Glass House
	Control Station		Osbn
	Borehole		
	Trial Hole		

Abbreviations (Topographic Survey):

AH:	Arch Height
AV:	Air Valve
BB:	Bellina Beacon
BOX:	Electricity Box, Cables Box, Etc.
BOL:	Bollard
BT/C:	British Telecom Inspection Chamber
BS:	Bus Stop
BS/UP:	Bus Stop / Lamp Post
CATV:	CATV Inspection Chamber
CCTV:	Closed Circuit Television
CL:	Cellar Light
C.PIT:	Catch Pit
ER:	Earth Rod
EC:	Electricity Inspection Chamber
EP:	Electricity Pole
FH:	Fire Hydrant
FP:	Flag Pole
GV:	Gas Valve
G:	Gully
IC:	Inspection Chamber
KO:	Kerb Outlet
LP:	Lamp Post
LB:	Letter Box
LC:	Lighting Column
MKR:	Marker
MH:	Manhole
MHP:	Measuring Point
MS:	Mile Stone
NYNEX:	Nynex Inspection Chamber
O/H:	Over Hanging Post
PO/IC:	Post Office Inspection Chamber
R/S:	Road Sign
RE:	Rodding Eye
RTW:	Retaining Wall
S/P:	Sign Post
SNP:	Street Name Plate
ST:	Shop Top
SV:	Shop Valve
T:	Telecom Inspection Chamber
TCB:	Telephone Call Box
TH:	Threshold Level
TL:	Traffic Light
TP:	Telegraph Pole
TROUGH:	Trough
WO:	Water Outlet
WM:	Water Meter

Fence Descriptions:

B/W:	Barbed Wire
C/S:	Close Boarded
C/BARRIER:	Crash Barrier
C/L:	Chain Link
C/P:	Chestnut Paving
C/I:	Corrugated Iron
I/R:	Iron Rolling
MBC:	Miscellaneous
P/R:	Post & Rail
P/W:	Post & Wire
P/C:	Post & Chain
S/PAL:	Steel Palisade
W/M:	Wire Mesh

Survey Notes:

Coordinates and Levels related to Ordnance Survey Datum - GPS OSGB36.

Revision	Date	Description

Chris Parlington Land Surveyors

56b Carrington Lane
Sale
Cheshire
M33 5NR
t: 0161 976 1194
www.cpls.co.uk e:survey@cpls.co.uk

Client

Bernard Taylor Partnership

Project

Church Lane, Moston, Manchester
Site Survey

Scale	1:200	Surveyed By	J C	Date	01.07.24
Drawing No.	010724JC-01	Checked By	CPLS	Date	02.07.24
		Drawn By	J C	Date	02.07.24

00 Proposed Site Plan
1 : 500



Key

- 2400 x 4800mm parking space
- Pavement
- Parking Space - Tarmac
- Access Road - Tarmac
- Access Road - Tarmac
- Private Garden
- Front Garden
- POS

Schedule of Accommodation

- 5no 1B2P Bungalow @ 50m²
- 6no 2B3P Semi-Detached Houses @ 70m²
- 3no 2B3P Terraced Houses @ 70m²
- 8no 2B4P Semi-Detached Houses @ 79m²
- 6no 3B5P Semi-Detached Houses @ 90m²
- 8no 3B5P Terraced Houses @ 90m²
- 3no 3B5P Detached Houses @ 90m²
- 39no Total**

- 1B2P - 100% parking spaces
- 2B3P - 100% parking spaces
- 2B4P - 100% parking spaces
- 3B5P - 100% parking spaces

Caveats

- Overlooking distances subject to LPA Approval
- Density and parking mix subject to LPA Approval

Layout subject to confirmation of red line boundary, all statutory approvals including highways, planning and building regulations, relevant surveys and reports such as topographical, ecology, trees, ground investigation and flood risk.

DO NOT SCALE FROM THIS DRAWING
ALL DIMENSIONS MUST BE CHECKED ON SITE BY
CONTRACTOR PRIOR TO CONSTRUCTION

Area Schedule		
Type	Description	Area
BTP - Adopted Footpath	Light Grey	948 m²
BTP - Adopted Road	Dark Grey	1368 m²
BTP - Car Parking	Salmon	592 m²
BTP - Front Garden	Dark Green	907 m²
BTP - Plot Hardstanding	Light Grey	954 m²
BTP - POS Zone	Dark Green	937 m²
BTP - Private Garden	Light Green	2602 m²
BTP - Unadopted Drive	Brown	217 m²

Total: 175 8525 m²

H	02.07.24	ED	Drawing revised to overlay topographical survey
G	01.05.24	ED	Drawing revised following comments from LPA
F	29.04.24	ED	Drawing revised following comments from LPA
E	26.04.24	ED	Drawing revised following comments from LPA
D	22.04.24	ED	Drawing revised following comments from LPA and client
C	29.02.24	ED	Drawing revised to add 2no cottage style apartments in relation to land ownership.
B	20.02.24	ED	Drawing revised to amend red line boundary
A	14.02.24	ED	Drawing revised to amend road as per client feedback
Rev	Date	Int	Description

btp
ARCHITECTS

RIBA
Chartered Practice

CLIENT:

Built Development Ltd

PROJECT:

Church Lane Moston

DESCRIPTION:

Proposed Site Plan

PURPOSE OF ISSUE:

Feasibility

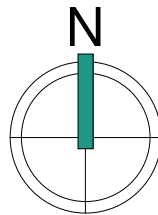
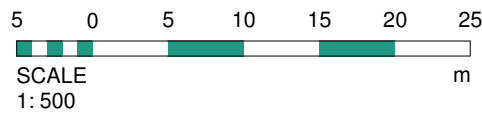
DRAWN BY:	CHECKED	DATE:	SCALE @ A2:
ED	VJS	14.02.24	1 : 500

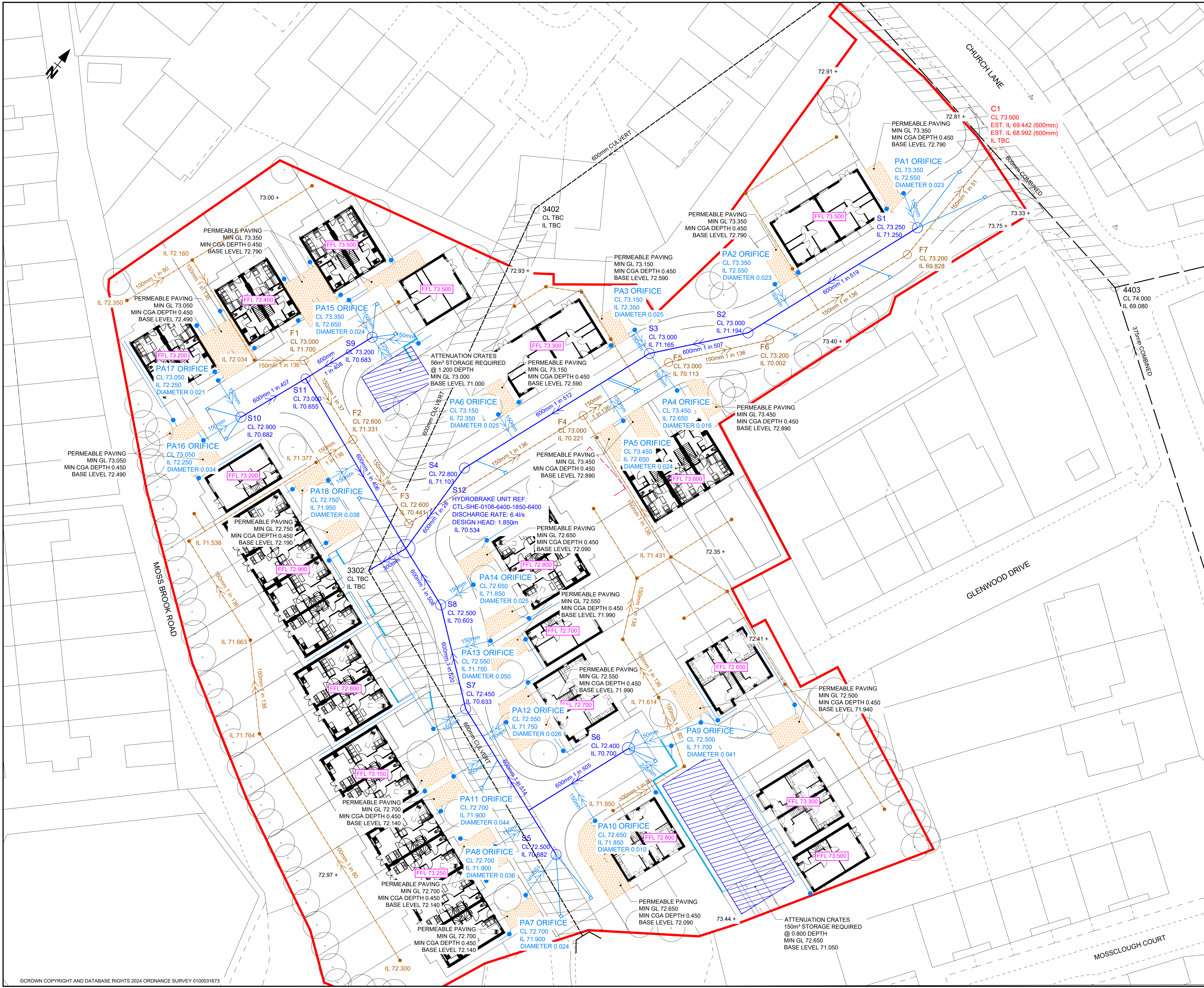
JOB NO:	STATUS CODE:	DRAWING NO:	REV
4450	S0	105	H

FILE IDENTIFIER:

CL-BTP-00-SP-DR-A-4450_105.H

Elizabeth House 486 Didsbury Road Heaton Mersey Stockport SK4 3BS
0161 443 1221 info@bernardtaylor.co.uk www.btparchitects.co.uk





THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF INSPIRE DESIGN & DEVELOPMENT LTD'S APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. INSPIRE DESIGN & DEVELOPMENT LTD ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED. © INSPIRE DESIGN & DEVELOPMENT LTD 2024

NOTES:

- DO NOT SCALE FROM THIS DRAWING.
- ALL MEASUREMENTS ARE IN METERS UNLESS OTHERWISE STATED.
- DRAWING NOT ISSUED FOR CONSTRUCTION.
- SITE LAYOUT PROVIDED BY BTP ARCHITECTS DWG No. CL-BTP-00-SP-DR-A-4450_105.H Rev H
- LOCATION OF SVPs TO BE CONFIRMED BY THE ARCHITECT
- PROPOSED EXTERNAL WORKS LEVELS TO BE CONFIRMED AT DETAILED DESIGN
- OUTFALL INVERT LEVELS TO BE CONFIRMED & REPORTED BACK TO INSPIRE DESIGN & DEVELOPMENT

KEY:

- FFL 73.300** PROPOSED FINISH FLOOR LEVEL
73.00 + EXISTING SPOT LEVEL

EXISTING

- PUBLIC COMBINED DRAINAGE WITH EASEMENT
 PUBLIC SURFACE WATER DRAINAGE WITH EASEMENT

PROPOSED

- ADOPTED SURFACE WATER DRAINAGE
 ADOPTED FOUL DRAINAGE
 ADOPTED COMBINED MANHOLE
 PRIVATE SURFACE WATER DRAINAGE
 PRIVATE FOUL DRAINAGE
 CHANNEL DRAIN
 GULLY
 ATTENUATION CRATES
 PERMEABLE PAVING

REV	DATE	NAME	CHECK	NOTE
-----	------	------	-------	------

DRAWING STATUS:

FOR APPROVAL

CLIENT

BUILT DEVELOPMENTS LTD



PROJECT

CHURCH LANE
MOSTON

DRAWING TITLE

DRAINAGE STRATEGY

DRAWN	CHECKED	APPROVED
NGP	SR	CR

DATE	SCALE @ A1
05/07/24	1:250

DRAWING No.	REVISION No.
-------------	--------------

BDL-1762-01-DR-001