

**PROJECT: LANDS AT WATTS CLOSE,
LONDON. N15 5DW**

PROJECT NO: 22778

DOCUMENT TITLE: DRAINAGE STRATEGY REPORT

DOCUMENT NO: 22778-RP-01

DATE: 29TH SEPTEMBER 2022

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	Lands at Watts Close, London, N15 5DW				22778	
	Section				Sheet no./rev.	
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1. GENERAL

1.0. General

The subject development site is located in a predominantly residential area between Watts Close and Lomond Close, approximately 300m to the north-west of Seven Sisters Station. The site can be found by the national grid reference TQ 32163 62589, with the proposed site location as outlined in Figure 1 & 2 below.

The proposed development will consist of the demolition of 11 existing bungalows and a community building to provide lands for the provision of 18 new homes for council rent. The proposed development will comprise 6No. two-storey family houses (three & four bedrooms) and 12No. apartments (one & two bedrooms) in two, three-storey blocks including two wheelchair user dwellings. The development will also include two wheelchair parking spaces, amenity and play space, landscaping and cycle and refuse/recycling storage. The overall site area within the site boundary is approximately 0.278ha.

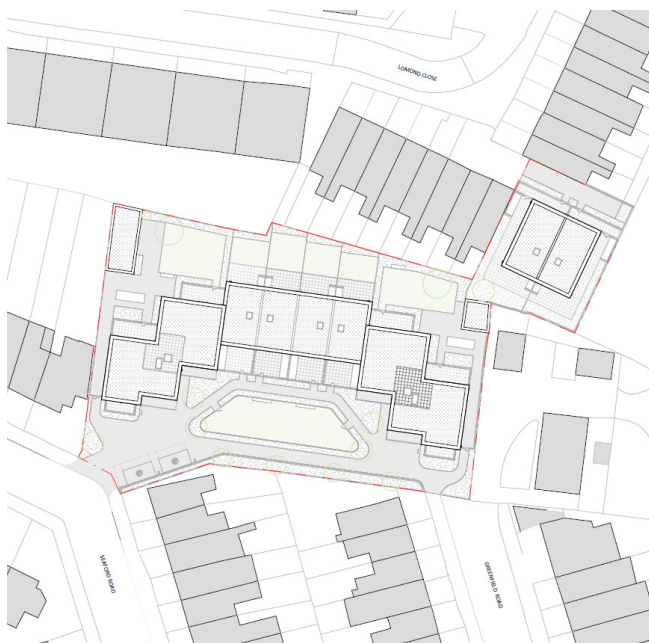


Figure 1: Proposed Site Plan

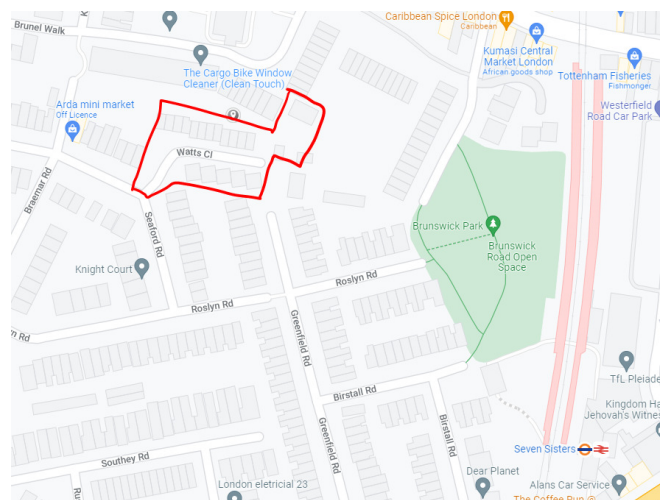


Figure 2: Site Location Plan

The report has been commissioned by the client to discharge Planning Condition 11 of the Planning Decision Notice which states:

Condition 11 (Drainage)

The authorised development shall not begin except for demolition works until drainage works have been carried out in accordance with details to be submitted to and approved by the Local Planning Authority. This shall include drainage calculations and confirmation of rate and point of discharge from the water authority.

Reason: *In order to ensure a satisfactory provision from drainage on site and ensure suitable drainage provision for the authorised development and comply with Policy SI13 of the London Plan 2021, Policies SP0 and SP4 of the Haringey Local Plan 2017 and Policy DM24 of The Development Management DPD 2017.*

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1.1. Brief

The purpose of this document is to outline the drainage strategy for the proposed development, and to provide details of the proposed storm & foul outfall connections to the existing public drainage infrastructure serving the area. It is intended that this document will be submitted to Haringey Local Authority for discharge of Condition 11 of the planning decision notice.

The report should be read in conjunction with the drainage drawings included in Appendix I. Please see Appendix I for further details.

1.2. Design Information

Title:	Drainage Strategy Report
Site:	Lands at Watts Close, London, N15 5DW
Report Ref:	22778-RP-01
Local Authority:	London Borough of Haringey
Calculations:	Arash Fehmi BE(Hons), MSc
Checked:	David Barden BE(Hons), DipStructEng, AdvDipPM, CEng, MIEI, MStructE

1.3. Design Reference

Reference has been made to the following documents to produce this report:

- CIRIA SuDS Manual 2015 C753
- The Haringey Sustainable Drainage Evaluation Guide
- National Planning Policy Framework (NPPF)
- Planning Practice Guidance – Flood Risk and Coastal Change
- The Haringey Sustainable Drainage planning guide
- The London Sustainable Drainage Proforma
- Environment Agency climate change guidance
- Environmental Agency (EA) Flood maps.

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2. SURFACE WATER DRAINAGE SYSTEM

2.0. Existing Surface Water Drainage

A utilities survey within the site indicates that the existing surface water drainage connects to a Thameswater (TW) sewer located in the adjacent highway. (Please refer to Appendix II & III for Utilities Survey & TW Asset Search respectively). The existing surface water drainage does not appear to contain any on-site attenuation or flow control device to restrict surface water runoff from the site.

2.1. Proposed Surface Water Drainage

The proposed development marginally increases the impermeable area at the site, leading to an increase in surface water run-off generated by the site. This surface water run-off, will however, be managed in the proposed scheme to mitigate off-site flood risk and to comply with planning requirements.

It is proposed to reduce surface water runoff from the Site to the 1 in 100-year greenfield runoff rates in accordance with the London Sustainable Drainage Action Plan and CIRIA SuDS Manual 2015.

To both reduce and attenuate flow, the proposed Site will be designed in accordance with the principles of SuDS in line with the London Plan Policy 5:13 as set out in the London Sustainable Drainage Action Plan, as listed below in order of preference for surface water disposal:

1. Store rainwater for later use: The presence of green roofs will reduce the volume of water available for collection and reuse, however it is still proposed to provide water butts to the properties. Green roofs have been specified for the wider environmental benefits to the site.
2. Use of infiltration techniques: Infiltration is not deemed to be viable due to the underlying geology of London Clay which is of low permeability.
3. Attenuate rainwater in ponds or open water features for gradual release: Due to the small site area, the use of ponds or other open water features are not considered suitable.
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release: Attenuation will be provided in the form of a modular attenuation tank, with outflow restricted by a pumping chamber. Green roofs are proposed throughout the development on both the housing and apartment blocks.
5. Discharge rainwater direct to a watercourse: There are no nearby watercourses suitable for the discharge of surface water run-off.
6. Discharge rainwater to a surface water or combined sewer drain: It is proposed to discharge surface water run-off to the TW surface water sewer located adjacent to the site, as per the existing regime, via existing lateral pipe.

2.2. Proposed Discharge Rates

As the site is situated in London the requirements of Policy SI 13 Sustainable drainage are relevant to the site. This states that the re-development of the site should aim to reduce the surface water run-off from the site to greenfield run-off rates. The greenfield run-off discharge rates have been calculated for the impermeable areas of the proposed development. Greenfield run-off was calculated using the method described in the Institute of Hydrology report 124 'Flood Estimation for Small Catchments' (see Greenfield Calculations in Appendix IV). The greenfield rates applicable to the site are summarised in table below: -

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Hardstanding Area (ha)	Greenfield rate (l/s)			
	Qbar	1-year	30-year	100-year
0.188	0.8	0.7	1.9	2.5

It is proposed to restrict discharge of surface water run-off from the site to the 1% AEP greenfield run-off rate in all events up to and including the 1% AEP rainfall event inclusive of 40% climate change event. Discharge will be limited by a pump sump flow control device.

The proposals therefore reduce the existing run-off rate in line with the London Plan and the Haringey SWMP.

2.3. Attenuation

Attenuation is provided within the site to manage the run-off storage volume required for rainfall events up to and including the 1% AEP annual probability event inclusive of 40% climate change. Attenuation will be provided using below ground modular attenuation storage crates located in central landscaped reserve to the front of the site. A full set of storm network and attenuation calculations are provided in Appendix IV of this report. (Please refer to Appendix IV for further details).

2.4. Green Roofs

Green roofs are to be provided to the apartment & housing blocks, which provide the benefit of reducing peak flow rates to the site drainage system for small and medium-sized events, as well as biodiversity benefits. As described in C753, their impact tends to be most significant in summer, where intense short duration events may generate very little run-off from the roof.

However, the reduction in volume of run-off from a green roof for an extreme event is unlikely to impact on downstream attenuation storage requirements, and the proposed attenuation tank has therefore conservatively been sized not accounting any benefit from the green roof storage volumes.

2.5. Maintenance

Maintenance of the proposed SuDS strategy shall include for regular inspections at varying intervals depending on the system requirements. The SuDS system proposed is Attenuation Storage and Green Roofs.

1. Attenuation Storage: The attenuation manhole inflow & outflow inspection chambers are to be monitored regularly by visual inspection for silt build up and cleaned as required. During the development it is recommended to inspect the chambers more frequently due to higher risk of sediment/debris build up. A visual inspection once a week is advised.

On completion of the development, a yearly check is recommended with additional inspections following heavy storm events. The proposed pump should be operated under a maintenance/emergency call out contract with a suitably experienced and resourced pump maintenance contractor. It is recommended that a 24 hour call out contract is agreed.

The responsibility of maintaining the proposed SuDS system in this instance will be with the property owner.

2. Typical Green Roof Maintenance: During the first 3 months whilst the green roof becomes established regular maintenance will be required, including irrigation as necessary, and subject to specifiers advise, an initial application of slow-release fertiliser. Once the green roof is established, a suitably qualified specialist green

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roof maintenance contractor should be employed to carry out two visits a year. Typical maintenance tasks will include:

- Inspection of vegetation and reporting any problems on plant establishment.
- Removal of unwanted weeds such as Buddleia, Canadian fleabane, sow-thistles, and docks.
- Clearance of drainage pits and vegetation barriers around the perimeter.

3. FOUL DRAINAGE SYSTEM

3.0. Existing Foul Drainage Infrastructure

The existing site was previously served by an existing 150mm diameter foul sewer, connected to a TW foul sewer located in the adjacent highway. The proposed foul discharge rate needs to be compared to the existing foul discharge rate (as outlined below) to determine if there is any increase in foul discharge rates to the existing public sewer. An existing population equivalent of 104 persons (11x4 persons for Bungalows + 60 persons for the Community Building) has been assumed for the previous occupied site.

3.1. Proposed Foul Sewer System

The proposed domestic foul flow rates from the site are taken from the British Water Code of Practice Flows and Load which allows 150 l/person/day for domestic use. A population equivalent of 72 persons has been taken for the site based on the accommodation schedule as outlined below.

Accommodation Schedule

	Unit	Level	1B2P	1B2P WCH	2B4P	3B5P	4B6P
Flats A West	1	G	✓				
	2	G		✓			
	3	1			✓		
	4	1			✓		
	5	2			✓		
	6	2			✓		
Houses Watts Cl.	7	G/1				✓	
	8	G/1				✓	
	9	G/1				✓	
	10	G/1				✓	
Flats B East	11	G	✓				
	12	G		✓			
	13	1			✓		
	14	1			✓		
	15	2			✓		
	16	2			✓		
Houses Lomond Cl.	17	G/1					✓
	18	G/1					✓
Sub-total			2	2	8	4	2
TOTAL			18				

$$QF = (\text{No. of occupants per unit}) \times (\text{Average Foul Discharge Rate})$$

$$QPEAK = (6) \times (QF)$$

Where:

QF = Discharge per unit (litres/second/unit)

QPEAK = Peak Discharge (litres/second/unit)

Average Foul Discharge Rate = 225 (litres/day/person)

Flow type: Domestic (150 litres/day/person)

Flow type: Community Centre (60 litres/day/person)

$$\text{Proposed QF} = (72 \text{ people}) \times (150 \text{ litres/day/person})$$

$$= 10,800 \text{ litres/day}$$

$$\text{Proposed QPEAK} = (6) \times (10,800 \text{ litres/day})$$

$$= 64,800 \text{ litres/day}$$

$$= 0.750 \text{ litres/second}$$

$$\text{Existing QF} = (44 \text{ people}) \times (150 \text{ litres/day/person}) + (60 \text{ people}) \times (60 \text{ litres/day/person})$$

$$= 10,200 \text{ litres/day}$$

$$\text{Proposed QPEAK} = (6) \times (10,200 \text{ litres/day})$$

$$= 61,200 \text{ litres/day}$$

$$= 0.708 \text{ litres/second}$$

As indicated from the above calculation, it is anticipated there will be negligible change in foul flows from the proposed development.

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4. CONCLUSION

Surface water drainage will utilise SuDS techniques to improve water quality and to provide attenuation on site to reduce the unrestricted discharge rate from the site to the 1% AEP greenfield run-off rate as a maximum for all storm events up to and including the 1% AEP rainfall event inclusive of 40% climate change.

As outlined in Section 3, it is anticipated there will be negligible change in foul flows from the proposed development.

In the context of flood risk, the proposals are considered safe and appropriate, and do not cause increased flood risk. This report outlines details of the proposed SuDS techniques, and describes a strategy for maintaining these techniques throughout the lifetime of the development.



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APPENDIX I – PROPOSED DRAINAGE DRAWINGS

PRELIMINARY

NOTES

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECTS DRAWINGS. FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT-ASK.
- CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.

CIVIL LEGEND

Ex. FOUL MANHOLE	Ex. F
Ex. FOUL PIPE	PIPE DESCRIPTION
NEW FOUL MANHOLE	F
NEW FOUL PIPE	1000
Ex. SURFACE WATER MANHOLE	Ex. S
Ex. SURFACE WATER PIPE	EXISTING SW PIPE ADJACENT ROAD
NEW SURFACE WATER MANHOLE	S
NEW SURFACE WATER PIPE	PIPE DESCRIPTION
Ex. COMBINED MANHOLE	Ex. C
Ex. COMBINED PIPE	PIPE DESCRIPTION
NEW COMBINED MANHOLE	C
NEW COMBINED PIPE	PIPE DESCRIPTION
NEW RISING MAIN	PUMPED RISING MAIN
PIPE CROSSOVER	
Ex. ROOF RAIN WATER MANHOLE	Ex. R
Ex. ROOF RAIN WATER PIPE	PIPE DESCRIPTION
NEW ROOF RAIN WATER MANHOLE	R
NEW ROOF RAIN WATER PIPE	PIPE DESCRIPTION
RAINWATER PIPE	RWP
SOIL VENT PIPE	SVP
ROAD GULLEY	RG
BACK INLET GULLEY TRAP	BIGT
FOUL RODDING EYE	RE
SURFACE RODDING EYE	RE
GULLEY TRAP	GT
ACO DRAINAGE CHANNEL	
SINGLE 90mm BT DUCT	
MDPE CWM - SIZE T.B.C.	
SINGLE 100mm POWER	
SINGLE 100mm DATA	

NOTE:
ALL COVER LEVELS AND PUBLIC SEWER INVERT LEVELS SUBJECT TO SITE CONFIRMATION BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS

NOTE:
DENOTES BACK INLET GULLEY TRAP

NOTE:
DENOTES ACO DRAIN

PROPOSED DRAINAGE PLAN

SCALE @ A1: 1:150
SCALE @ A3: 1:300

PROPOSED FOUL WATER MANHOLE SCHEDULE

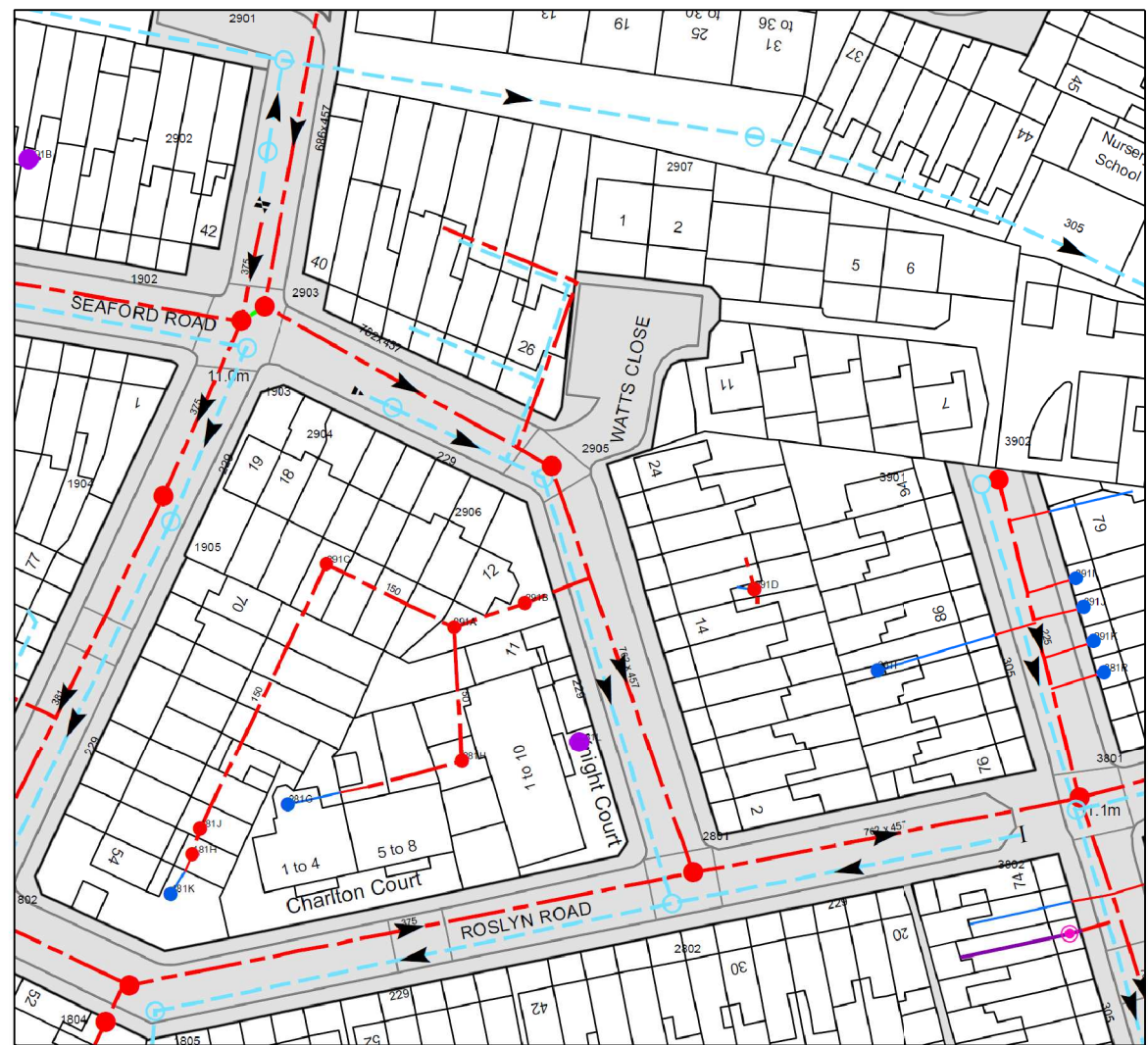
REF.	TYPE	COVER LEVEL	INVERT LEVEL	SIZE	REMARKS
Ex F 1.0	uPVC-AJ	+11.000	+8.830	450mm Ø	NEW FOUL MH AT EX MH LOCATION
F 1.0	uPVC-AJ	+11.000	+8.920	450mm Ø	
F 1.1	uPVC-AJ	+11.000	+8.950	450mm Ø	
F 1.2	uPVC-AJ	+11.000	+9.020	450mm Ø	
F 1.3	uPVC-AJ	+11.000	+9.200	450mm Ø	
F 1.4	uPVC-AJ	+11.000	+9.350	450mm Ø	
F 1.5	uPVC-AJ	+11.000	+9.400	450mm Ø	
F 1.6	uPVC-AJ	+11.000	+9.460	450mm Ø	
F 1.7	uPVC-AJ	+11.000	+9.540	450mm Ø	
F 1.8	uPVC-AJ	+11.000	+9.560	450mm Ø	
F 1.9	uPVC-AJ	+11.000	+9.570	450mm Ø	
F 1.10	uPVC-AJ	+11.000	+9.600	450mm Ø	
F 1.11	uPVC-AJ	+11.000	+9.670	450mm Ø	
F 1.12	uPVC-AJ	+11.000	+9.700	450mm Ø	
F 1.13	uPVC-AJ	+11.000	+9.710	450mm Ø	
F 1.14	uPVC-AJ	+11.000	+9.740	450mm Ø	
F 1.15	uPVC-AJ	+11.000	+9.810	450mm Ø	
F 1.16	uPVC-AJ	+11.000	+9.880	450mm Ø	
F 1.17	uPVC-AJ	+11.000	+9.930	450mm Ø	
F 1.18	uPVC-AJ	+11.000	+10.030	450mm Ø	
F 1.19	uPVC-AJ	+11.000	+10.450	450mm Ø	BACKDROP MANHOLE
F 1.20	uPVC-AJ	+11.565	+10.520	450mm Ø	
F 1.21	uPVC-AJ	+11.565	+10.670	450mm Ø	
F 1.22	uPVC-AJ	+11.565	+10.720	450mm Ø	
F 1.23	uPVC-AJ	+11.565	+10.890	450mm Ø	
F 1.24	uPVC-AJ	+11.565	+11.070	450mm Ø	
F 1.25	uPVC-AJ	+11.565	+11.220	450mm Ø	
F 2.0	uPVC-AJ	+11.000	+10.110	450mm Ø	
F 2.1	uPVC-AJ	+11.000	+10.230	450mm Ø	
F 2.2	uPVC-AJ	+11.000	+10.300	450mm Ø	
F 2.3	uPVC-AJ	+11.000	+10.480	450mm Ø	
F 3.0	uPVC-AJ	+11.565	+10.720	450mm Ø	
F 3.1	uPVC-AJ	+11.565	+10.830	450mm Ø	
F 4.0	uPVC-AJ	+11.000	+10.300	900mm Ø	

PROPOSED SURFACE WATER MANHOLE SCHEDULE

REF.	TYPE	COVER LEVEL	INVERT LEVEL	SIZE	REMARKS
Ex S 1.0	uPVC-AJ	+11.000	+10.120	450mm Ø	EXISTING STORM MH RE-USED
S 1.0	uPVC-AJ	+11.000	+10.250	450mm Ø	SW TREATMENT MANHOLE
S 1.1	uPVC-AJ	+11.000	+8.370	450mm Ø	FLOW CONTROL MANHOLE
S 1.2	uPVC-AJ	+11.000	+8.670	450mm Ø	ATTENUATION INLET MANHOLE
S 1.3	uPVC-AJ	+11.000	+10.130	450mm Ø	
S 1.4	uPVC-AJ	+11.000	+10.170	450mm Ø	
S 1.5	uPVC-AJ	+11.000	+10.190	450mm Ø	
S 1.6	uPVC-AJ	+11.000	+10.350	450mm Ø	
S 1.7	uPVC-AJ	+11.565	+10.790	450mm Ø	
S 1.8	uPVC-AJ	+11.565	+10.880	450mm Ø	
S 1.9	uPVC-AJ	+11.565	+10.970	450mm Ø	
S 2.0	uPVC-AJ	+11.565	+10.970	450mm Ø	
S 3.0	uPVC-AJ	+11.000	+10.240	450mm Ø	
S 3.1	uPVC-AJ	+11.000	+10.400	450mm Ø	
S 4.0	uPVC-AJ	+11.000	+10.270	450mm Ø	
S 4.1	uPVC-AJ	+11.000	+10.400	450mm Ø	
S 5.0	uPVC-AJ	+11.000	+10.310	450mm Ø	
S 5.1	uPVC-AJ	+11.000	+10.400	450mm Ø	

EXISTING PUBLIC SEWER FOUL WATER MANHOLE SCHEDULE

REF.	TYPE	COVER LEVEL	INVERT LEVEL	INTERNAL SIZE	COMMENTS
T.W. FMH 2905	T.B.C. ON SITE	+10.010	+7.110	T.B.C. ON SITE	EXISTING PUBLIC MANHOLE
T.W. FMH 2906	T.B.C. ON SITE	+10.920	+10.010	T.B.C. ON SITE	EXISTING PUBLIC MANHOLE



PUBLIC SEWER KEY PLAN

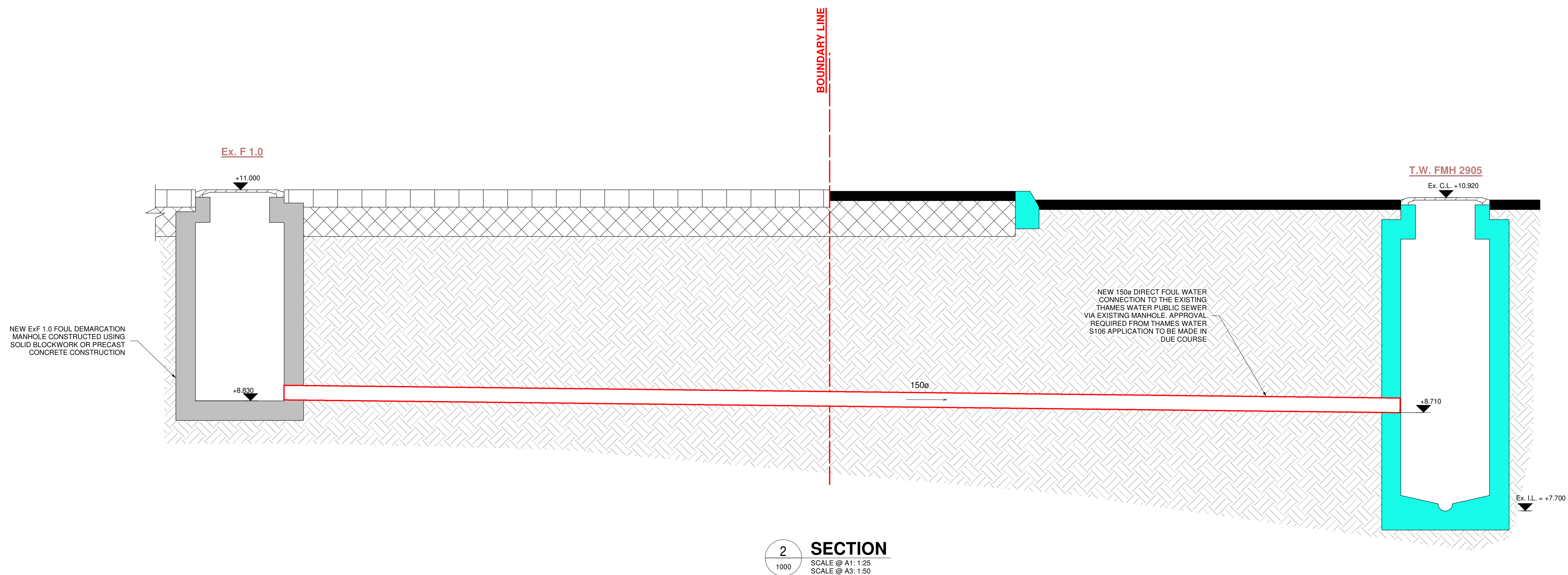
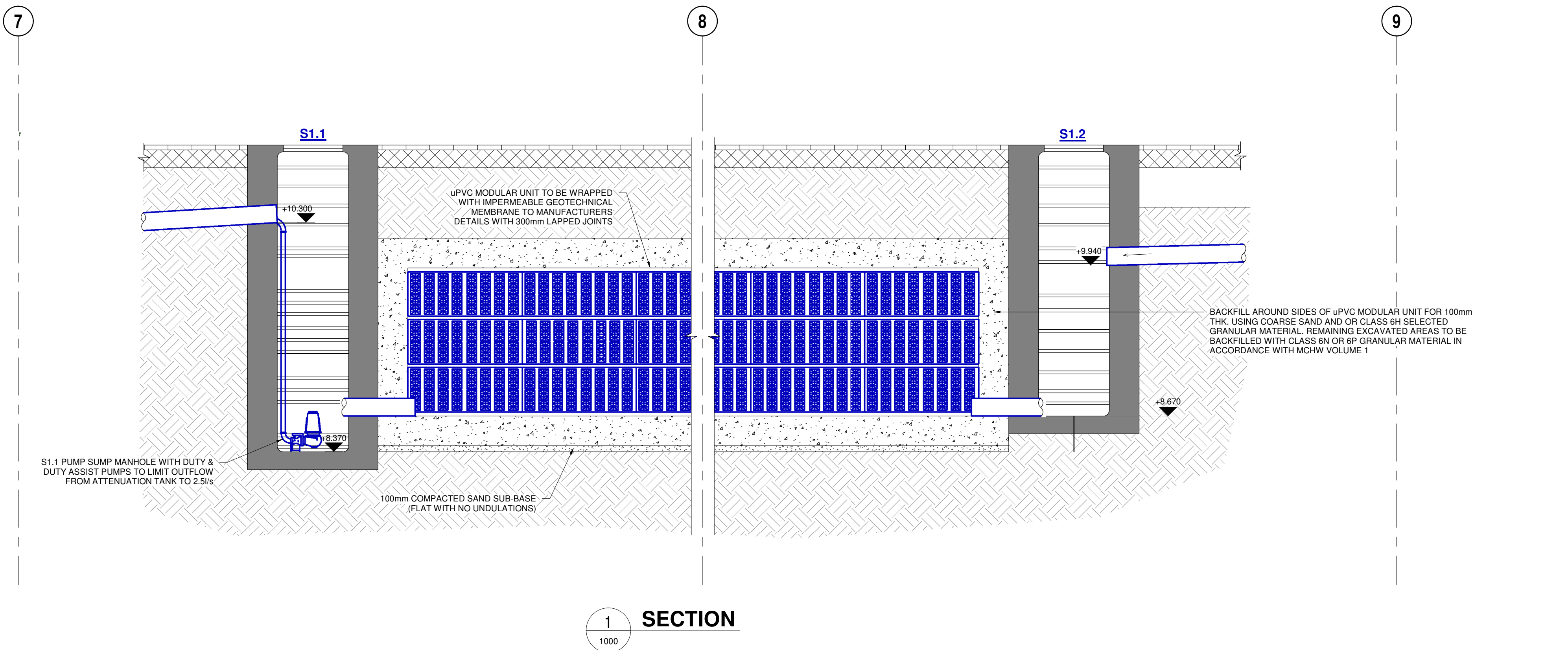
SCALE @ A1: 1:500
SCALE @ A3: 1:1000

- NOTE:**
- EXACT SET OUT LOCATION OF SVPs TO BE CONFIRMED BY ARCHITECT
 - MINIMUM GRADIENT OF FOUL DRAINAGE TO BE 100mm Ø @ 1:80 OR 150mm Ø @ 1:100
 - CONTRACTOR TO ENSURE THAT WORKS DO NOT AFFECT EXISTING FOUL AND SURFACE RUNS FROM OTHER PROPERTIES. EXISTING SERVICES TO BE KEPT LIVE AT ALL TIMES FOR THE DURATION OF THE WORK
 - INTERNAL MANHOLES AND ACCESS JUNCTIONS TO BE FITTED WITH RECESSED DOUBLE SEALED MANHOLE COVERS TO TAKE FLOOR FINISHES IF REQUIRED
 - TRAPPED CONNECTIONS TO BE PROVIDED TO ALL ABOVE GROUND FOUL DRAINAGE BY CONTRACTOR
 - AIR ADMITTANCE VALVES TO BE PROVIDED BY CONTRACTORS AND TO BE PROVIDED TO ALL GROUND FLOOR SVPs NOT CONNECTED TO A SOIL STACK
 - RODDING ACCESS TO BE PROVIDED BY CONTRACTOR AT ALL ABOVE GROUND DRAINAGE POP UP LOCATIONS. REFER TO SUB STACK DETAIL FOR FURTHER INFORMATION
 - EXISTING DRAINAGE INFORMATION SUBJECT TO CONFIRMATION BY CONTRACTOR VIA OPENING UP WORKS ON SITE
 - PUMPED FOUL AND SURFACE WATER DRAINAGE SYSTEMS TO BE FITTED WITH A SUITABLE WARNING SYSTEM GIVING VISUAL AND/OR AUDIBLE SIGNALS TO INDICATE SYSTEM MALFUNCTION
 - A NOTICE PLATE SHOULD BE PROVIDED IN THE OFFICE CONFIRMING TYPE OF WASTE SYSTEM AND MAINTENANCE PERIODS. THE LABEL SHALL BE ROBUST INDELIBLY MARKED AND SECURELY FIXED IN AN UNOBTUSIVE BUT OBVIOUS POSITION WITHIN THE BUILDING

PRELIMINARY

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECTS DRAWINGS. FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED, WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT: "ASK"
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



P1	29.09.22	ISSUED FOR INFORMATION	K.O.	D.B.	D.B.	D.B.
ISSUE	DATE	DESCRIPTION	DRN.	ORIG.	P.E.	P.D.
ISSUE STATUS ☒ PRELIMINARY (P1, P2, P3 etc...) ☐ PLANNING (PL1, PL2, PL3 etc) ☐ TENDER (T1,T2, T3 etc...) ☐ CONSTRUCTION (O, 1, 2 etc...)						



CLIENT

FORMATION GROUP

PROJECT TITLE
WATTS CLOSE, LONDON. N15 EDW

DRAWING TITLE

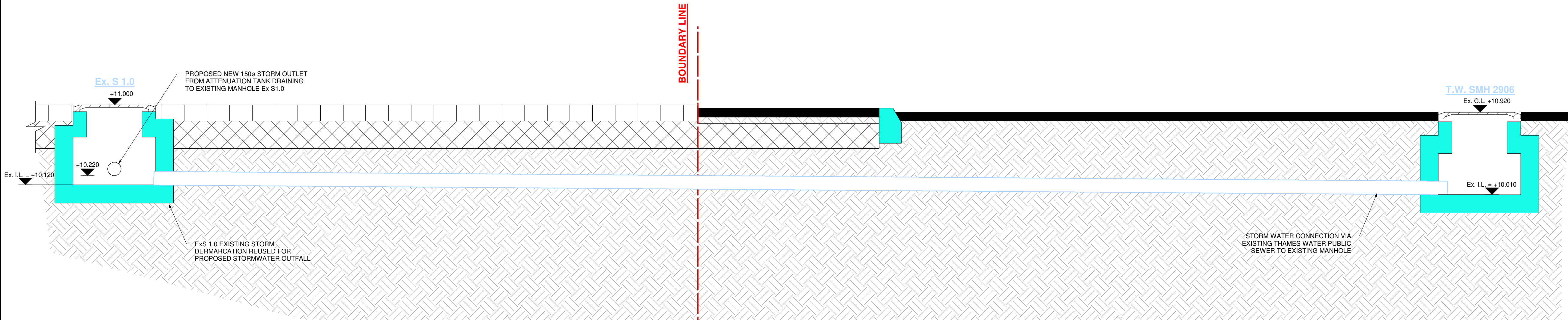
DRAINAGE SECTION AND DETAILS
SHEET 1

JOB NO.	DRAWING REF.	ISSUE
22778	WAT-BC-XX-XX-DR-S-1100	P1

PRELIMINARY

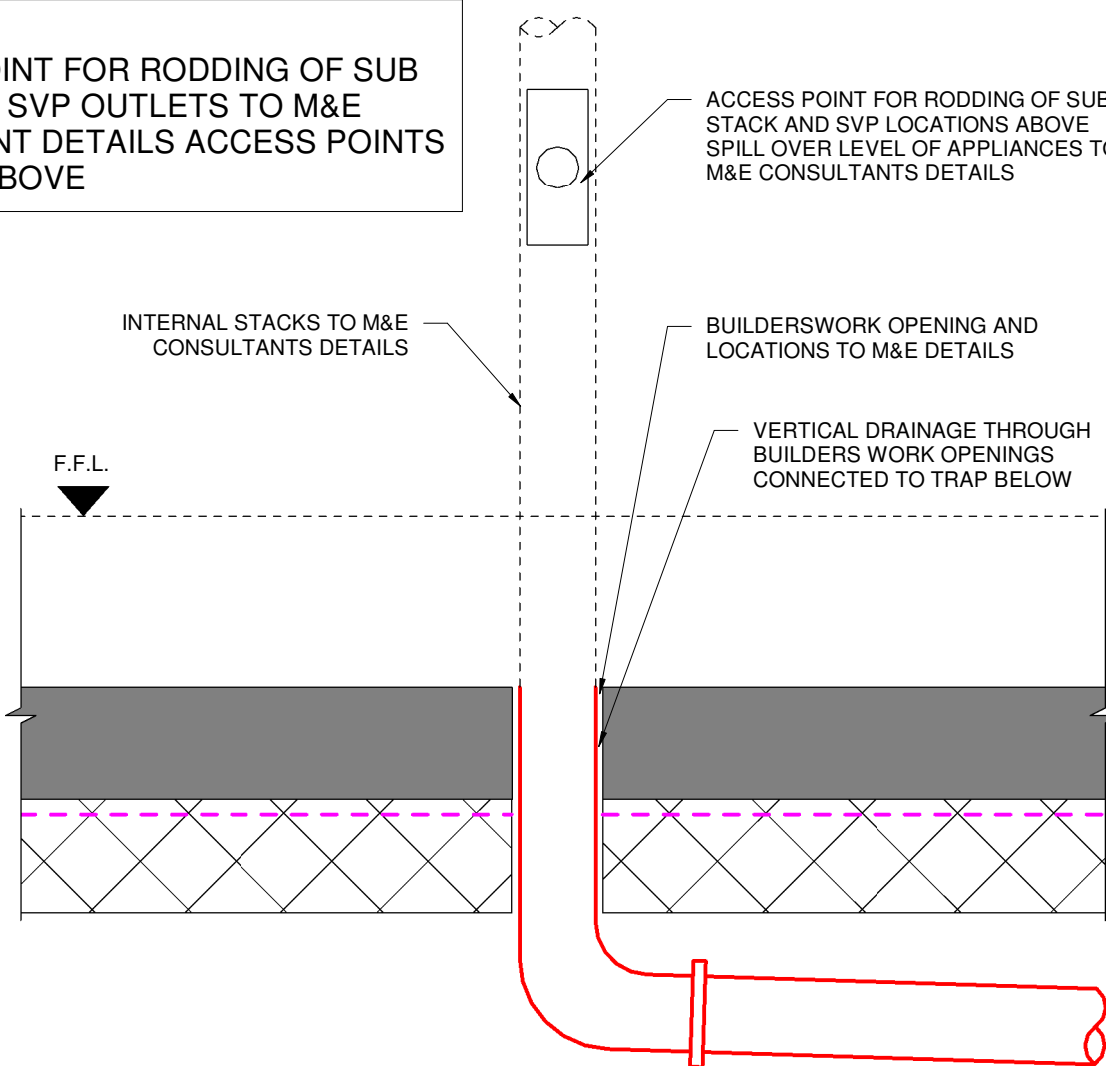
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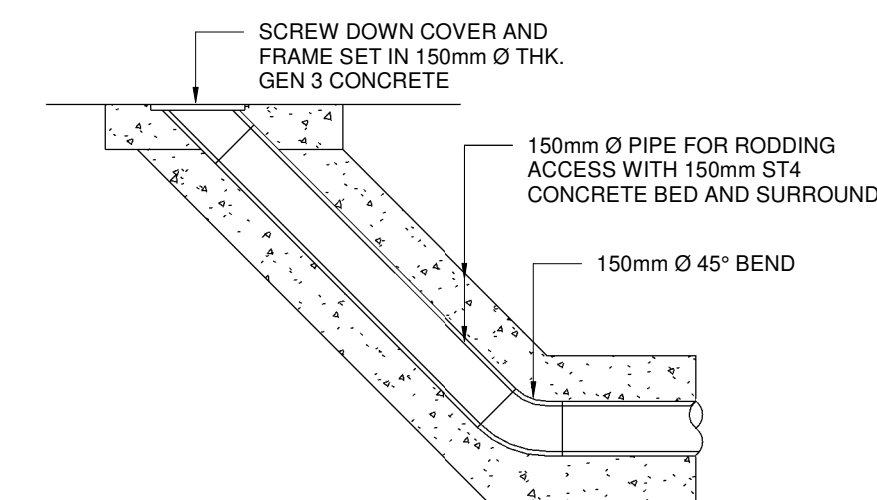


3 SECTION
SCALE @ A1: 1:25
SCALE @ A3: 1:50

NOTE:
ACCESS POINT FOR RODDING OF SUB
STACK AND SVP OUTLETS TO M&E
CONSULTANT DETAILS ACCESS POINTS
LOCATED ABOVE

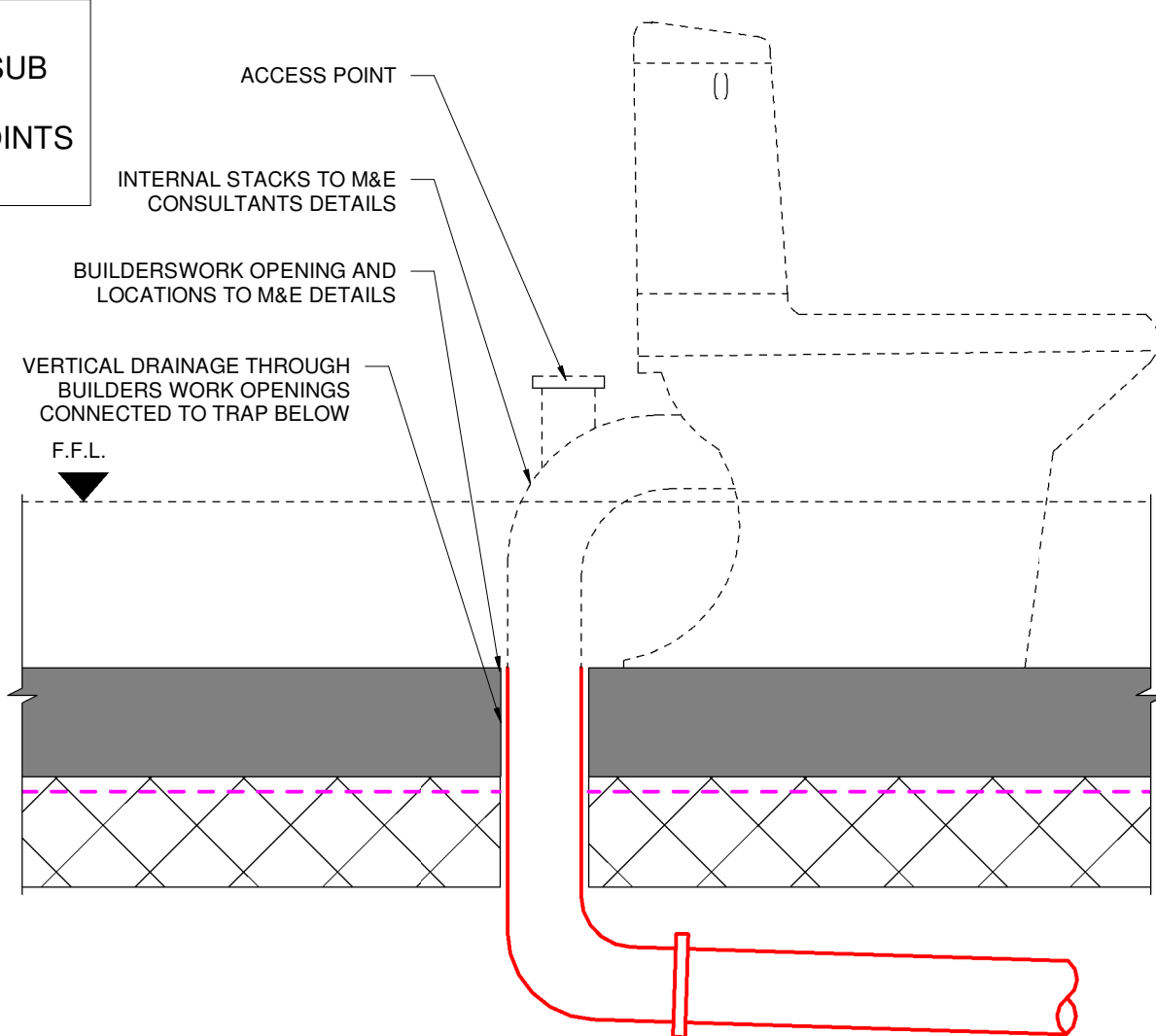


DETAIL A
SCALE @ A1: 1:10
SCALE @ A3: 1:20

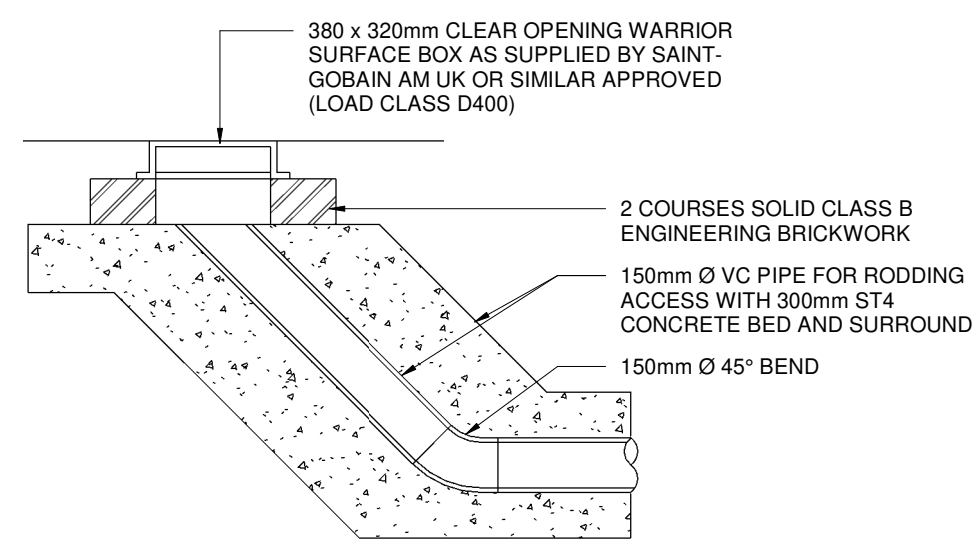


RODDING ACCESS DETAIL
(NON- TRAFFICKED AREAS)

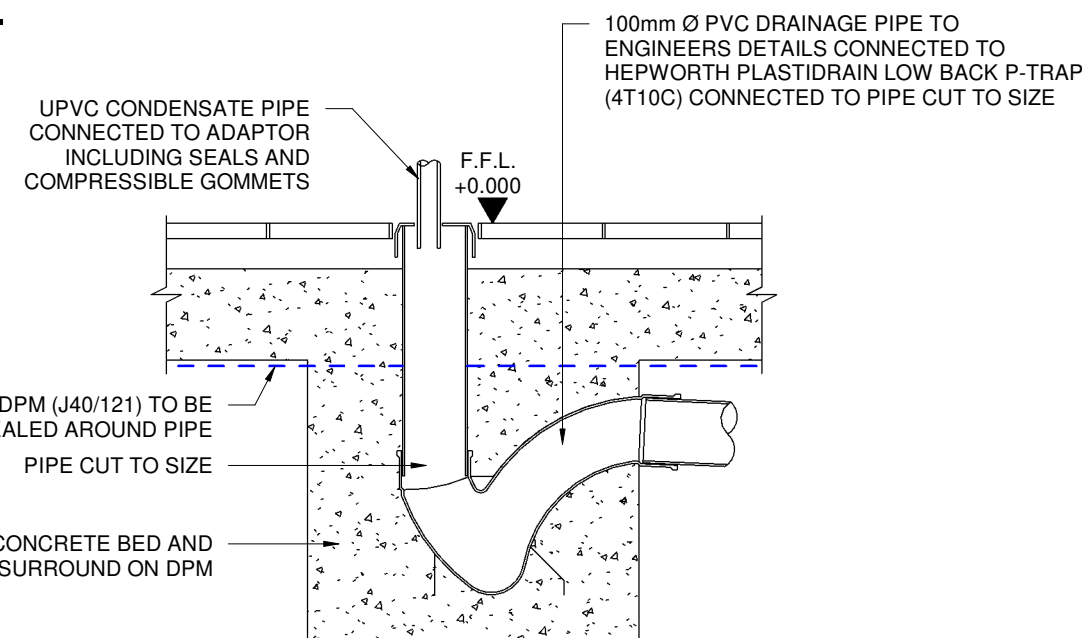
NOTE:
ACCESS POINT FOR RODDING OF SUB
STACK AND SVP OUTLETS TO M&E
CONSULTANT DETAILS ACCESS POINTS
LOCATED ABOVE



DETAIL B
SCALE @ A1: 1:10
SCALE @ A3: 1:20



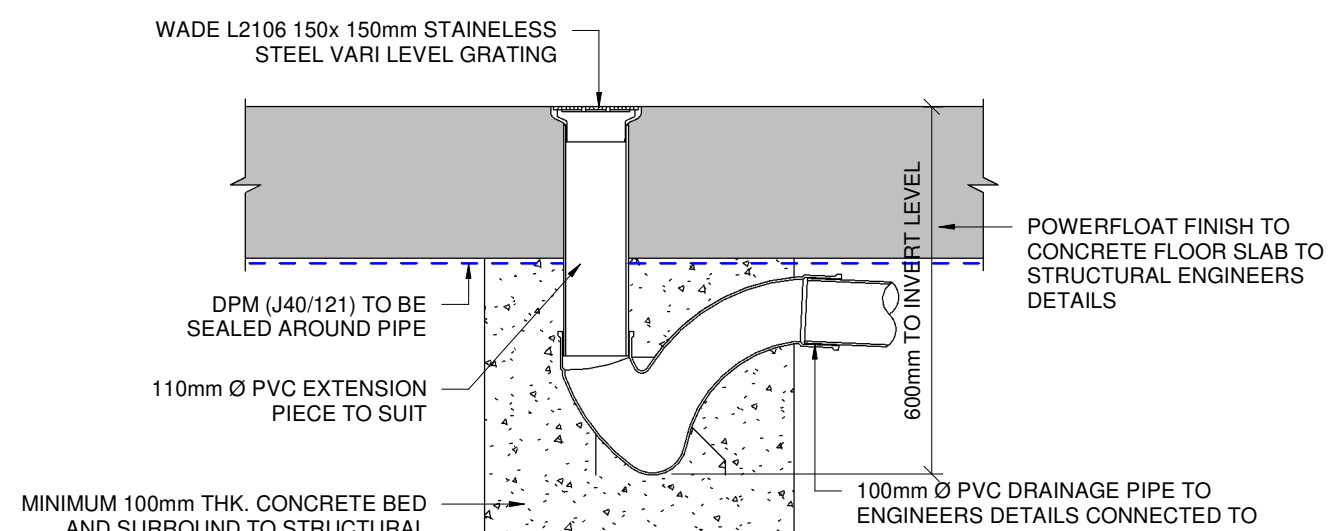
SURFACE BOX RODDING ACCESS DETAIL
(TRAFFICKED AREAS)



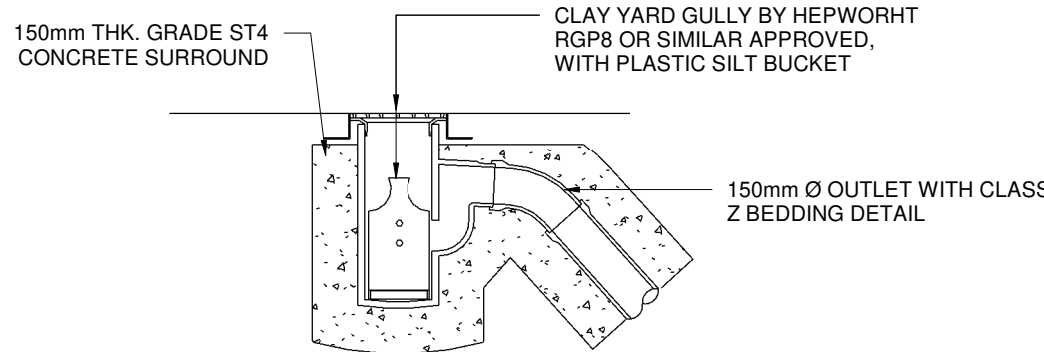
CONDENSATE DRAIN DETAIL



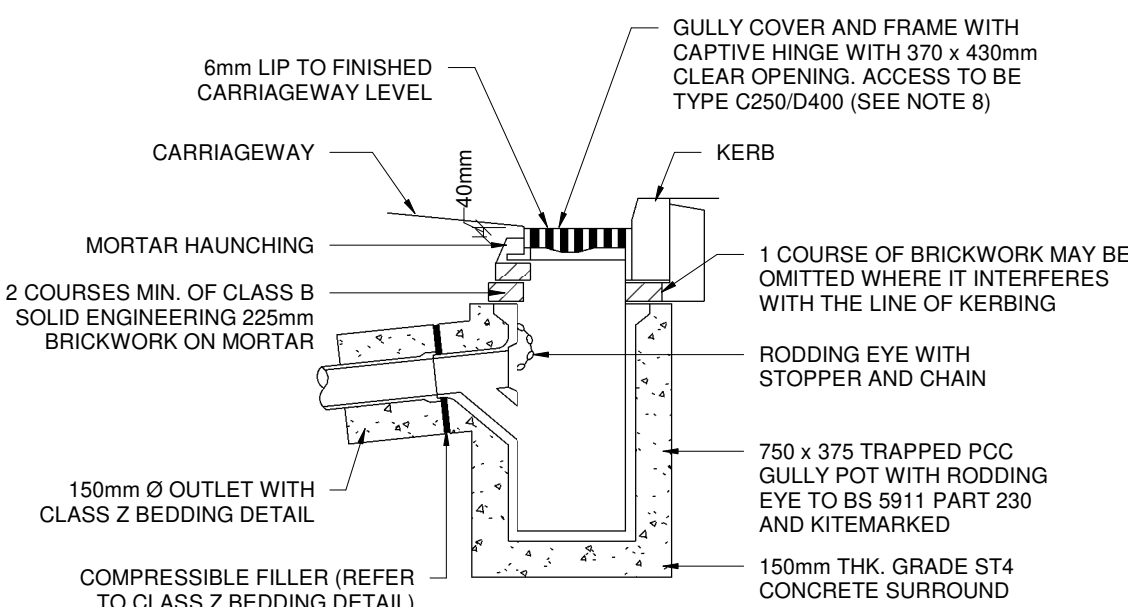
BLOCK & BEAM DRAINAGE HANGER



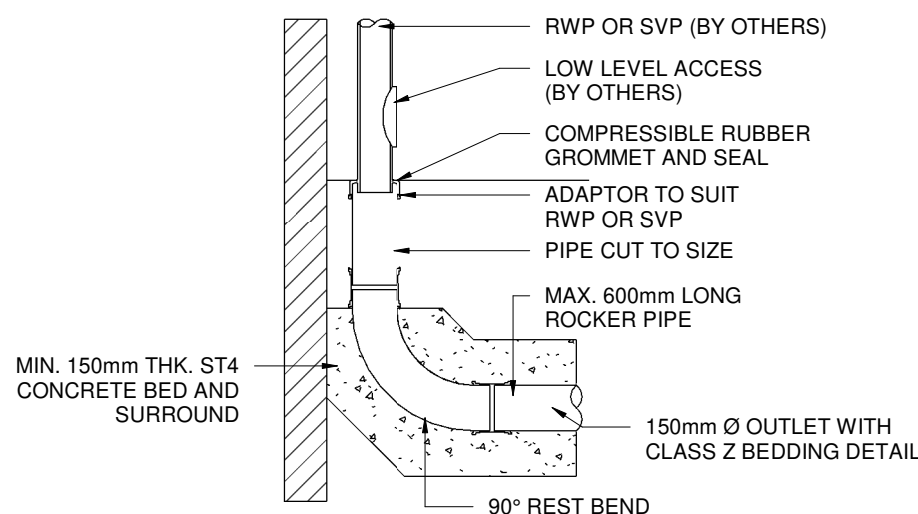
FLOOR GULLY DETAIL



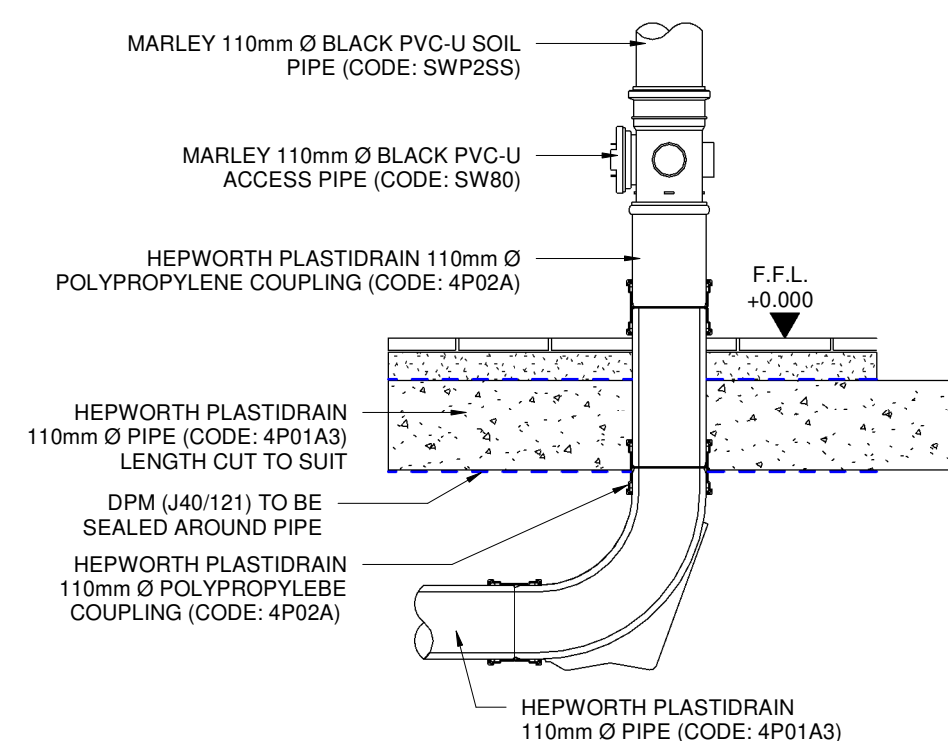
TYPICAL YARD GULLY DETAIL
(MEDIUM DUTY SUITABLE FOR LIGHTLY TRAFFICKED AREAS)



TYPICAL ROAD GULLY DETAIL
(375 x 750mm NOT ADOPTED)



TYPICAL EXTERNAL RWP OR SVP CONNECTION DETAIL



CONNECTION TO SVP DETAIL



CLIENT
FORMATION GROUP

PROJECT TITLE
WATTS CLOSE, LONDON. N15 EDW

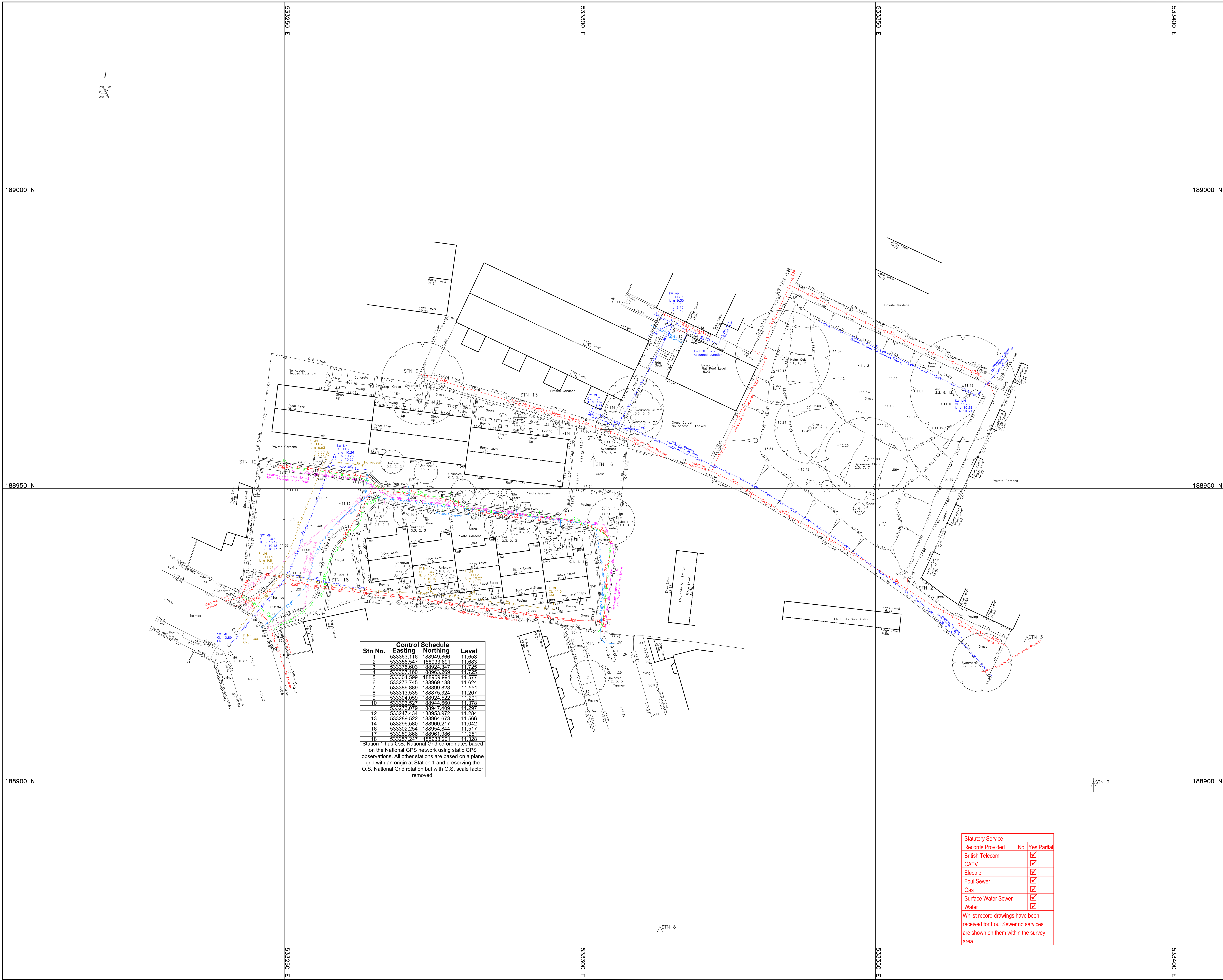
DRAWING TITLE
DRAINAGE SECTION AND DETAILS
SHEET 2

JOB NO. 22778
DRAWING REF. WAT-BC-XX-XX-DR-S-1101
ISSUE P1



Project Lands at Watts Close, London, N15 5DW				Job Ref. 22778	
Section Drainage Strategy Report				Sheet no./rev. 14	
Calc. by MG	Date 26/04/2022	Chk'd by DB	Date 26/04/2022	App'd by DB	Date 26/04/2022

APPENDIX II – UTILITY SURVEY

[illegible]



Project Lands at Watts Close, London, N15 5DW				Job Ref. 22778	
Section Drainage Strategy Report				Sheet no./rev. 16	
Calc. by MG	Date 26/04/2022	Chk'd by DB	Date 26/04/2022	App'd by DB	Date 26/04/2022

APPENDIX III – TW ASSET SEARCH

Sweco
IPSWICH
IP2 8PN

Search address supplied Watts Close
London
N15 5DW

Your reference 65202627

Our reference ALS/ALS/24/2021_4505133

Search date 16 September 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0800 009 4540

Search address supplied: Watts Close, London, N15 5DW

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.



For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

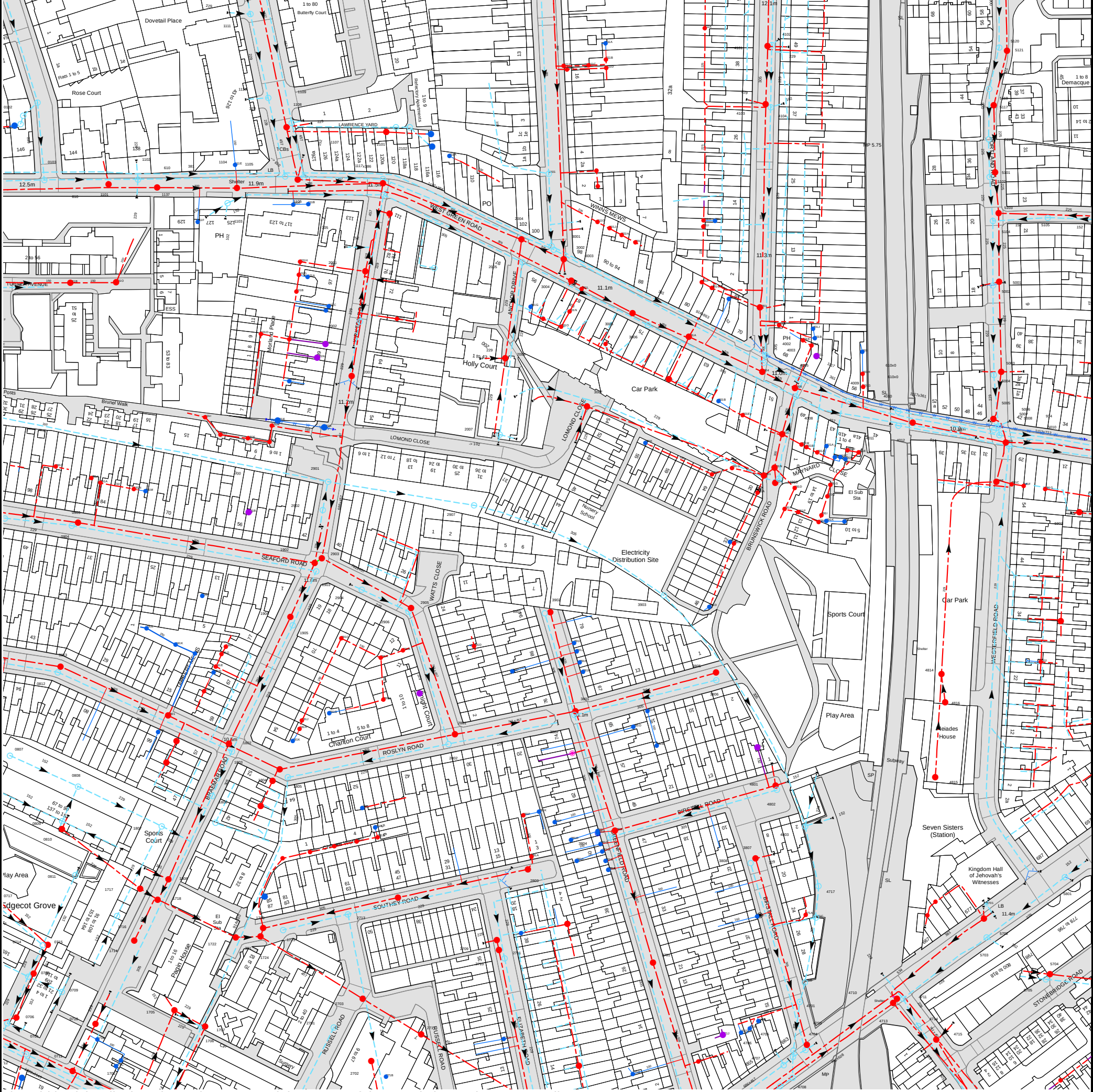
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS/24/2021 4505133



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 533305,188956
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
01YT	n/a	n/a
01ZP	n/a	n/a
01ZQ	n/a	n/a
0102	12.78	11.56
111E	n/a	n/a
2101	11.4	9.63
1107	11.52	9.72
1105	11.66	9.73
211A	n/a	n/a
21YS	n/a	n/a
21XZ	n/a	n/a
21XX	n/a	n/a
21YQ	n/a	n/a
1108	11.88	8.01
21YP	n/a	n/a
1109	11.8	10.13
1110	12.02	11.14
1111	12.53	11.45
311I	n/a	n/a
311G	n/a	n/a
311J	n/a	n/a
311H	n/a	n/a
3107	n/a	n/a
3101	11.06	9.84
3108	n/a	n/a
4104	11.76	10.6
4103	11.8	9.86
311E	n/a	n/a
311D	n/a	n/a
311F	n/a	n/a
311C	n/a	n/a
311B	n/a	n/a
4101	11.97	10.1
4102	11.93	10.94
311A	n/a	n/a
311K	n/a	n/a
001B	n/a	n/a
0103	12.36	10.22
1101	12.28	11.05
101O	n/a	n/a
1102	12.08	10
1137	n/a	n/a
111F	n/a	n/a
1103	n/a	n/a
1104	11.87	10.68
101D	n/a	n/a
101C	n/a	n/a
111A	n/a	n/a
101B	n/a	n/a
1106	11.64	7.65
101G	n/a	n/a
101H	n/a	n/a
101A	n/a	n/a
111B	n/a	n/a
101N	n/a	n/a
201F	n/a	n/a
201D	n/a	n/a
201C	n/a	n/a
2002	11.94	10.48
2001	11.93	10.43
2102	11.49	7.54
2103	11.33	9.57
21YV	n/a	n/a
201H	n/a	n/a
20VZ	n/a	n/a
2006	11.19	9.74
5003	10.98	9.44
401I	n/a	n/a
5002	10.99	9.61
5001	11.01	9.2
5104	11.1	9.05
5105	10.74	9.94
5103	11.1	9.75
5102	11.16	9.33
5101	11.13	9.83
5118	11.25	9.42
5117	11.4	9.98
5119	11.5	9.5
5121	12.15	10.13
5120	12.15	9.63
391F	n/a	n/a
391G	n/a	n/a
301K	n/a	n/a
301E	n/a	n/a
3007	11.24	10.19
301B	n/a	n/a
3027	n/a	n/a
3028	n/a	n/a
301A	n/a	n/a
301O	n/a	n/a
3006	10.9	9.38

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3026	n/a	n/a
3005	10.95	9.78
301N	n/a	n/a
201G	n/a	n/a
301M	n/a	n/a
301L	n/a	n/a
301G	n/a	n/a
301F	n/a	n/a
3004	11	9.89
2005	10.94	9.57
3003	10.97	8.79
3002	10.91	9.74
3001	10.93	10.27
301I	n/a	n/a
2004	11.05	8.59
301H	n/a	n/a
301J	n/a	n/a
491D	n/a	n/a
491G	n/a	n/a
4904	11.21	9.81
4903	11.23	10.24
4901	11.2	9.92
491N	n/a	n/a
491M	n/a	n/a
491C	n/a	n/a
491L	n/a	n/a
491A	n/a	n/a
491O	n/a	n/a
491B	n/a	n/a
401A	n/a	n/a
401M	n/a	n/a
401C	n/a	n/a
4009	10.89	9.12
4008	10.92	9.2
4006	10.98	8.52
4005	11.01	9.23
4004	10.93	8.6
4003	10.94	9.22
401L	n/a	n/a
4002	10.9	9.61
401F	n/a	n/a
401E	n/a	n/a
401B	n/a	n/a
401J	n/a	n/a
401K	n/a	n/a
4001	11.19	8.95
491E	n/a	n/a
401H	n/a	n/a
401G	n/a	n/a
4010	10.62	8.05
4011	10.59	7.97
4012	10.75	8.37
5005	10.89	9.47
5007	10.8	7.5
5004	10.97	9.39
591E	n/a	n/a
5006	10.79	9.47
5008	10.9	9.07
5009	10.91	8.32
5010	10.73	7.52
591C	n/a	n/a
591F	n/a	n/a
591G	n/a	n/a
0904	12.23	10.47
0903	12.25	9.71
0902	12.19	10.58
091C	n/a	n/a
2906	10.92	10.01
2905	10.01	7.11
191I	n/a	n/a
2904	10.92	10.18
1903	10.99	9.93
1902	11.05	9.05
2903	11.02	7.22
191B	n/a	n/a
2902	10.94	9.39
2907	11.82	8.82
191M	n/a	n/a
191N	n/a	n/a
191A	n/a	n/a
2901	10.55	8.96
091A	n/a	n/a
101L	n/a	n/a
101K	n/a	n/a
101J	n/a	n/a
2007	11.35	10.34
201E	n/a	n/a
101M	n/a	n/a
101E	n/a	n/a
101I	n/a	n/a
101F	n/a	n/a
2003	11.94	7.47
59VS	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5902	10.99	10.13
3901	11.29	10.14
3902	11.34	9.75
3802	11.17	9.67
391I	n/a	n/a
391J	n/a	n/a
391K	n/a	n/a
381R	n/a	n/a
381O	n/a	n/a
381N	n/a	n/a
3903	11.62	8.7
391D	n/a	n/a
3805	11.55	9.11
3806	11.49	9.98
391H	n/a	n/a
391E	n/a	n/a
391A	n/a	n/a
491F	n/a	n/a
491P	n/a	n/a
491H	n/a	n/a
491I	n/a	n/a
491K	n/a	n/a
491Q	n/a	n/a
491J	n/a	n/a
4814	n/a	n/a
4816	n/a	n/a
591I	n/a	n/a
2712	10.63	8.89
17WY	n/a	n/a
18XT	n/a	n/a
181G	n/a	n/a
281D	n/a	n/a
281C	n/a	n/a
281B	n/a	n/a
281E	n/a	n/a
18TV	n/a	n/a
18TT	n/a	n/a
1805	10.57	9.6
1803	10.48	9.44
2802	10.81	9.74
181K	n/a	n/a
181H	n/a	n/a
181J	n/a	n/a
281G	n/a	n/a
281H	n/a	n/a
291A	n/a	n/a
191G	n/a	n/a
191F	n/a	n/a
291C	n/a	n/a
1905	10.87	9.77
1904	10.9	8.96
5704	11.37	9.88
5801	11.52	10.31
571A	n/a	n/a
1807	10.14	9.6
1815	n/a	n/a
1801	10.71	7.79
1808	10.17	7.98
191K	n/a	n/a
1814	n/a	n/a
191J	n/a	n/a
181F	n/a	n/a
1806	10.29	9.35
181D	n/a	n/a
18VV	n/a	n/a
181E	n/a	n/a
1802	10.52	8.75
1804	10.69	7.61
281J	n/a	n/a
291B	n/a	n/a
281L	n/a	n/a
2801	11.9	7.06
291D	n/a	n/a
0807	n/a	n/a
0812	11.17	9.81
0813	11.26	8.11
0810	n/a	n/a
0809	n/a	n/a
0811	n/a	n/a
0808	n/a	n/a
1717	10.41	8.97
191L	n/a	n/a
1718	10.18	7.97
181I	n/a	n/a
4707	10.59	8.87
4706	10.65	7.93
4705	10.69	8.26
4704	10.69	8.87
4703	10.77	7.09
4715	10.8	9.18
4714	10.84	9.4
471B	n/a	n/a
4713	10.95	6.47

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4701	10.77	8.34
4711	10.94	9.47
4710	10.99	n/a
471D	n/a	n/a
5705	11.29	10.08
5703	11.29	9.91
5702	11.36	8.34
471C	n/a	n/a
371C	n/a	n/a
4732	n/a	n/a
471A	n/a	n/a
5701	11.28	10.48
4733	n/a	n/a
4717	10.83	8.47
4803	11.4	8.46
4802	11.48	9.78
4801	11.47	8.58
4815	n/a	n/a
381S	n/a	n/a
3702	n/a	n/a
371I	n/a	n/a
371J	n/a	n/a
371D	n/a	n/a
371E	n/a	n/a
3701	10.59	6.79
27YP	n/a	n/a
37WZ	n/a	n/a
381E	n/a	n/a
381A	n/a	n/a
2803	10.85	9.52
3808	11.09	9.47
381B	n/a	n/a
381C	n/a	n/a
3807	11.16	8.36
281A	n/a	n/a
381G	n/a	n/a
381Q	n/a	n/a
381D	n/a	n/a
3804	10.82	9.34
381J	n/a	n/a
381I	n/a	n/a
3803	10.91	6.92
381P	n/a	n/a
281F	n/a	n/a
381K	n/a	n/a
381M	n/a	n/a
3801	11.2	7
281I	n/a	n/a
1704	10.27	8.46
07VW	n/a	n/a
0711	10.33	7.21
171C	n/a	n/a
171A	n/a	n/a
0712	10.36	8.58
171B	n/a	n/a
1707	10.28	8.16
1706	10.29	8.91
0710	10.28	8.68
0705	n/a	n/a
0706	n/a	n/a
1705	10.33	8.26
0709	n/a	n/a
0707	n/a	n/a
0708	n/a	n/a
0714	n/a	n/a
0715	n/a	n/a
1714	10.2	8.98
1722	10.26	7.83
1724	10.21	7.86
1716	n/a	n/a
371G	n/a	n/a
4709	10.51	9.29
4708	10.53	8.27
271B	n/a	n/a
2702	10.18	8.47
271A	n/a	n/a
2717	n/a	n/a
2701	10.3	9.15
2703	10.43	7.77
2711	10.61	9.5
2710	10.57	9.07
2709	10.61	9.18
1725	10.42	9.29
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Trunk Surface Water
	Trunk Foul
	Storm Relief
	Vent Pipe
	Bio-solids (Sludge)
	Proposed Thames Surface Water Sewer
	Proposed Thames Water Foul Sewer
	Gallery
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Sludge Rising Main
	Proposed Thames Water Rising Main
	Vacuum

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or 'D' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Outfall
	Undefined End
	Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories.

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit

Areas

Lines denoting areas of underground surveys, etc.

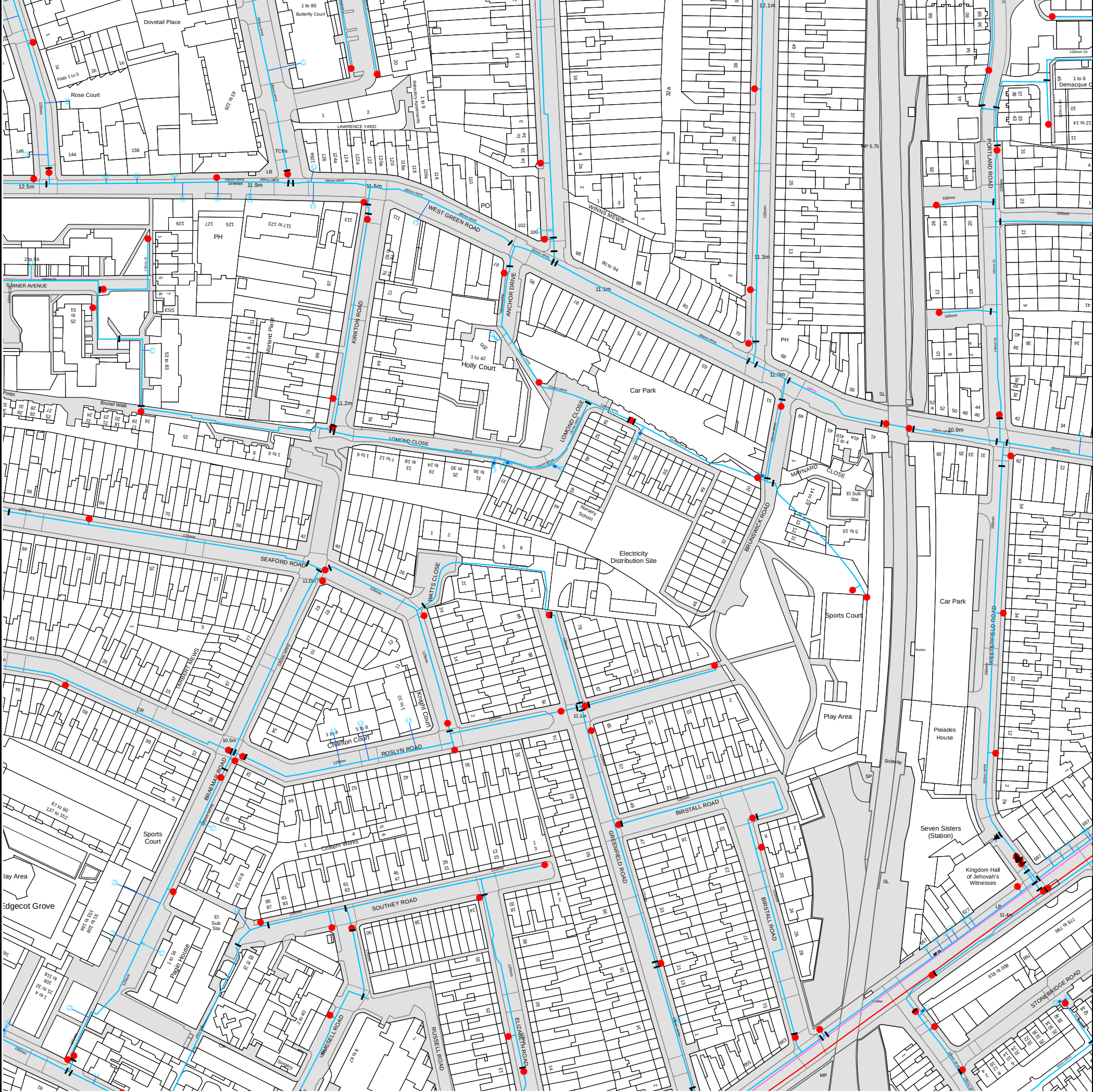
	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer		Surface Water Sewer
	Combined Sewer		Gully
	Culverted Watercourse		Proposed
			Abandoned Sewer

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS/24/2021 4505133



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 533305, 188956.
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.



ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"	Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
16"	Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
3" SUPPLY	Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.
3" FIRE	Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
3" METERED	Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
	Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
	Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

	General Purpose Valve
	Air Valve
	Pressure Control Valve
	Customer Valve

Hydrants

	Single Hydrant
--	----------------

Meters

	Meter
--	-------

End Items

Symbol indicating what happens at the end of a water main.

	Blank Flange
	Capped End
	Emptying Pit
	Undefined End
	Manifold
	Customer Supply
	Fire Supply

Operational Sites

	Booster Station
	Other
	Other (Proposed)
	Pumping Station
	Service Reservoir
	Shaft Inspection
	Treatment Works
	Unknown
	Water Tower

Other Symbols

	Data Logger
--	-------------

Other Water Pipes (Not Operated or Maintained by Thames Water)

	Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
	Private Main: Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

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All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

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Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking	Cheque
Call 0800 009 4540 quoting your invoice number starting CBA or ADS / OSS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



Project Lands at Watts Close, London, N15 5DW				Job Ref. 22778	
Section Drainage Strategy Report				Sheet no./rev. 31	
Calc. by MG	Date 26/04/2022	Chk'd by DB	Date 26/04/2022	App'd by DB	Date 26/04/2022

APPENDIX IV – STORM WATER DEISGN CALCULATIONS

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)	0.76
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.500
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1.9	0.010	5.00	11.565	450	51.450	29.400	0.600
S1.8	0.010	5.00	11.565	450	48.900	20.900	0.687
S2.0	0.010	5.00	11.565	450	43.100	31.900	0.600
S1.7	0.010	5.00	11.565	450	40.500	23.650	0.824
S1.6	0.010	5.00	11.000	450	36.850	20.000	0.650
S3.1	0.010	5.00	11.000	450	11.950	18.750	0.600
S3.0	0.010	5.00	11.000	450	28.250	18.750	0.810
S1.5	0.010	5.00	11.000	450	36.850	15.900	0.938
S1.4	0.010	5.00	11.000	450	39.750	12.550	0.954
S1.3	0.010	5.00	11.000	450	39.750	1.940	0.991
S1.2	0.010	5.00	11.000	450	27.700	1.300	1.033
S5.1	0.010	5.00	11.000	450	0.400	10.900	0.600
S5.0	0.010	5.00	11.000	450	0.400	1.850	0.689
S4.1	0.010	5.00	11.000	450	27.100	7.750	0.600
S4.0	0.010	5.00	11.000	450	13.300	7.750	0.735
S1.0	0.010	5.00	11.000	450	6.000	0.200	0.880
Storage			11.000		20.100	1.125	2.410
FlowControl			11.000	450	12.500	0.950	2.437
Outfall			11.000	450	4.600	0.000	0.885

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)
M9	S1.9	S1.8	8.874	0.600	10.965	10.878	0.087	102.0	100	5.19	50.0
M8	S1.8	S1.7	8.839	0.600	10.878	10.791	0.087	101.6	100	5.39	50.0
S20	S2.0	S1.7	8.650	0.600	10.965	10.791	0.174	49.7	100	5.13	50.0
M7	S1.7	S1.6	5.162	0.600	10.741	10.350	0.391	13.2	150	5.42	50.0
M6	S1.6	S1.5	4.100	0.600	10.350	10.137	0.213	19.2	150	5.45	50.0
S31	S3.1	S3.0	16.300	0.600	10.400	10.240	0.160	101.9	100	5.36	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)
M9	0.761	6.0	1.4	0.500	0.587	0.010	0.0
M8	0.763	6.0	2.7	0.587	0.674	0.020	0.0
S20	1.095	8.6	1.4	0.500	0.674	0.010	0.0
M7	2.787	49.3	5.4	0.674	0.500	0.040	0.0
M6	2.306	40.7	6.8	0.500	0.713	0.050	0.0
S31	0.761	6.0	1.4	0.500	0.660	0.010	0.0

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)
S30	S3.0	S1.5	9.060	0.600	10.190	10.137	0.053	170.9	150	5.55	50.0
M5	S1.5	S1.4	4.431	0.600	10.062	10.046	0.016	276.9	225	5.65	50.0
M4	S1.4	S1.3	10.610	0.600	10.046	10.009	0.037	286.8	225	5.88	50.0
M3	S1.3	S1.2	12.067	0.600	10.009	9.967	0.042	287.3	225	6.14	50.0
M2	S1.2	Storage	7.602	0.600	9.967	9.940	0.027	281.6	225	6.31	50.0
S51	S5.1	S5.0	9.050	0.600	10.400	10.311	0.089	101.7	100	5.20	50.0
S50	S5.0	Storage	19.713	0.600	10.311	10.118	0.193	102.1	100	5.63	50.0
S41	S4.1	S4.0	13.800	0.600	10.400	10.265	0.135	102.2	100	5.30	50.0
S40	S4.0	Storage	9.494	0.600	10.265	10.172	0.093	102.1	100	5.51	50.0
M1	Storage	FlowControl	7.602	0.600	8.590	8.563	0.027	281.6	225	6.47	50.0
M0	FlowControl	S1.0	6.543	0.600	10.300	10.120	0.180	36.4	225	6.52	50.0
Exit	S1.0	Outfall	1.414	0.600	10.120	10.115	0.005	282.8	225	6.55	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)
S30	0.765	13.5	2.7	0.660	0.713	0.020	0.0
M5	0.781	31.0	10.8	0.713	0.729	0.080	0.0
M4	0.767	30.5	12.2	0.729	0.766	0.090	0.0
M3	0.766	30.5	13.6	0.766	0.808	0.100	0.0
M2	0.774	30.8	14.9	0.808	0.835	0.110	0.0
S51	0.762	6.0	1.4	0.500	0.589	0.010	0.0
S50	0.760	6.0	2.7	0.589	0.782	0.020	0.0
S41	0.760	6.0	1.4	0.500	0.635	0.010	0.0
S40	0.761	6.0	2.7	0.635	0.728	0.020	0.0
M1	0.774	30.8	20.3	2.185	2.212	0.150	0.0
M0	2.176	86.5	20.3	0.475	0.655	0.150	0.0
Exit	0.772	30.7	21.7	0.655	0.660	0.160	0.0

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)
M9	8.874	102.0	100	Circular	11.565	10.965	0.500	11.565	10.878	0.587
M8	8.839	101.6	100	Circular	11.565	10.878	0.587	11.565	10.791	0.674
S20	8.650	49.7	100	Circular	11.565	10.965	0.500	11.565	10.791	0.674
M7	5.162	13.2	150	Circular	11.565	10.741	0.674	11.000	10.350	0.500
M6	4.100	19.2	150	Circular	11.000	10.350	0.500	11.000	10.137	0.713
S31	16.300	101.9	100	Circular	11.000	10.400	0.500	11.000	10.240	0.660
S30	9.060	170.9	150	Circular	11.000	10.190	0.660	11.000	10.137	0.713
M5	4.431	276.9	225	Circular	11.000	10.062	0.713	11.000	10.046	0.729

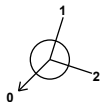
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
M9	S1.9	450	Manhole	Adoptable	S1.8	450	Manhole	Adoptable
M8	S1.8	450	Manhole	Adoptable	S1.7	450	Manhole	Adoptable
S20	S2.0	450	Manhole	Adoptable	S1.7	450	Manhole	Adoptable
M7	S1.7	450	Manhole	Adoptable	S1.6	450	Manhole	Adoptable
M6	S1.6	450	Manhole	Adoptable	S1.5	450	Manhole	Adoptable
S31	S3.1	450	Manhole	Adoptable	S3.0	450	Manhole	Adoptable
S30	S3.0	450	Manhole	Adoptable	S1.5	450	Manhole	Adoptable
M5	S1.5	450	Manhole	Adoptable	S1.4	450	Manhole	Adoptable

Pipeline Schedule

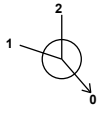
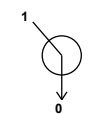
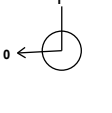
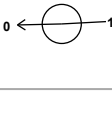
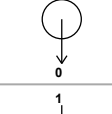
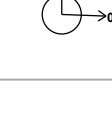
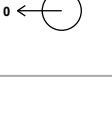
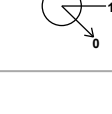
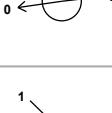
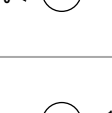
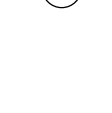
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
M4	10.610	286.8	225	Circular	11.000	10.046	0.729	11.000	10.009	0.766
M3	12.067	287.3	225	Circular	11.000	10.009	0.766	11.000	9.967	0.808
M2	7.602	281.6	225	Circular	11.000	9.967	0.808	11.000	9.940	0.835
S51	9.050	101.7	100	Circular	11.000	10.400	0.500	11.000	10.311	0.589
S50	19.713	102.1	100	Circular	11.000	10.311	0.589	11.000	10.118	0.782
S41	13.800	102.2	100	Circular	11.000	10.400	0.500	11.000	10.265	0.635
S40	9.494	102.1	100	Circular	11.000	10.265	0.635	11.000	10.172	0.728
M1	7.602	281.6	225	Circular	11.000	8.590	2.185	11.000	8.563	2.212
M0	6.543	36.4	225	Circular	11.000	10.300	0.475	11.000	10.120	0.655
Exit	1.414	282.8	225	Circular	11.000	10.120	0.655	11.000	10.115	0.660

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
M4	S1.4	450	Manhole	Adoptable	S1.3	450	Manhole	Adoptable
M3	S1.3	450	Manhole	Adoptable	S1.2	450	Manhole	Adoptable
M2	S1.2	450	Manhole	Adoptable	Storage		Junction	
S51	S5.1	450	Manhole	Adoptable	S5.0	450	Manhole	Adoptable
S50	S5.0	450	Manhole	Adoptable	Storage		Junction	
S41	S4.1	450	Manhole	Adoptable	S4.0	450	Manhole	Adoptable
S40	S4.0	450	Manhole	Adoptable	Storage		Junction	
M1	Storage		Junction		FlowControl	450	Manhole	Adoptable
M0	FlowControl	450	Manhole	Adoptable	S1.0	450	Manhole	Adoptable
Exit	S1.0	450	Manhole	Adoptable	Outfall	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1.9	51.450	29.400	11.565	0.600	450				
						0	M9	10.965	100
S1.8	48.900	20.900	11.565	0.687	450		1	M9	10.878
						0	M8	10.878	100
S2.0	43.100	31.900	11.565	0.600	450		0	S20	10.965
S1.7	40.500	23.650	11.565	0.824	450		1	S20	10.791
						2	M8	10.791	100
						0	M7	10.741	150
S1.6	36.850	20.000	11.000	0.650	450		1	M7	10.350
						0	M6	10.350	150
S3.1	11.950	18.750	11.000	0.600	450		0	S31	10.400
						0	S31	10.400	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S3.0	28.250	18.750	11.000	0.810	450		1 S31	10.240	100
						0	S30	10.190	150
S1.5	36.850	15.900	11.000	0.938	450		1 S30	10.137	150
						2	M6	10.137	150
						0	M5	10.062	225
S1.4	39.750	12.550	11.000	0.954	450		1 M5	10.046	225
						0	M4	10.046	225
S1.3	39.750	1.940	11.000	0.991	450		1 M4	10.009	225
						0	M3	10.009	225
S1.2	27.700	1.300	11.000	1.033	450		1 M3	9.967	225
						0	M2	9.967	225
S5.1	0.400	10.900	11.000	0.600	450		0 S51	10.400	100
S5.0	0.400	1.850	11.000	0.689	450		1 S51	10.311	100
						0	S50	10.311	100
S4.1	27.100	7.750	11.000	0.600	450		0 S41	10.400	100
S4.0	13.300	7.750	11.000	0.735	450		1 S41	10.265	100
						0	S40	10.265	100
S1.0	6.000	0.200	11.000	0.880	450		1 M0	10.120	225
						0	Exit	10.120	225
Storage	20.100	1.125	11.000	2.410			1 S40	10.172	100
						2	S50	10.118	100
						3	M2	9.940	225
						0	M1	8.590	225
FlowControl	12.500	0.950	11.000	2.437	450		1 M1	8.563	225
						0	M0	10.300	225
Outfall	4.600	0.000	11.000	0.885	450		1 Exit	10.115	225

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.7
Summer CV	0.750	30 year (l/s)	1.9
Winter CV	0.840	100 year (l/s)	2.5
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year 360 minute (m³)	51

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	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.188	Betterment (%)	0
SAAR (mm)	620	QBar	0.8
Soil Index	4	Q 1 year (l/s)	0.7
SPR	0.47	Q 30 year (l/s)	1.9
Region	6	Q 100 year (l/s)	2.5
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.188	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.431
CWI	93.333	Runoff Volume (m³)	51

Node FlowControl Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	10.300	Design Flow (l/s)	2.5
Replaces Downstream Link	✓	Design Depth (m)	1.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	2.500	1.500	2.500

Node Storage Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	8.590
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	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	85.0	0.0	1.500	85.0	0.0	1.501	0.0	0.0



Project Lands at Watts Close, London, N15 5DW				Job Ref. 22778	
Section Drainage Strategy Report				Sheet no./rev. 38	
Calc. by MG	Date 26/04/2022	Chk'd by DB	Date 26/04/2022	App'd by DB	Date 26/04/2022

APPENDIX V – FOUL WATER DESIGN CALCULATIONS

Design Settings

Frequency of use (kDU)	1.00	Minimum Velocity (m/s)	0.82
Flow per dwelling per day (l/day)	900	Connection Type	Level Inverts
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Dwellings	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
Ex		11.000	Adoptable	3.700	0.000	2.333
F1.0		11.000	Adoptable	0.000	1.600	2.283
F1.1		11.000	Adoptable	0.000	3.100	2.264
F1.2	10	11.000	Adoptable	0.000	6.830	2.217
F1.3		11.000	Adoptable	0.000	16.410	2.097
F1.4		11.000	Adoptable	7.910	16.410	1.998
F1.5		11.000	Adoptable	10.730	16.410	1.963
F1.6		11.000	Adoptable	10.730	19.560	1.924
F1.7	5	11.000	Adoptable	14.670	19.560	1.875
F1.8	5	11.000	Adoptable	16.070	19.560	1.857
F1.9		11.000	Adoptable	16.570	19.560	1.845
F1.10		11.000	Adoptable	17.970	19.560	1.828
F1.11		11.000	Adoptable	22.270	19.560	1.774
F1.12	5	11.000	Adoptable	23.670	19.560	1.756
F1.13	5	11.000	Adoptable	24.210	19.560	1.744
F1.14	10	11.000	Adoptable	25.580	19.560	1.727
F1.15		11.000	Adoptable	29.480	19.560	1.678
F1.16		11.000	Adoptable	29.480	16.440	1.639
F1.17	10	11.000	Adoptable	32.280	16.440	1.604
F1.18		11.000	Adoptable	37.380	16.440	1.540
F1.19		11.565	Adoptable	37.380	20.440	1.815
F1.20		11.565	Adoptable	39.830	22.790	1.773
F1.21		11.565	Adoptable	43.580	21.640	1.675
F1.22		11.565	Adoptable	45.030	21.240	1.637
F1.23		11.565	Adoptable	49.380	20.440	1.526
F1.24	6	11.565	Adoptable	50.780	25.090	1.405
F1.25		11.565	Adoptable	52.030	29.090	1.300
F2.0		11.000	Adoptable	40.230	12.890	1.483
F2.1	10	11.000	Adoptable	40.230	6.820	1.407
F2.2		11.000	Adoptable	40.230	3.090	1.360
F2.3		11.000	Adoptable	35.410	3.090	1.300
F3.0	6	11.565	Adoptable	41.630	27.990	1.404
F3.1		11.565	Adoptable	42.780	32.000	1.300
F4.0		11.000	Adoptable	4.900	3.000	1.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
M0	F1.0	Ex	4.031	1.500	8.717	8.667	0.050	80.0	100
M1	F1.1	F1.0	1.500	1.500	8.736	8.717	0.019	80.0	100
M2	F1.2	F1.1	3.730	1.500	8.783	8.736	0.047	80.0	100
M3	F1.3	F1.2	9.580	1.500	8.903	8.783	0.120	79.8	100
M4	F1.4	F1.3	7.910	1.500	9.002	8.903	0.099	79.9	100
M5	F1.5	F1.4	2.820	1.500	9.037	9.002	0.035	80.6	100
M6	F1.6	F1.5	3.150	1.500	9.076	9.037	0.039	80.8	100
M7	F1.7	F1.6	3.940	1.500	9.125	9.076	0.049	80.4	100
M8	F1.8	F1.7	1.400	1.500	9.143	9.125	0.018	77.8	100
M9	F1.9	F1.8	1.000	1.500	9.155	9.143	0.012	83.3	100
M10	F1.10	F1.9	1.400	1.500	9.172	9.155	0.017	82.4	100
M11	F1.11	F1.10	4.300	1.500	9.226	9.172	0.054	79.6	100
M12	F1.12	F1.11	1.400	1.500	9.244	9.226	0.018	77.8	100
M13	F1.13	F1.12	1.000	1.500	9.256	9.244	0.012	83.3	100
M14	F1.14	F1.13	1.370	1.500	9.273	9.256	0.017	80.6	100
M15	F1.15	F1.14	3.900	1.500	9.322	9.273	0.049	79.6	100
M16	F1.16	F1.15	3.120	1.500	9.361	9.322	0.039	80.0	100
M17	F1.17	F1.16	2.800	1.500	9.396	9.361	0.035	80.0	100
M18	F1.18	F1.17	5.100	1.500	9.460	9.396	0.064	79.7	100
M19	F1.19	F1.18	4.000	1.500	9.750	9.700	0.050	80.0	100
M20	F1.20	F1.19	3.395	1.500	9.792	9.750	0.042	80.8	100
M21	F1.21	F1.20	3.922	1.500	9.890	9.792	0.098	40.0	100
M22	F1.22	F1.21	1.504	1.500	9.928	9.890	0.038	39.6	100
M23	F1.23	F1.22	4.423	1.500	10.039	9.928	0.111	39.8	100

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
M0	0.360	0.744	5.8	0.8	2.183	2.233	0.000	72	0.0	0.0	25	0.508
M1	0.360	0.744	5.8	0.8	2.164	2.183	0.000	72	0.0	0.0	25	0.508
M2	0.360	0.744	5.8	0.8	2.117	2.164	0.000	72	0.0	0.0	25	0.508
M3	0.347	0.745	5.8	0.6	1.997	2.117	0.000	62	0.0	0.0	23	0.488
M4	0.347	0.744	5.8	0.6	1.898	1.997	0.000	62	0.0	0.0	23	0.488
M5	0.345	0.741	5.8	0.6	1.863	1.898	0.000	62	0.0	0.0	23	0.486
M6	0.345	0.740	5.8	0.6	1.824	1.863	0.000	62	0.0	0.0	23	0.485
M7	0.346	0.742	5.8	0.6	1.775	1.824	0.000	62	0.0	0.0	23	0.487
M8	0.338	0.754	5.9	0.6	1.757	1.775	0.000	57	0.0	0.0	21	0.474
M9	0.312	0.729	5.7	0.5	1.745	1.757	0.000	52	0.0	0.0	21	0.447
M10	0.314	0.733	5.8	0.5	1.728	1.745	0.000	52	0.0	0.0	21	0.449
M11	0.320	0.746	5.9	0.5	1.674	1.728	0.000	52	0.0	0.0	21	0.457
M12	0.323	0.754	5.9	0.5	1.656	1.674	0.000	52	0.0	0.0	21	0.463
M13	0.312	0.729	5.7	0.5	1.644	1.656	0.000	47	0.0	0.0	20	0.436
M14	0.303	0.741	5.8	0.4	1.627	1.644	0.000	42	0.0	0.0	19	0.432
M15	0.274	0.746	5.9	0.3	1.578	1.627	0.000	32	0.0	0.0	17	0.399
M16	0.274	0.744	5.8	0.3	1.539	1.578	0.000	32	0.0	0.0	17	0.398
M17	0.274	0.744	5.8	0.3	1.504	1.539	0.000	32	0.0	0.0	17	0.398
M18	0.242	0.745	5.9	0.2	1.440	1.504	0.000	22	0.0	0.0	14	0.347
M19	0.206	0.744	5.8	0.1	1.715	1.200	0.000	12	0.0	0.0	11	0.289
M20	0.205	0.740	5.8	0.1	1.673	1.715	0.000	12	0.0	0.0	11	0.288
M21	0.209	1.054	8.3	0.1	1.575	1.673	0.000	6	0.0	0.0	7	0.293
M22	0.210	1.059	8.3	0.1	1.537	1.575	0.000	6	0.0	0.0	7	0.295
M23	0.209	1.057	8.3	0.1	1.426	1.537	0.000	6	0.0	0.0	7	0.294

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
M24	F1.24	F1.23	4.856	1.500	10.160	10.039	0.121	40.1	100
M25	F1.25	F1.24	4.191	1.500	10.265	10.160	0.105	40.0	100
S2-0	F2.0	F1.18	4.552	1.500	9.517	9.460	0.057	79.9	100
S2-1	F2.1	F2.0	6.070	1.500	9.593	9.517	0.076	79.9	100
S2-2	F2.2	F2.1	3.730	1.500	9.640	9.593	0.047	80.0	100
S2-3	F2.3	F2.2	4.820	1.500	9.700	9.640	0.060	80.0	100
S3-0	F3.0	F1.20	5.503	1.500	10.161	10.023	0.138	39.9	100
S3-1	F3.1	F3.0	4.172	1.500	10.265	10.161	0.104	40.0	100
S4-0	F4.0	F1.1	4.901	1.500	9.700	9.577	0.123	40.0	100

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
M24	0.209	1.053	8.3	0.1	1.305	1.426	0.000	6	0.0	0.0	7	0.293
M25	0.000	1.054	8.3	0.0	1.200	1.305	0.000	0	0.0	0.0	0	0.000
S2-0	0.187	0.744	5.8	0.1	1.383	1.440	0.000	10	0.0	0.0	10	0.274
S2-1	0.187	0.744	5.8	0.1	1.307	1.383	0.000	10	0.0	0.0	10	0.274
S2-2	0.000	0.744	5.8	0.0	1.260	1.307	0.000	0	0.0	0.0	0	0.000
S2-3	0.000	0.744	5.8	0.0	1.200	1.260	0.000	0	0.0	0.0	0	0.000
S3-0	0.209	1.055	8.3	0.1	1.304	1.442	0.000	6	0.0	0.0	7	0.294
S3-1	0.000	1.054	8.3	0.0	1.200	1.304	0.000	0	0.0	0.0	0	0.000
S4-0	0.000	1.054	8.3	0.0	1.200	1.323	0.000	0	0.0	0.0	0	0.000

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)
M0	4.031	80.0	100	Circular	11.000	8.717	2.183	11.000	8.667	2.233
M1	1.500	80.0	100	Circular	11.000	8.736	2.164	11.000	8.717	2.183
M2	3.730	80.0	100	Circular	11.000	8.783	2.117	11.000	8.736	2.164
M3	9.580	79.8	100	Circular	11.000	8.903	1.997	11.000	8.783	2.117
M4	7.910	79.9	100	Circular	11.000	9.002	1.898	11.000	8.903	1.997
M5	2.820	80.6	100	Circular	11.000	9.037	1.863	11.000	9.002	1.898
M6	3.150	80.8	100	Circular	11.000	9.076	1.824	11.000	9.037	1.863
M7	3.940	80.4	100	Circular	11.000	9.125	1.775	11.000	9.076	1.824

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
M0	F1.0	450	Manhole	Adoptable	Ex	450	Manhole	Adoptable
M1	F1.1	450	Manhole	Adoptable	F1.0	450	Manhole	Adoptable
M2	F1.2	450	Manhole	Adoptable	F1.1	450	Manhole	Adoptable
M3	F1.3	450	Manhole	Adoptable	F1.2	450	Manhole	Adoptable
M4	F1.4	450	Manhole	Adoptable	F1.3	450	Manhole	Adoptable
M5	F1.5	450	Manhole	Adoptable	F1.4	450	Manhole	Adoptable
M6	F1.6	450	Manhole	Adoptable	F1.5	450	Manhole	Adoptable
M7	F1.7	450	Manhole	Adoptable	F1.6	450	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)
M8	1.400	77.8	100	Circular	11.000	9.143	1.757	11.000	9.125	1.775
M9	1.000	83.3	100	Circular	11.000	9.155	1.745	11.000	9.143	1.757
M10	1.400	82.4	100	Circular	11.000	9.172	1.728	11.000	9.155	1.745
M11	4.300	79.6	100	Circular	11.000	9.226	1.674	11.000	9.172	1.728
M12	1.400	77.8	100	Circular	11.000	9.244	1.656	11.000	9.226	1.674
M13	1.000	83.3	100	Circular	11.000	9.256	1.644	11.000	9.244	1.656
M14	1.370	80.6	100	Circular	11.000	9.273	1.627	11.000	9.256	1.644
M15	3.900	79.6	100	Circular	11.000	9.322	1.578	11.000	9.273	1.627
M16	3.120	80.0	100	Circular	11.000	9.361	1.539	11.000	9.322	1.578
M17	2.800	80.0	100	Circular	11.000	9.396	1.504	11.000	9.361	1.539
M18	5.100	79.7	100	Circular	11.000	9.460	1.440	11.000	9.396	1.504
M19	4.000	80.0	100	Circular	11.565	9.750	1.715	11.000	9.700	1.200
M20	3.395	80.8	100	Circular	11.565	9.792	1.673	11.565	9.750	1.715
M21	3.922	40.0	100	Circular	11.565	9.890	1.575	11.565	9.792	1.673
M22	1.504	39.6	100	Circular	11.565	9.928	1.537	11.565	9.890	1.575
M23	4.423	39.8	100	Circular	11.565	10.039	1.426	11.565	9.928	1.537
M24	4.856	40.1	100	Circular	11.565	10.160	1.305	11.565	10.039	1.426
M25	4.191	40.0	100	Circular	11.565	10.265	1.200	11.565	10.160	1.305
S2-0	4.552	79.9	100	Circular	11.000	9.517	1.383	11.000	9.460	1.440
S2-1	6.070	79.9	100	Circular	11.000	9.593	1.307	11.000	9.517	1.383
S2-2	3.730	80.0	100	Circular	11.000	9.640	1.260	11.000	9.593	1.307
S2-3	4.820	80.0	100	Circular	11.000	9.700	1.200	11.000	9.640	1.260
S3-0	5.503	39.9	100	Circular	11.565	10.161	1.304	11.565	10.023	1.442

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
M8	F1.8	450	Manhole	Adoptable	F1.7	450	Manhole	Adoptable
M9	F1.9	450	Manhole	Adoptable	F1.8	450	Manhole	Adoptable
M10	F1.10	450	Manhole	Adoptable	F1.9	450	Manhole	Adoptable
M11	F1.11	450	Manhole	Adoptable	F1.10	450	Manhole	Adoptable
M12	F1.12	450	Manhole	Adoptable	F1.11	450	Manhole	Adoptable
M13	F1.13	450	Manhole	Adoptable	F1.12	450	Manhole	Adoptable
M14	F1.14	450	Manhole	Adoptable	F1.13	450	Manhole	Adoptable
M15	F1.15	450	Manhole	Adoptable	F1.14	450	Manhole	Adoptable
M16	F1.16	450	Manhole	Adoptable	F1.15	450	Manhole	Adoptable
M17	F1.17	450	Manhole	Adoptable	F1.16	450	Manhole	Adoptable
M18	F1.18	450	Manhole	Adoptable	F1.17	450	Manhole	Adoptable
M19	F1.19	450	Manhole	Adoptable	F1.18	450	Manhole	Adoptable
M20	F1.20	450	Manhole	Adoptable	F1.19	450	Manhole	Adoptable
M21	F1.21	450	Manhole	Adoptable	F1.20	450	Manhole	Adoptable
M22	F1.22	450	Manhole	Adoptable	F1.21	450	Manhole	Adoptable
M23	F1.23	450	Manhole	Adoptable	F1.22	450	Manhole	Adoptable
M24	F1.24	450	Manhole	Adoptable	F1.23	450	Manhole	Adoptable
M25	F1.25	450	Manhole	Adoptable	F1.24	450	Manhole	Adoptable
S2-0	F2.0	450	Manhole	Adoptable	F1.18	450	Manhole	Adoptable
S2-1	F2.1	450	Manhole	Adoptable	F2.0	450	Manhole	Adoptable
S2-2	F2.2	450	Manhole	Adoptable	F2.1	450	Manhole	Adoptable
S2-3	F2.3	450	Manhole	Adoptable	F2.2	450	Manhole	Adoptable
S3-0	F3.0	450	Manhole	Adoptable	F1.20	450	Manhole	Adoptable

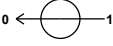
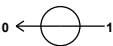
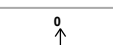
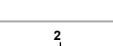
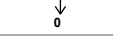
Pipeline Schedule

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)
S3-1	4.172	40.0	100	Circular	11.565	10.265	1.200	11.565	10.161	1.304
S4-0	4.901	40.0	100	Circular	11.000	9.700	1.200	11.000	9.577	1.323
	Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type	
	S3-1	F3.1	450	Manhole	Adoptable	F3.0	450	Manhole	Adoptable	
	S4-0	F4.0	450	Manhole	Adoptable	F1.1	450	Manhole	Adoptable	

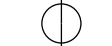
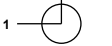
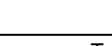
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Ex	3.700	0.000	11.000	2.333	450		1 M0	8.667	100
F1.0	0.000	1.600	11.000	2.283	450		1 M1	8.717	100
F1.1	0.000	3.100	11.000	2.264	450		0 M0	8.717	100
F1.2	0.000	6.830	11.000	2.217	450		1 S4-0	9.577	100
F1.3	0.000	16.410	11.000	2.097	450		2 M2	8.736	100
F1.4	7.910	16.410	11.000	1.998	450		0 M1	8.736	100
F1.5	10.730	16.410	11.000	1.963	450		1 M3	8.783	100
F1.6	10.730	19.560	11.000	1.924	450		0 M2	8.783	100
F1.7	14.670	19.560	11.000	1.875	450		1 M4	8.903	100
							0 M3	8.903	100
							1 M5	9.002	100
							0 M4	9.002	100
							1 M6	9.037	100
							0 M5	9.037	100
							1 M7	9.076	100
							0 M6	9.076	100
							1 M8	9.125	100
							0 M7	9.125	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1.8	16.070	19.560	11.000	1.857	450		M9	9.143	100
						0	M8	9.143	100
F1.9	16.570	19.560	11.000	1.845	450		M10	9.155	100
						0	M9	9.155	100
F1.10	17.970	19.560	11.000	1.828	450		M11	9.172	100
						0	M10	9.172	100
F1.11	22.270	19.560	11.000	1.774	450		M12	9.226	100
						0	M11	9.226	100
F1.12	23.670	19.560	11.000	1.756	450		M13	9.244	100
						0	M12	9.244	100
F1.13	24.210	19.560	11.000	1.744	450		M14	9.256	100
						0	M13	9.256	100
F1.14	25.580	19.560	11.000	1.727	450		M15	9.273	100
						0	M14	9.273	100
F1.15	29.480	19.560	11.000	1.678	450		M16	9.322	100
						0	M15	9.322	100
F1.16	29.480	16.440	11.000	1.639	450		M17	9.361	100
						0	M16	9.361	100
F1.17	32.280	16.440	11.000	1.604	450		M18	9.396	100
						0	M17	9.396	100
F1.18	37.380	16.440	11.000	1.540	450		S2-0	9.460	100
						2	M19	9.700	100
						0	M18	9.460	100
F1.19	37.380	20.440	11.565	1.815	450		M20	9.750	100
						0	M19	9.750	100
F1.20	39.830	22.790	11.565	1.773	450		S3-0	10.023	100
						2	M21	9.792	100
						0	M20	9.792	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1.21	43.580	21.640	11.565	1.675	450		M22	9.890	100
F1.22	45.030	21.240	11.565	1.637	450		M21	9.890	100
F1.23	49.380	20.440	11.565	1.526	450		M23	9.928	100
F1.24	50.780	25.090	11.565	1.405	450		M22	9.928	100
F1.25	52.030	29.090	11.565	1.300	450		M24	10.039	100
F2.0	40.230	12.890	11.000	1.483	450		M25	10.039	100
F2.1	40.230	6.820	11.000	1.407	450		M25	10.160	100
F2.2	40.230	3.090	11.000	1.360	450		M24	10.160	100
F2.3	35.410	3.090	11.000	1.300	450		M25	10.265	100
F3.0	41.630	27.990	11.565	1.404	450		S2-1	9.517	100
F3.1	42.780	32.000	11.565	1.300	450		S2-0	9.517	100
F4.0	4.900	3.000	11.000	1.300	450		S2-2	9.593	100
							S2-1	9.593	100
							S2-3	9.640	100
							S2-2	9.640	100
							S2-3	9.700	100
							S3-1	10.161	100
							S3-0	10.161	100
							S3-1	10.265	100
							S4-0	9.700	100

Simulation Settings

Analysis Speed	Normal	Drain Down Time (mins)	240
Skip Steady State	x	Foul Event Duration (mins)	15

Storm Durations

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



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