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CLIENT: BLUESKY STUDENT LADYBARN HOUSE LIMITED

REPORT NO: P2024-075

DRAINAGE TECHNICAL NOTE

LADYBARN HOUSE, MANCHESTER

MORAN STRUCTURAL Consultants

CONSULTING CIVIL & STRUCTURAL ENGINEERS

Client	Bluesky Student Ladybarn House Limited
Project No.	P2024-075
Project Title	Ladybarn House, Manchester
Document Title	Drainage Technical Note
Author	Craig Cook, Civil Engineer IEng FIHE

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01	Site layout amended	CC	12/08/2024

CONTENTS

1. INTRODUCTION

2. SUSTAINABLE DRAINAGE OVERVIEW

3. SUSTAINABLE DRAINAGE PROPOSALS

3.1. ROOF AREA

3.2. EXTERNAL AREAS

4. SURFACE WATER DESIGN

5. WATER QUALITY

6. FOUL DRAINAGE DESIGN

7. DRAINAGE MAINTENANCE

APPENDIX LIST

A. Proposed Drainage Drawings
B. Hydraulic Calculations
C. United Utilities Sewer Map

1. INTRODUCTION

This report has been produced to outline the sustainable drainage principles to be incorporated into the proposed development considering the hydrological and hydrogeological context of the development. The proposals have been developed in accordance with both national and local guidance including the National Planning Policy Framework (NPPF), CIRIA SuDS Manual C753 and Building Regulations Part H.

This site is located on Moseley Road/Carill Drive, Manchester, at National Grid reference SJ 85603 93972. The site is approximately 5km south east of Manchester City Centre.

The proposals entail the erection of 1no student accommodation block. The site is bound by a mix of commercial and residential properties. A proposed site plan can be seen in Figure 1 below.



Figure 1 – Proposed site plan (c/o BAL Architecture)

2. SUSTAINABLE DRAINAGE OVERVIEW

The means of surface water discharge for the proposed site has been devised using the hierarchical approach contained withing the building Regulations Part H and the CIRIA SuDS Manual C753. Using this approach, the hierarchy of discharge is as follows;

1. Via infiltration
2. To a watercourse
3. To a surface water sewer
4. To a combined sewer

Borehole records indicate the site is underlain by made ground and clay, with sandstone bedrock (Chester Formation). Intrusive ground investigation will be undertaken, including percolation testing, to determine whether infiltration is viable.

Assuming infiltration is not viable, an alternative method for disposing of surface water will be required; with regards to the hierarchy for disposing of surface water, the next viable option would be to discharge into a watercourse, of which there is a culverted watercourse adjacent the site on Carill Drive. There may be an existing connection from the site to the culvert, however this will be confirmed by way of a drainage survey. Any connection to the culverted watercourse would require land drainage consent from the Drainage Authority.

3. SUSTAINABLE DRAINAGE PROPOSALS

Type of SuDS		Description	Applicability to the Site
Source Control	Water butts	Small storage tanks on each individual housing plot.	This may be appropriate for the site and will be considered where practical to implement.
	Rainwater harvesting	Recycling of water from roofs and impermeable areas.	This is not appropriate for the site, due to insufficient space for a header tank.
	Grey water recycling	Water collected from residential and commercial use and reused	This is not appropriate for the site, due to insufficient space for a header tank.
	Green roofs	Vegetated roofs that reduce runoff and remove pollutants	This may be appropriate for the site, however the proposed PV array may limit the extent of green roofs.
	Filter drains	Linear drains or trenches filled with granular material that allow infiltration to the surrounding ground	Infiltration has not yet been confirmed as appropriate for this site due to existing ground conditions, however lined filter drains will be utilised for permeable paving.

	Pervious surfaces	Surfaces that allow surface water inflow into underlying surfaces.	This is appropriate for the site and has been included in the proposals.
	Rain Gardens	Shallow depressions with free draining soil and planted with vegetation that withstands occasional standing water	This is appropriate for soft landscaped areas of the site, subject to layout within amenity and garden spaces.
Site & Regional Control	Basins and ponds	Shallow areas of open space that temporarily hold water and collect silt.	This is not appropriate for the site, due to topography and proposed site layout.
	Swales	Vegetated channels to convey store and treat runoff.	This is not appropriate for the site, due to topography and proposed site layout.
	Infiltration trenches	Linear drains trenches filled with granular material that allow infiltration to the surrounding ground.	These are assumed to not be appropriate due to ground conditions.
	Infiltration basin	Shallow depression that stores runoff before it infiltrates into the subsoil.	
	Infiltration devices	Generally granular geo-cellular features or soakaways that store water and allow infiltration to the surrounding ground.	

Surface water from the site will be generated from two main areas; the residential building roofs and the external hard landscaped areas. Surface water runoff from these areas will be managed as follows;

3.1. ROOF AREA

Traditional gutters will collect rainwater and discharge to a below ground gravity drainage system that will direct flows to the culvert at a restricted rate, with attenuation in the form of latent storage and permeable pavement/filter drain aggregate.

3.2. EXTERNAL AREAS

Surface water runoff will percolate through the proposed tanked permeable pavement to the car park, which will then be collected by filter drains and discharge to a below ground gravity drainage system that will direct flows to the culvert at a restricted rate.

The proposal is for the surface water to be directed into the culvert as described above, with a flow restriction device, such as a HydroBrake, to restrict flows to 2 l/s. This is as close as is reasonably practicable to limit discharge from the site to greenfield runoff rates, whilst specifying a flow control

device with a clear opening of 50mm minimum, in order to reduce the risk of blockages. This would also provide significant betterment on the existing development, which consists of a substantial area of bound surface.

Return Periods/Peak Flows and Volumes	1 in 2 year	1 in 30 year	1 in 100 year
Existing Flow Rate	22.5 l/s	41.9 l/s	61.9 l/s
Proposed Flow Rate	1.7 l/s	1.8 l/s	2.0 l/s
Betterment	92.4%	95.7%	96.8%

4. SURFACE WATER DESIGN

The surface water drainage system has been designed and modelled using Causeway Flow software to ensure compliance to design guidance and sustainable drainage best practice.

Outputs from the Causeway Flow software have been provided as Appendix B. These outputs demonstrate the surface water system to be capable of managing surface water flows for storms up to and including the 1 in 100-year event including a 40% allowance for climate change. No increased surface water flood risk is therefore present from the site to the proposed development or the surrounding properties.

5. WATER QUALITY

In accordance with CIRIA C753, the pollution hazard features for the drainage areas are;

- Residential roofs - Very low
- Car parks - Low

To reduce the risk of pollution, CIRIA have developed 'Pollution Hazard Indices', further details of these are found in the figures below.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 3 - Pollution Hazard Indices for Different Land use Classifications (Source: CIRIA 753)

	Mitigation indices[1]		
Type of SuDS component	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 4 - Indicative SuDS Mitigation Indices for Discharging Surface Water (Source: CIRIA 753)

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each containment type) that equals or exceeds the pollution hazard index (for each contaminant type):

Total SuDS mitigation index ≥ pollution hazard index

(for each contaminant type) (for each contaminant type)

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required where:

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5\ (\text{mitigation index}_2)$$

Where:

Mitigation index$_n$ = mitigation index for component n

Provided the total SuDS mitigation index exceeds the pollution hazard indices, then sufficient water quality will be provided.

For the calculations below the hazards are represented by;

Total suspended solids = Red

Metals = Blue

Hydrocarbons = Green

The figures are presented to show the actual achieved in the right-hand side column. The right-hand side's total must be higher than the left-hand side.

Car Park
0.5 0.4 0.4 = Permeable Pavement 0.7 0.6 0.7

The mitigation provided by the permeable paving satisfies the mitigation index, therefore sufficient treatment has been provided.

All the methods above provide enough water quality in accordance with CIRIA's C753 document. Further evidence will need to be provided at detailed design stage.

6. FOUL DRAINAGE DESIGN

In contrast to surface water drainage, the preferred method of foul water disposal is via sewers, which will connect into the United Utilities foul water sewer network before eventually reaching a wastewater recycling centre where the water will receive treatment.

The design proposal is for the foul effluent to be collected from the proposed dwellings via below ground drainage and gravity falls to the existing site foul water drain that discharges to the combined sewer on Wilmslow Road. The proposed indirect sewer connection will be subject to a S106 sewer connection agreement with United Utilities.

In accordance with 'Design and Construction Guidance' the proposed peak foul flows have been calculated as follows:

4000 litres per dwelling per day or 0.05 litres per second:

36 no. dwellings X 0.05 litres = 1.8 litres per second

The proposed foul water drainage network described above is displayed in the Proposed Drainage Layout drawing included as Appendix A.

7. DRAINAGE MAINTENANCE

Maintenance of the proposed drainage systems shall remain the responsibility of the property owners to ensure long term performance to design parameters. The piped network has been designed to ensure self-cleansing velocities therefore regular specialist maintenance is not envisaged.

SuDS features within the surface water drainage strategy are likely to require maintenance as follows:

Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Figure 5 – Permeable pavement maintenance requirements (Source: CIRIA C753)

APPENDIX A. PROPOSED DRAINAGE LAYOUT AND DETAILS

ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR



Drainage Notes

1. All 100Ø proposed foul drainage pipes shown are to be laid at a gradient of 1:80.
2. All 150Ø proposed foul drainage pipes shown are to be laid at a gradient of 1:150.
3. All existing land drains encountered on site during construction are to be re-connected.
4. Temporary protection to be provided to drainage work during construction as necessary.
5. Topographical survey and architectural layout based on third party information.
6. Anticipated foul flow rates calculated using discharge unit method to BS EN 12056-2.
7. Drawing to be read in conjunction with Causeway Flow design pack.
8. Pipes to be structured walled to BS EN 13476, Polypropylene to BE EN 1852 or PVC-U to BS EN 1401.
9. Both clay and concrete pipes shall be strength class 120 (100/150mm min crushing strength 28kN/m). Thermoplastic pipes shall have a minimum ring stiffness of SN4
10. Pipes which run adjacent to buildings shall be installed in strict accordance with Building Regulations Part H, clauses 2.23 to 2.25
11. Class Z concrete bed and surround to all foul and surface water pipes with less than 900mm cover depth. Type S granular bed and surround to all foul and surface water pipes with greater than 900mm cover depth.
12. All manholes and inspection chambers subject to vehicular loading to have D400 load-rated covers and frames to BS EN 124. B125 load-rated covers and frames to all other chambers.
13. Concrete to be GEN1 unless specified otherwise.
14. The first flexible joint in pipes adjoining a manhole shall be a maximum length of 600mm from the inside face of the manhole, connecting to a rocker pipe. The length of the rocker pipe shall be 600mm.
15. All foul and surface water pipes to be constructed to Building Regulations Part H.
16. HydroBrake to restrict flows to 2 l/s.
17. Permeable pavement sub-base to consist of min. 30% voids, e.g. MoT Type 3.
18. Soft spots (<5% CBR) to be excavated and removed from site, to be reinstated with MoT Type 1 laid and compacted in 100-150mm thick layers.

Key

- Proposed Surface Water Drainage
- Existing Drain/Sewer
- Proposed Foul Drainage
- Proposed Inspection Chamber
- Proposed Manhole
- RWP — Proposed Rainwater Downpipe
- FD — Proposed Foul Drainage Pop-Up (with rodding access)
- Proposed Linear Drain
- Proposed Tanked Permeable Pavement

Temporary Stability

All temporary works such as propping/stability is the responsibility of the Building Contractor. If in doubt ask MSC engineer.

CDM2015 Regulations
The client, in this case the property owner, has a legal obligation to act as principal designer. It is appropriate for the builder/ contractor to assume the PD role. This must be agreed as part of the scope of works for the building contract.

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REV	AMENDMENT	BY	DATE
P1	Proposed Site Layout Amended	CC	13/08/2024
P0	First Issue	CC	11/08/2024

PURPOSE OF ISSUE
PRELIMINARY

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CLIENT
Bluesky Student Ladybarn House Ltd

PROJECT
Proposed Student Accommodation
Ladybarn House, Manchester

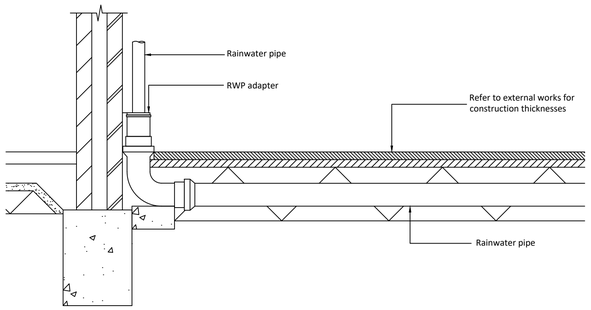
DRAWING TITLE
Proposed Drainage Layout

SHEET SIZE	SCALE	DATE	DRAWN	CHECKED	STATUS
A1	1:200	AUG 2024	CC	MM	P

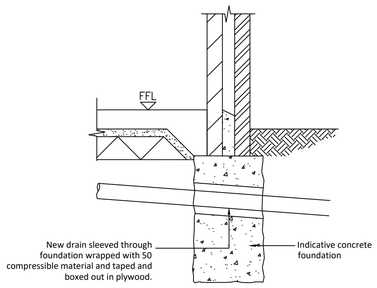
MSC PROJECT No.	DRAWING No.	REV
P2024-075	P2024-075-3000	P1

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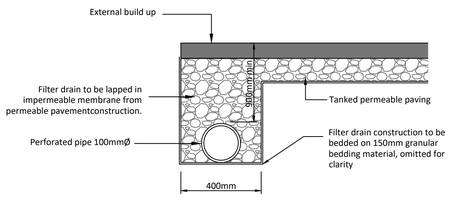


Typical Rainwater Downpipe Detail
1:20 @ A1

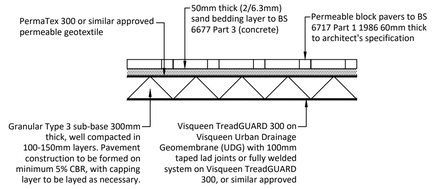


Drain Sleeved Through Foundation Detail
1:20 @ A1

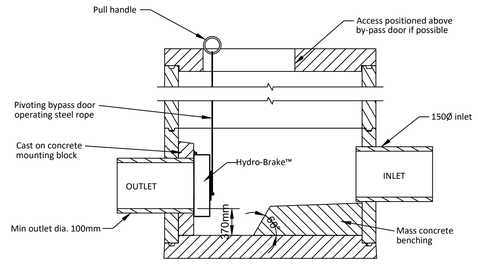
Pipe Protection Near Foundation Details
1:20 @ A1



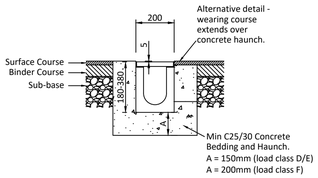
Filter Drain to Tanked Permeable Pavement Detail
1:20 @ A1



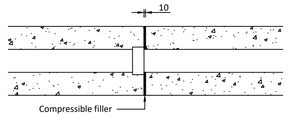
Tanked Permeable Pavement Detail
1:20 @ A1



Typical HydroBrake Detail
1:20 @ A1



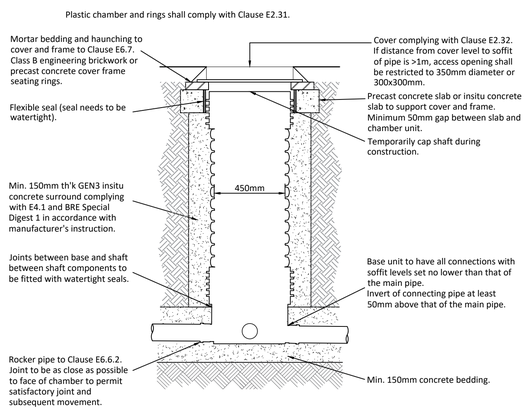
Typical Linear Drain Detail
1:20 @ A1



Typical Flexible Joint To Concrete Bed And Surround Detail
1:20 @ A1



Typical Pipe Bedding Details
1:50 @ A1



Typical Inspection Chamber Detail
1:20 @ A1

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REV	AMENDMENT	BY	DATE
P0	First Issue	CC	10/08/2024

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PRELIMINARY

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PROJECT
Proposed Student Accommodation
Ladybarn House, Manchester

DRAWING TITLE
Proposed Drainage Details

SHEET SIZE	SCALE	DATE	DRAWN	CHECKED	STATUS
A1	Varies	AUG 2024	CC	MM	P

MSC PROJECT No.	DRAWING No.	REV
P2024-075	P2024-075-3001	P0

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APPENDIX B. HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
EX1	0.118	4.00	38.500	450	1.050
EX2			38.500	450	1.100

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	EX1	EX2	5.000	0.600	37.450	37.400	0.050	100.0	150	4.08	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)
1.000	1.005	17.8	16.0	0.900	0.950	0.118	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)
1.000	5.000	100.0	150	Circular	38.500	37.450	0.900	38.500	37.400	0.950

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	EX1	450	Manhole	Private	EX2	450	Manhole	Private

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EX1	38.500	1.050	450	0	1.000	37.450	150
EX2	38.500	1.100	450	1	1.000	37.400	150

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Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
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)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	0	0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	EX1	10	37.662	0.212	22.7	0.5112	0.0000	SURCHARGED
15 minute winter	EX2	10	37.535	0.135	22.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	EX1	1.000	EX2	22.5	1.278	1.267	0.0857	9.9

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	EX1	10	37.982	0.532	43.2	1.2806	0.0000	SURCHARGED
15 minute summer	EX2	9	37.542	0.142	41.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	EX1	1.000	EX2	41.9	2.382	2.362	0.0871	18.9

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	EX1	9	38.500	1.050	78.4	2.5274	2.2811	FLOOD
15 minute summer	EX2	7	37.542	0.142	61.9	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)
15 minute winter	EX1	1.000	EX2	61.9	3.519	3.489	0.0871	32.2

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	0.600
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	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	0.010	4.00	38.650	450	385643.172	393959.876	0.750
S2	0.010	4.00	38.550	450	385620.225	393961.580	0.879
S3	0.010	4.00	38.650	450	385645.155	393946.533	0.750
S4	0.010	4.00	38.550	450	385619.250	393948.457	1.010
S5	0.013	4.00	38.500	450	385615.370	393965.992	1.000
S6	0.013	4.00	38.500	450	385613.851	393948.783	1.291
S7			38.550	1200	385613.668	393946.707	1.427
S8			38.600	450	385613.668	393944.838	1.496

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	S1	S2	23.010	0.600	37.900	37.671	0.229	100.5	150	4.38	50.0
1.001	S2	S4	13.159	0.600	37.671	37.540	0.131	100.5	150	4.60	50.0
2.000	S3	S4	25.976	0.600	37.900	37.540	0.360	72.2	150	4.37	50.0
1.002	S4	S7	5.850	0.600	37.540	37.123	0.417	14.0	150	4.64	50.0
3.000	S5	S6	17.276	0.600	37.500	37.209	0.291	59.4	100	4.29	50.0
3.001	S6	S7	2.084	0.600	37.209	37.173	0.036	57.9	100	4.32	50.0
1.003	S7	S8	1.869	0.600	37.123	37.104	0.019	98.4	150	4.67	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	1.002	17.7	1.4	0.600	0.729	0.010	0.0	28	0.590
1.001	1.002	17.7	2.7	0.729	0.860	0.020	0.0	40	0.726
2.000	1.185	20.9	1.4	0.600	0.860	0.010	0.0	26	0.670
1.002	2.703	47.8	5.4	0.860	1.277	0.040	0.0	34	1.809
3.000	1.001	7.9	1.8	0.900	1.191	0.013	0.0	32	0.810
3.001	1.014	8.0	3.5	1.191	1.277	0.026	0.0	46	0.982
1.003	1.013	17.9	8.9	1.277	1.346	0.066	0.0	75	1.011

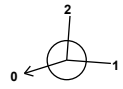
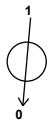
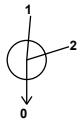
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Pipeline Schedule

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	23.010	100.5	150	Circular	38.650	37.900	0.600	38.550	37.671	0.729
1.001	13.159	100.5	150	Circular	38.550	37.671	0.729	38.550	37.540	0.860
2.000	25.976	72.2	150	Circular	38.650	37.900	0.600	38.550	37.540	0.860
1.002	5.850	14.0	150	Circular	38.550	37.540	0.860	38.550	37.123	1.277
3.000	17.276	59.4	100	Circular	38.500	37.500	0.900	38.500	37.209	1.191
3.001	2.084	57.9	100	Circular	38.500	37.209	1.191	38.550	37.173	1.277
1.003	1.869	98.4	150	Circular	38.550	37.123	1.277	38.600	37.104	1.346

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	450	Manhole	Private	S2	450	Manhole	Private
1.001	S2	450	Manhole	Private	S4	450	Manhole	Private
2.000	S3	450	Manhole	Private	S4	450	Manhole	Private
1.002	S4	450	Manhole	Private	S7	1200	Manhole	Private
3.000	S5	450	Manhole	Private	S6	450	Manhole	Private
3.001	S6	450	Manhole	Private	S7	1200	Manhole	Private
1.003	S7	1200	Manhole	Private	S8	450	Manhole	Private

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	385643.172	393959.876	38.650	0.750	450				
						0	1.000	37.900	150
S2	385620.225	393961.580	38.550	0.879	450	1	1.000	37.671	150
									
						0	1.001	37.671	150
S3	385645.155	393946.533	38.650	0.750	450				
						0	2.000	37.900	150
S4	385619.250	393948.457	38.550	1.010	450	1	2.000	37.540	150
						2	1.001	37.540	150
									
						0	1.002	37.540	150
S5	385615.370	393965.992	38.500	1.000	450				
						0	3.000	37.500	100
S6	385613.851	393948.783	38.500	1.291	450	1	3.000	37.209	100
									
						0	3.001	37.209	100
S7	385613.668	393946.707	38.550	1.427	1200	1	3.001	37.173	100
						2	1.002	37.123	150
									
						0	1.003	37.123	150

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S8	385613.668	393944.838	38.600	1.496	450	1 1	1.003	37.104	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
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)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	0	0

Node S7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	37.123	Product Number	CTL-SHE-0064-2000-1250-2000
Design Depth (m)	1.250	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	38.000	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	130	Depth (m)	0.300
Safety Factor	2.0	Width (m)	13.000	Inf Depth (m)	
Porosity	0.30	Length (m)	9.000		

Node S6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	38.000	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	126	Depth (m)	0.300
Safety Factor	2.0	Width (m)	13.000	Inf Depth (m)	
Porosity	0.30	Length (m)	9.000		

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	S1	29	37.970	0.070	1.4	0.0300	0.0000	OK
30 minute winter	S2	29	37.971	0.300	4.7	0.1160	0.0000	SURCHARGED
30 minute winter	S3	30	37.970	0.070	1.4	0.0298	0.0000	OK
30 minute winter	S4	29	37.970	0.430	6.2	0.1535	0.0000	SURCHARGED
30 minute winter	S5	30	37.971	0.471	3.3	0.1973	0.0000	SURCHARGED
30 minute winter	S6	29	37.970	0.761	3.1	0.2739	0.0000	SURCHARGED
30 minute winter	S7	29	37.970	0.847	4.1	0.9575	0.0000	SURCHARGED
15 minute summer	S8	1	37.104	0.000	1.7	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 winter	S1	1.000	S2	1.4	0.461	0.079	0.2960	
30 minute winter	S2	1.001	S4	2.8	0.701	0.157	0.2317	
30 minute winter	S3	2.000	S4	1.4	0.506	0.067	0.3331	
30 minute winter	S4	1.002	S7	3.8	0.605	0.080	0.1030	
30 minute winter	S5	3.000	S6	-1.6	0.402	-0.203	0.1352	
30 minute winter	S6	3.001	S7	3.0	0.568	0.371	0.0163	
30 minute winter	S7	Hydro-Brake®	S8	1.7				7.3

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	38.142	0.242	7.0	0.1029	0.0000	SURCHARGED
15 minute winter	S2	12	38.139	0.468	7.2	0.1811	0.0000	SURCHARGED
15 minute winter	S3	12	38.134	0.234	7.2	0.0996	0.0000	SURCHARGED
15 minute winter	S4	12	38.130	0.590	11.4	0.2105	0.0000	SURCHARGED
60 minute winter	S5	59	38.104	0.604	3.6	3.1132	0.0000	SURCHARGED
60 minute winter	S6	58	38.103	0.894	6.6	3.1614	0.0000	SURCHARGED
30 minute winter	S7	21	38.108	0.985	8.6	1.1145	0.0000	SURCHARGED
15 minute summer	S8	1	37.104	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	3.5	0.569	0.199	0.4051	
15 minute winter	S2	1.001	S4	5.4	0.809	0.306	0.2317	
15 minute winter	S3	2.000	S4	3.5	0.602	0.169	0.4573	
15 minute winter	S4	1.002	S7	9.7	0.785	0.202	0.1030	
60 minute winter	S5	3.000	S6	-1.7	0.404	-0.213	0.1352	
60 minute winter	S6	3.001	S7	-4.4	0.576	-0.553	0.0163	
30 minute winter	S7	Hydro-Brake®	S8	1.8				13.7

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	38.524	0.624	6.6	0.2656	0.0000	FLOOD RISK
15 minute winter	S2	12	38.507	0.836	10.7	0.3236	0.0000	FLOOD RISK
15 minute winter	S3	12	38.484	0.584	6.6	0.2486	0.0000	FLOOD RISK
15 minute winter	S4	12	38.467	0.927	19.4	0.3309	0.0000	FLOOD RISK
120 minute winter	S5	116	38.294	0.794	4.9	9.8744	0.0000	FLOOD RISK
120 minute winter	S6	116	38.293	1.084	7.9	9.9035	0.0000	FLOOD RISK
15 minute winter	S7	12	38.382	1.259	18.3	1.4244	0.0000	FLOOD RISK
15 minute summer	S8	1	37.104	0.000	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	4.5	0.535	0.256	0.4051	
15 minute winter	S2	1.001	S4	9.1	0.800	0.514	0.2317	
15 minute winter	S3	2.000	S4	4.6	0.596	0.219	0.4573	
15 minute winter	S4	1.002	S7	18.3	1.038	0.382	0.1030	
120 minute winter	S5	3.000	S6	-2.4	0.403	-0.307	0.1352	
120 minute winter	S6	3.001	S7	-5.3	-0.680	-0.668	0.0163	
15 minute winter	S7	Hydro-Brake®	S8	2.0				19.0

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APPENDIX C. UNITED UTILITIES SEWER MAP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

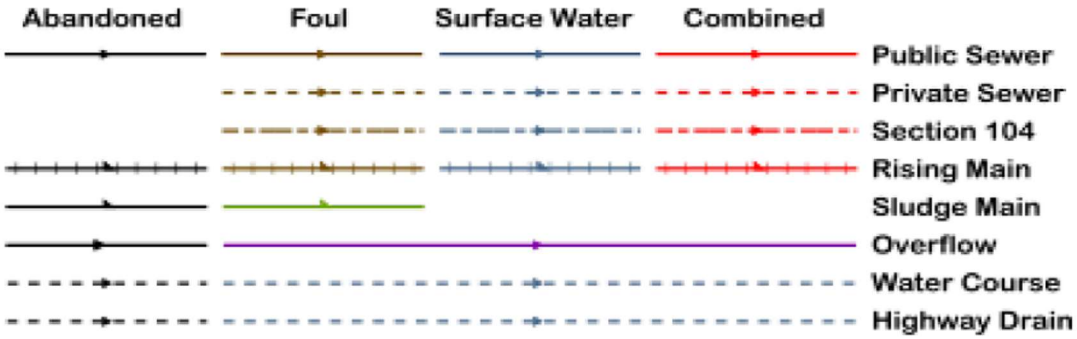
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

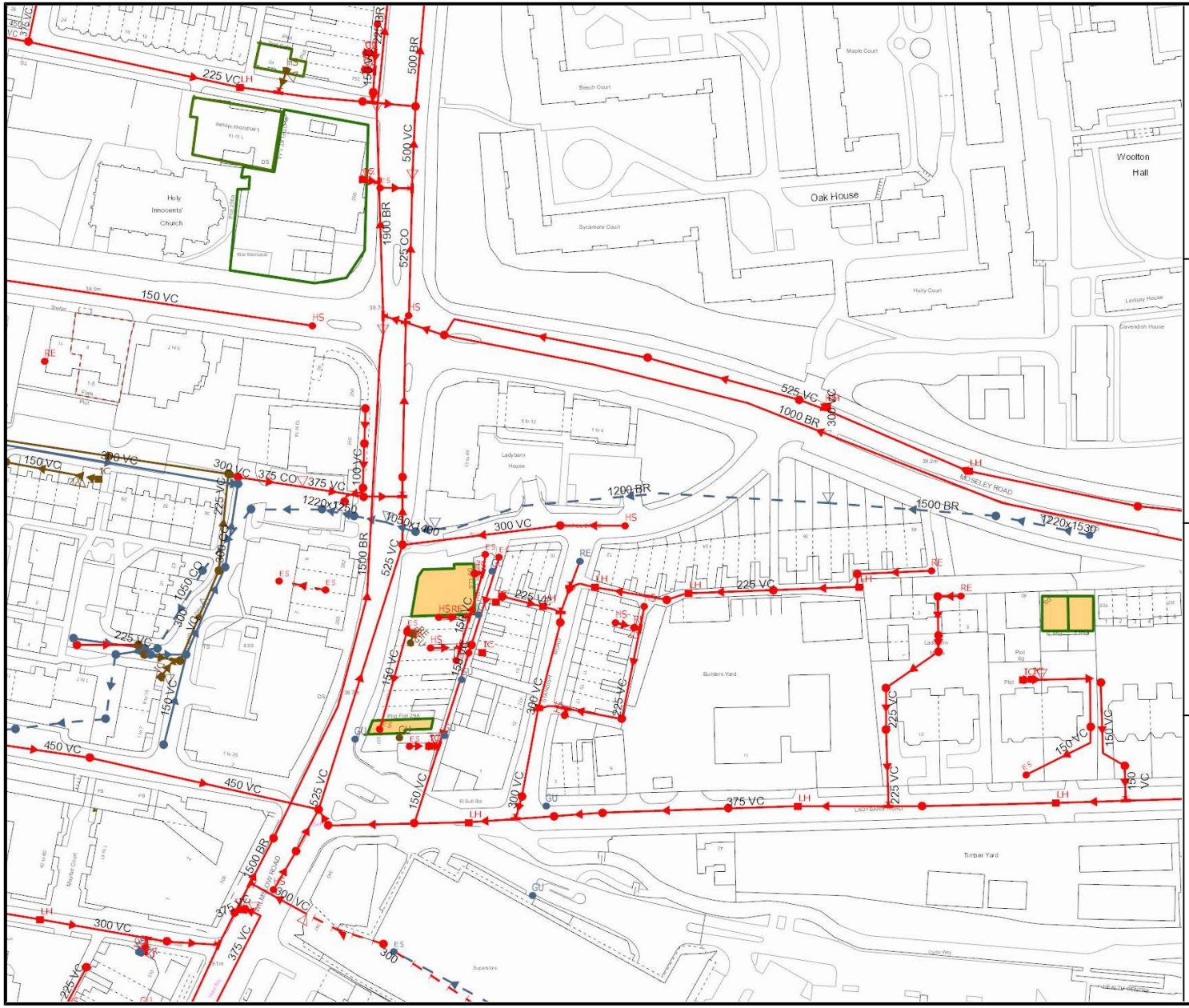
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic



United Utilities

Water for the North West

SEWER RECORDS

Address or Site Reference

FLAT 1 2 LADYBARN HOUSE
MOSELEY ROAD,
FALLOWFIELD,
MANCHESTER,
M14 6ND

Scale: 1:1250

Date: 20/06/2024

Printed by: Property Searches

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.

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