



Job Title

25 Rochdale Road, Manchester

Prepared for

Wyngrove Ltd

Report Type

Flood Risk Assessment and Drainage
Strategy

Date

25th August 2022

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Flood Risk Assessment and Drainage Strategy

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Reviewed by Nanette Heystek

Civic Job No. 870-02

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1. Introduction

1.1 Project Background

Civic Engineers has been appointed by Wyngrove Ltd to provide Flood Risk and Drainage advice and reporting as required to support a full planning application for the proposed development at 25 Rochdale Road, Manchester.

Whilst the site is located in a Critical Drainage Area and is located in Flood Zone 1 and whilst it does fall within the Conurbation Core Critical Drainage Area as defined in the Manchester, Salford & Trafford Strategic Flood Risk Assessment (SFRA), given the location is within Flood Zone 1 and that the site area is less than 0.5ha (approximately 0.13ha) it has been agreed with Manchester City Council that a Flood Risk & SuDS Statement should be provided to support the planning application, rather than a Flood Risk Assessment.

1.2 Development Proposals

The proposed development comprises a new 11-storey hotel building containing circa 229 rooms, a 210 sqm commercial space at ground floor level and associated ancillary spaces, plant rooms and cycle storage.

2. Existing Site Details

2.1 Location

The site is approximately 0.13 ha in area and has recently been occupied by a single-storey office building that has recently been demolished, alongside associated surface car parking. The site is now solely used as a paid surface car park, access from Rochdale Road, and operated by Total Car Parks.

The site is bounded by Rochdale Road to the southeast, the Particular Baptist Chapel to the northeast, Ludgate Street to the southwest and Dyche Street to the northwest.

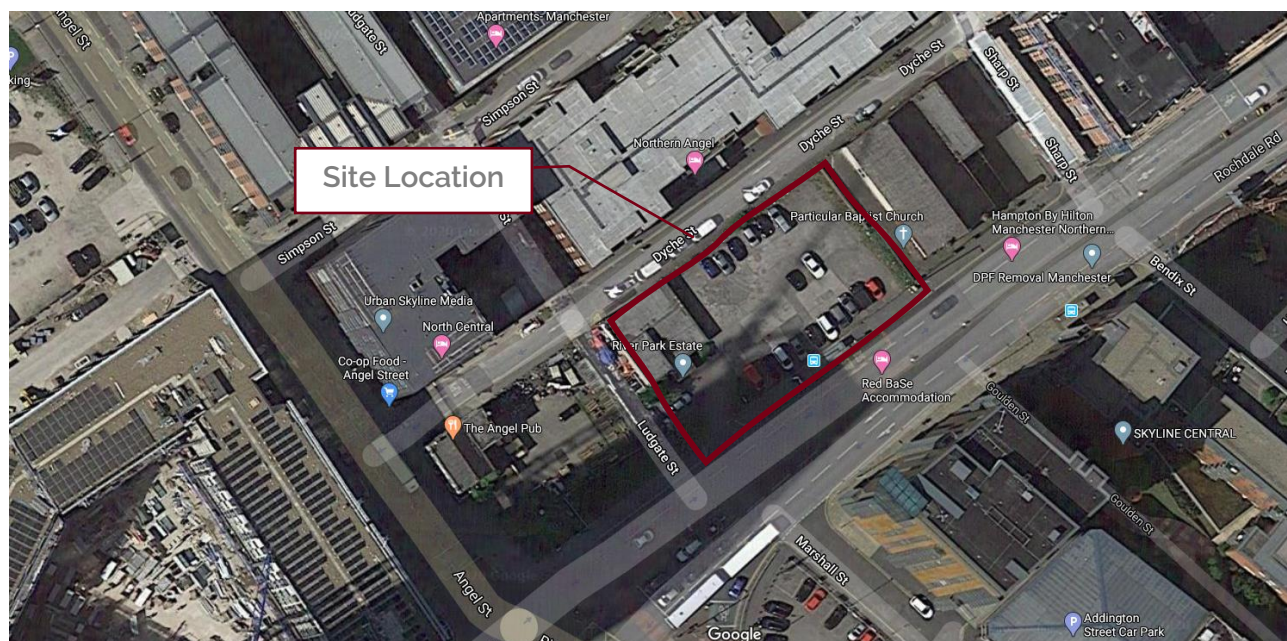


Figure 1 Site Location Plan

The site comprises hardstanding across circa 75% of the site with the remaining 25% of the site comprised of a ground floor slab from the recently demolished building.

Retaining walls bound the site along three edges with the Rochdale Road side having level threshold. The substructure information for these walls is currently unknown. The retaining wall on the north boundary is circa 600mm tall retaining the site. The retaining wall to the west boundary appears to have been part of the recently demolished structure and is circa 1.0m tall. Both walls are of masonry construction.

The recently demolished building was a single-storey office building. The superstructure is understood to have been masonry cavity wall construction with the substructure believed to be shallow foundations. The site is generally flat at 51m AOD. There is a circa 0.5-1.0m level change between the site and the boundary on the west and north boundaries.

2.2 Existing Drainage

Civic received the CCTV survey from Subscan UDS on the 1st May 2020, which can be found in Appendix E. The existing system solely comprises of two gullies and an interceptor. The CCTV survey indicates two runs. The run begins from the gully located along the south perimeter of the site and runs parallel to the boundary in a clockwise direction, connecting into an interceptor located along the western boundary of the site. The interceptor then connects to the existing combined UU sewer running parallel to the northern site boundary. There is no existing foul drainage.

2.3 Topography

A topographical survey has been undertaken by CPLS dated April 2016 and a copy of the survey is included in Appendix A. The topographical survey shows that the site has a slight fall running east (51.110m AOD) to west (50.670m AOD). Dyche Street to the north of the site is approximately 1m lower than the subject site.

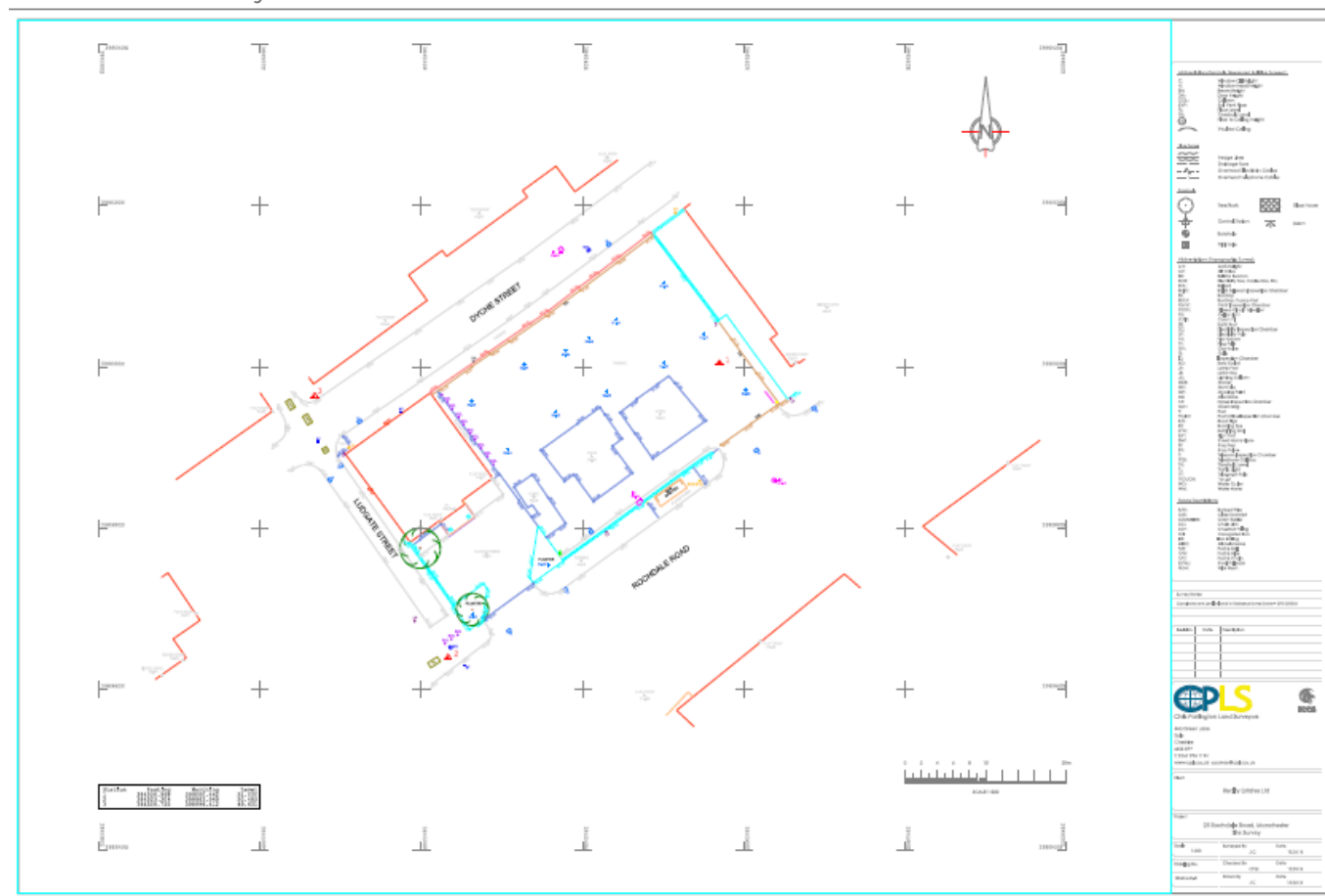


Figure 2 Topographic View of Site

2.4 Geology

A previous Phase 1 Preliminary Risk Assessment undertaken by The LK Group in August 2017 has indicated that there is made ground up to circa 1.8m below ground level. Natural ground comprises stiff to very stiff clay to 15m. Sand and gravel is noted deeper than 15m below ground level.

The bedrock is noted as Chester Pebble Beds Formation (sandstone).

A Phase 2 intrusive ground investigation has been conducted and can be provided upon request.

3. Relevant Policy and Guidance

3.1 National Planning Policy Framework

In February 2019 the Ministry of Housing, Communities and Local Government revised the National Planning Policy Framework document (NPPF) and the Planning Practice Guidance which provides guidance on how flood risk should be assessed during the planning and development process.

The NPPF refers to the Flood Zones which are shown on the Environment Agency Flood Map, and establishes the range of uses which are appropriate, or compatible, land uses for each Flood Zone.

The Flood Zones can be summarised as follows:

Zone 1: Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability. This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability. This zone comprises land assessed as having 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Zone 3b: Functional Flood Plain. This zone comprises land where water must flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

The 'Technical Guidance to the National Planning Policy Framework' defines the type and nature of different development classifications in the context of their flood risk vulnerability. The flood risk vulnerability and flood zone 'compatibility' has been summarised below.

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	Exception Test Required	✓	✓
Zone 2	Exception Test Required	✓	Exception Test Required	✓	✓
Zone 3a	Exception Test Required	✓	*	Exception Test Required	✓
Zone 3b (functional floodplain)	Exception Test Required	✓	*	*	*
✓ Development is appropriate * Development should not be permitted.					

Table 1 Flood Risk vulnerability and flood zone compatibility from NPPF Technical Guide

3.2 Site Specific NPPF Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the Government web based 'Flood Map for Planning' is reviewed, the flood map identifies the probability of flooding from rivers or sea (not taking into account the presence of flood defences). The Government web based 'Long Term Flood Risk Assessment for Locations in England' should also be used to identify the flood risks from rivers and seas, surface water and reservoirs.

From the 'Flood Map for Planning', shown below it can be seen that the site falls within Flood Zone 1. Hotels are classed as more vulnerable uses as such this is a compatible use.

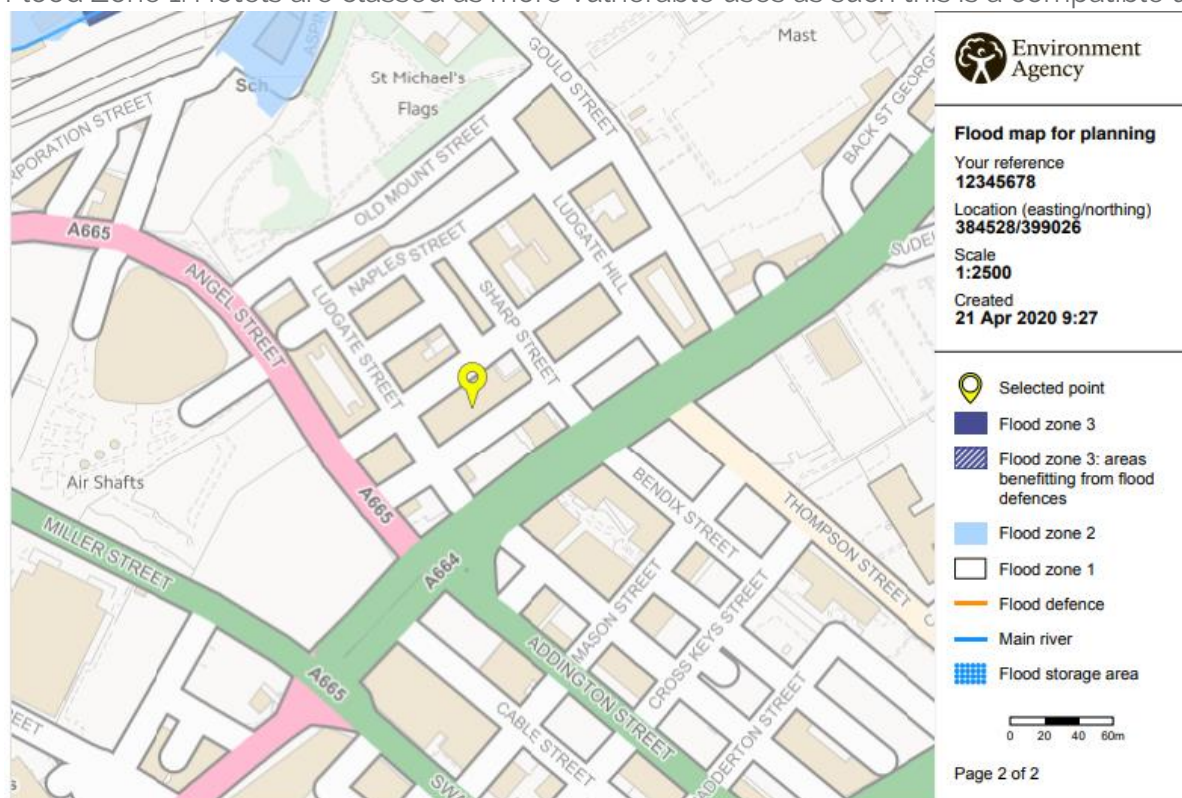


Figure 3 Flood Map for Site

3.3 Manchester, Salford and Trafford Strategic Flood Risk Assessment (SFRA)

The SFRA states that:

"Development should aim for a minimum reduction in surface water runoff rates of 50% for brownfield sites, with an aim or reducing runoff to Greenfield rates up to a 1 in 100-year storm event, considering climate change.

Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 years plus climate change event."

4. Flood Risk Assessment

The potential sources of flooding to the development have been assessed and are discussed below.

4.1 Rivers and Sea Flooding

From the Government flood map for planning:

- Where a site is in a dark blue shaded zone, this indicates that the site is within high flood risk where there is a chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is in a blue shaded zone, this indicates that the site is within medium flood risk where there is a chance of flooding between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is in a lighter blue shaded zone, this indicates that the site is within low flood risk where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is in the lightest blue shaded zone, this indicates that the site is within very low flood risk where there is a chance of flooding of less than 1 in 1000 (0.1%).

Flood risk to the site from rivers and seas is indicated Figure 4 Rivers & Seas Flood Risk Map and the site is within an unshaded area and therefore has low risk of flooding from rivers or sea.

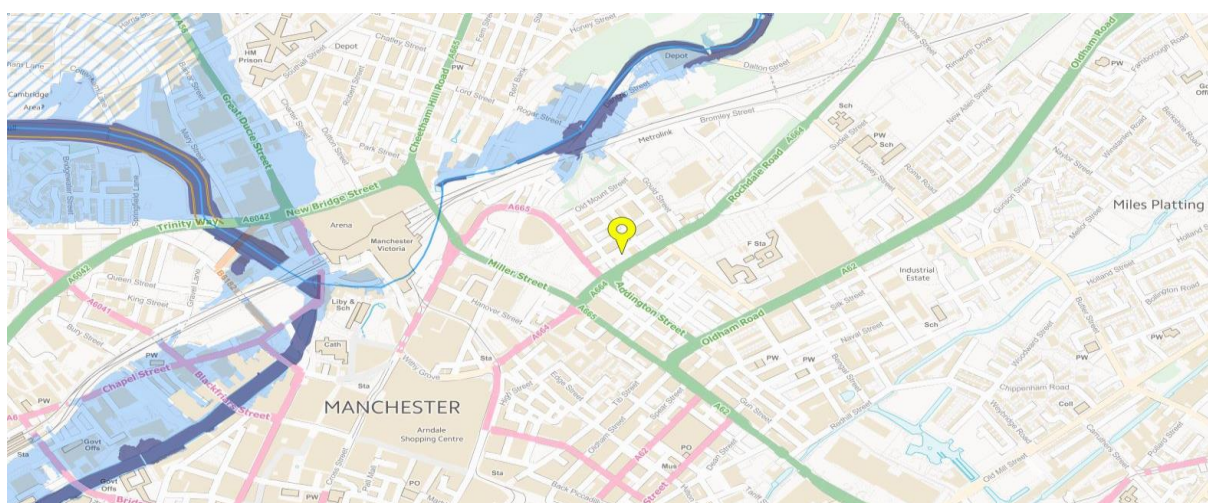


Figure 4 Rivers & Seas Flood Risk Map

4.2 Reservoir Flooding

The EA's 'Risk of Flooding from Reservoirs' map shows there is a low risk of flooding from reservoirs as shown in Figure 5 over page.

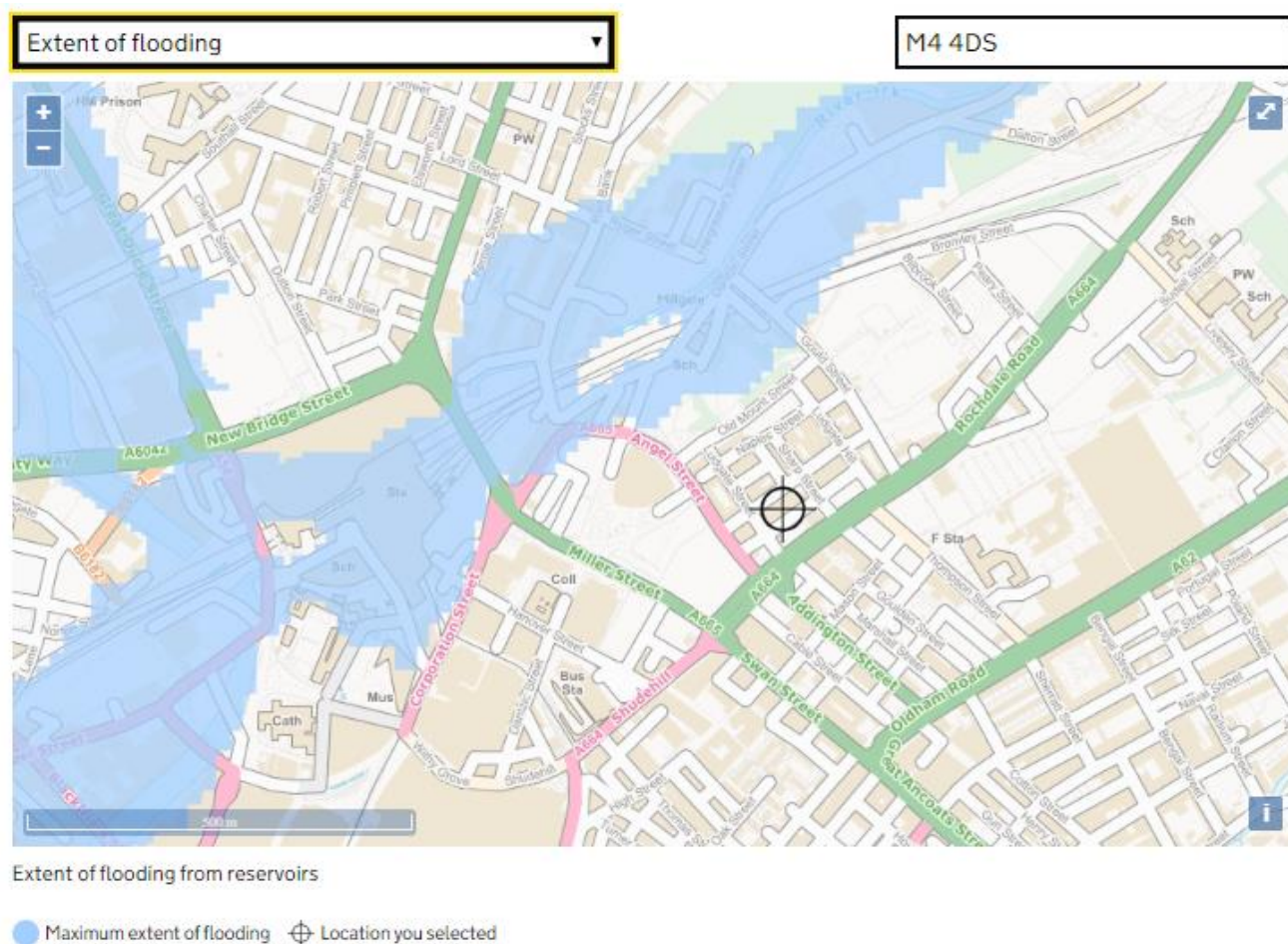


Figure 5 Reservoir Flood Risk Map

4.3 Groundwater Flooding

There are no known occurrences of ground water flooding at the site and it is not anticipated that the risk of flooding from groundwater would exceed that due to fluvial sources as described above.

4.4 Surface Water Flooding to the Site

Surface water flooding can be caused when rainwater, during extreme rainfall events, does not drain away through the normal drainage system or soak into the ground. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

Surface water flooding is dependant primarily on topography which dictates either the flow path of overland flow which is not contained within public sewers, or areas in which ponding may occur. Surface water flooding is more difficult to predict than the risk of flooding from Rivers or Sea as it is dependent on the amount of rain which will fall in a very localised area, the specific topography of that region and the capacity and functionality of the drainage network within that section.

From the UK Government's Flood Risk from Surface Water (extent of flooding) map:

- Where a site is in a dark blue shaded zone, this indicates that the site is at high risk of flooding where there is a chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is in a light blue shaded zone; this indicates that the site is at low risk of flooding where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is in a white (unshaded) area; this indicates that the site is at very low risk of flooding where there is a chance of flooding of less than 1 in 1000 (0.1%).

The extent of flooding to the site from surface water is indicated below with an area classified as being at 'Very Low' risk of flooding from surface water.

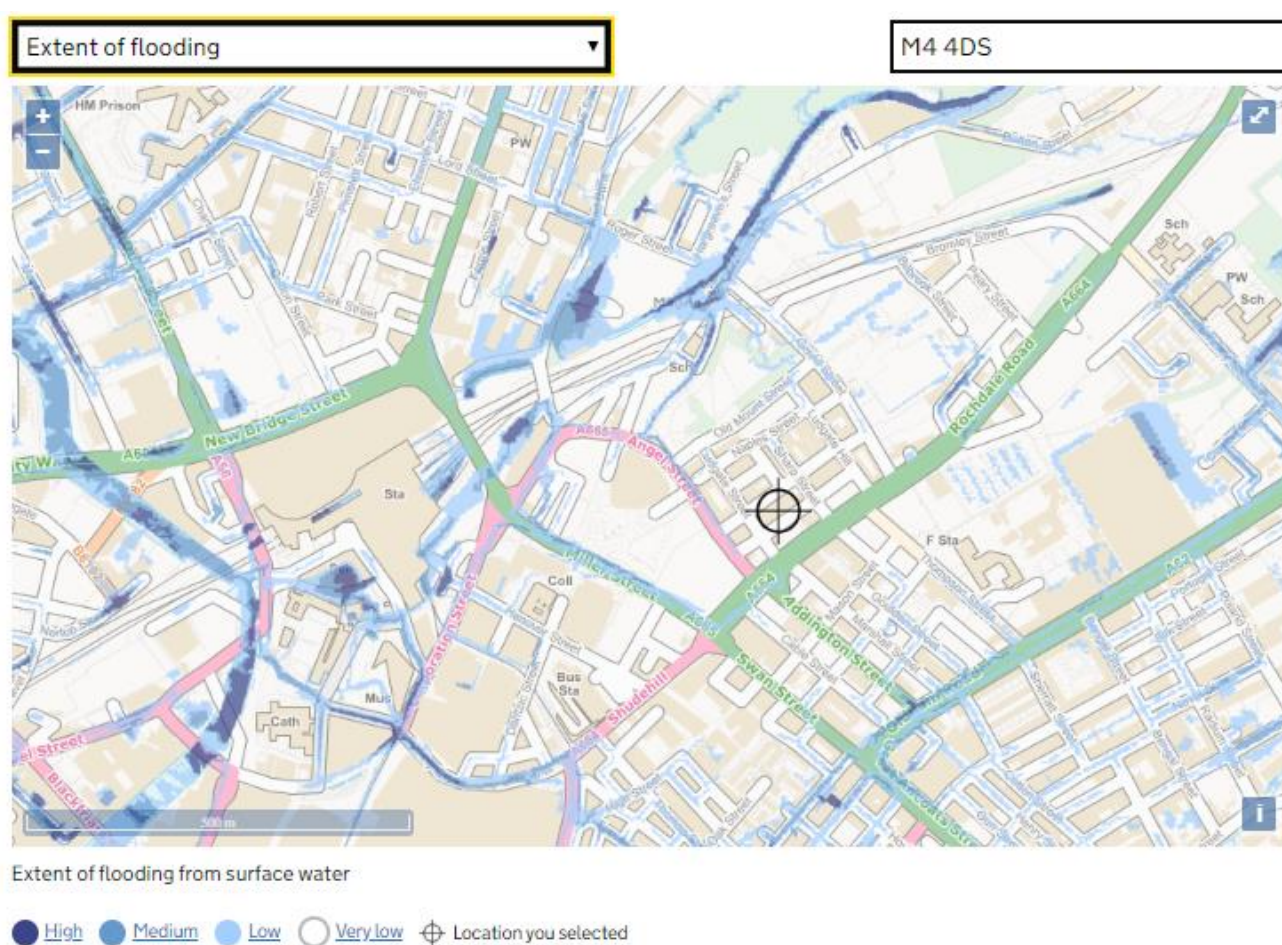


Figure 6 Surface Water Flood Risk Map

4.5 Summary of Flood Risk

From the evidence collated and subsequent negotiations, the flood risk proposed to the development can be summarised as follows:

- Rivers and Sea – Low Risk
- Reservoir – Low Risk

- Groundwater – Low Risk
- Public Sewers – Low Risk
- Surface Water – Low Risk

5. Surface Water Management Strategy

5.1 Existing Site Drainage

United Utilities asset maps can be found in Appendix B and an extract is shown below. The maps show a network of existing combined sewers below the three highways surrounding the site boundaries as follows:

- Dyche Street – 450x700 sewer (assumed 'brick egg' construction)
- Rochdale Road – 381x508 sewer (assumed 'brick egg' construction) + 2362mm diameter brick sewer
- Ludgate Street – unknown dia/construction

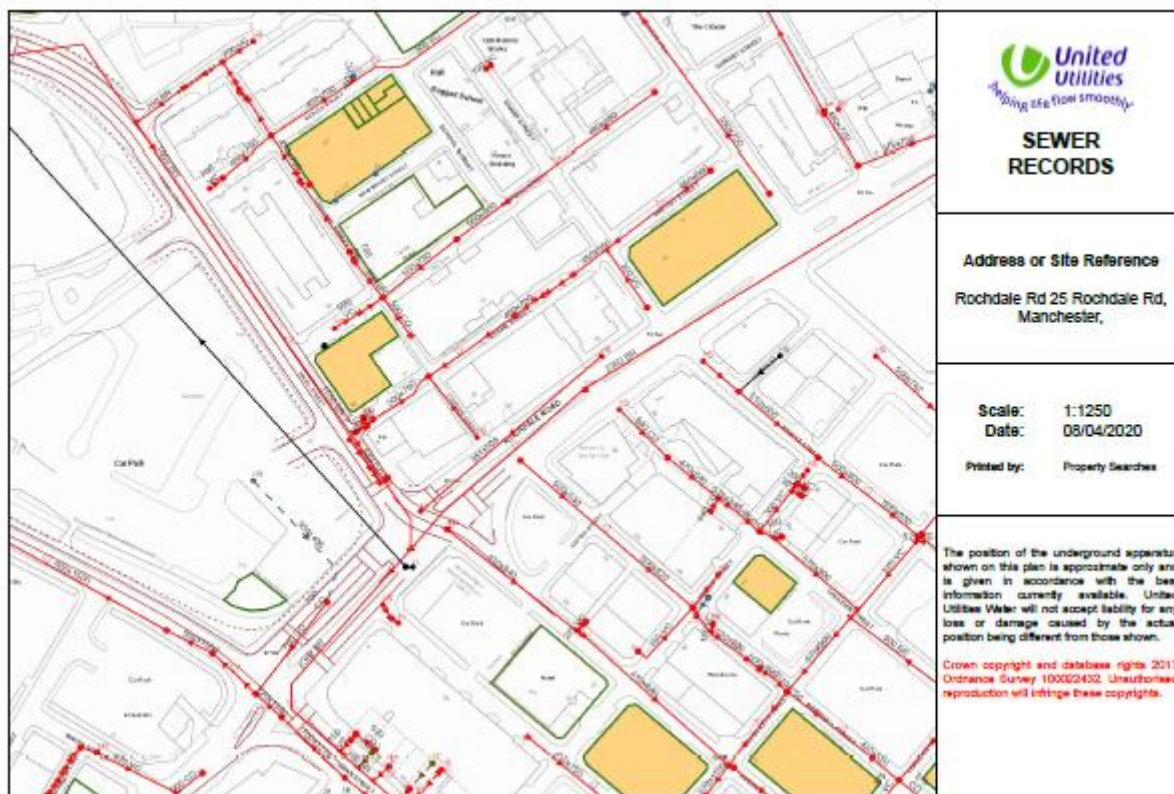


Figure 7 United Utilities Asset Maps

CCTV Drainage surveys have confirmed that the site has positive connections to the public sewer for discharge of surface water that would have served the previous development on the site.

Investigations on nearby sites suggest that the ground conditions at the site could comprise a depth of made ground over significant depth of clay. The use of soakaways within the natural ground is therefore not feasible at the site due to the relatively impermeable natural strata underlying the site and the fact that the building will occupy most of the site.

5.2 Existing Site/Pre-development Runoff

Pre-development run off rates have been calculated using a simulated network within Causeway Flow. Surface water calculations are included in Appendix C.

Based on the existing site's impermeable area 0.15 hectares, the existing/predevelopment runoff rate is 17.9 l/s. A 50% betterment of the existing rate will be achieved for the post-development run-off rate using attenuation features.

5.3 Drainage Hierarchy Points of Discharge

For new development NPPF Planning Practice Guidance Paragraph 080 states that:

"Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

1. *into the ground (infiltration).*
2. *to a surface water body;*
3. *to a surface water sewer, highway drain, or another drainage system.*
4. *to a combined sewer."*

Infiltration

Based on the anticipated ground conditions and the fact that the proposed building fills the entire site infiltration into the ground is not likely to be feasible.

Water Body

There are no watercourses in the immediate vicinity of the site as such discharging to a water course (surface water body) will not be practicable.

Surface Water Sewer

There is no separate surface water sewer in the vicinity of the site.

Combined Sewer

Based on the constraints described above it is proposed to discharge surface water run-off from the site into the combined sewer within Dyche Street; ideally the surface water would discharge via an existing connection. Any connection to the public sewer would be subject to agreement with United Utilities.

Summary

The surface water discharge options are summarised below;

Surface Water Disposal Method	Potential	Description
Infiltration	X	Infiltration is unlikely to be feasible.
Water Body	X	There is no waterbody within the immediate vicinity of the site.
Surface Water Sewer	X	There is no separate surface water sewer within the immediate vicinity of the site.

Combined Water Sewer	✓	There are multiple combined public sewers within the vicinity of the site which would be suitable for surface water discharge.
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Table 2 Summary of Surface Water Disposal

5.4 Post-development Runoff and Attenuation

As the proposed site is classed as 'Brownfield', the surface water flow from the site will be restricted so that it does not exceed the pre-development run off rates, with the aim of achieving a 50% reduction in accordance with the recommendations of the SFRA.

In February 2016, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 3 Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments demonstrates the climate change allowances with central and upper end allowances being considered.

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 3 Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Based on the nature of the development, a lifespan in excess of 60 years is anticipated. The potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, the design will consider an allowance of 40% climate change on peak rainfall intensity for calculations.

In restricting the flows from the development site to the 1 in 1-year brownfield rate (with betterment) there will be a requirement to provide attenuation to accommodate flows up to the critical 1 in 100-year event with a climate change allowance of 40%. The purpose of the attenuation being to maintain operation of the system during the 1 in 1yr, 1 in 30yr and the 1 in 100yr (plus climate change) storm events.

The required volume of attenuation has been calculated using Causeway Flow based on the proposed development. Surface Water Calculations are included in Appendix C and propose a restricted rate of gL/s. An attenuation tank has been proposed to achieve the required attenuation along with the additional storage within the pipes.

A drainage strategy drawing has been produced within Appendix D of this report showing indicative drainage connection points and layouts incorporating attenuation.

5.5 Sustainable Urban Drainage Systems (SUDS)

Where possible the site drainage will look to utilise SuDS features. Section 1.1 of the SuDS Manual (Ciria C753) states the following:

"Sustainable drainage systems (SuDS) can deliver multiple benefits.

Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.

The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water run-off from developed areas.

The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone."

The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 3 Sustainable Development Objectives (Representation of Figure 2.1 of The SuDS Manual).

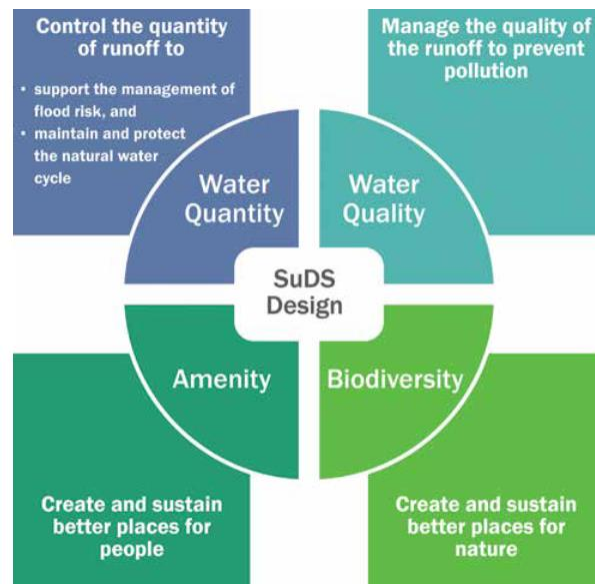


Figure 8

Figure 3 Sustainable Development Objectives (Representation of Figure 2.1 of The SuDS Manual)

Due to the nature of the development with the building occupying the whole site area there will be limited opportunity for SuDS at the development. The proposed attenuation tank and flow control system will provide betterment in reducing discharge rates and providing storage at the source, thereby minimising impact downstream and reducing the burden on United Utilities.

An application to connect to the UU sewer has been submitted.

6. Proposed Foul Water Drainage

Foul drainage will discharge to the combined sewer within Dyche Street. An application to connect to the UU sewer has been submitted.

7. Conclusion

The NPPF Technical Guide classifies the flood risk vulnerability of hotel uses as 'more vulnerable' and Table 3 of the Technical Guide indicates that such development is compatible with Flood Zone 1.

All forms of flood risk to the site have been assessed and it has been determined that there is low risk of flooding from all forms to the proposed development.

The site will discharge surface water to the public sewer at a rate equivalent to 50% of the existing rate as such there will be no increased risk of flooding elsewhere as a result of the development.

Appendix A – Topographical Survey

Appendix B – United Utilities Sewerage Asset Maps

National One Call

1
Mill Place, Mill Road Ind Est
Linlithgow Bridge, West Lothian
EH49 7TL

FAO:

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Your Ref: NOC/GHWSI977
Our Ref: UUPS-ORD-160481
Date: 08/04/2020

Dear Sirs

Location: Rochdale Rd 25 Rochdale Rd, Manchester

I acknowledge with thanks your request dated 06/04/2020 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

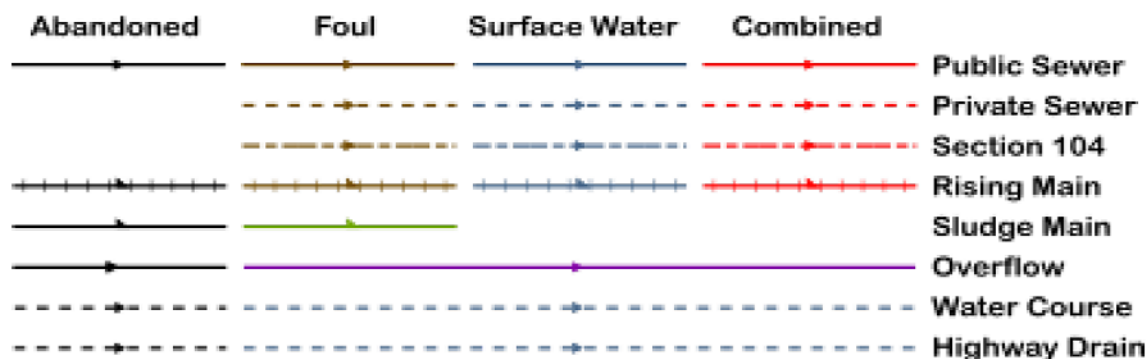
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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.

Wastewater Symbolology



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

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	



SEWER RECORDS

Address or Site Reference

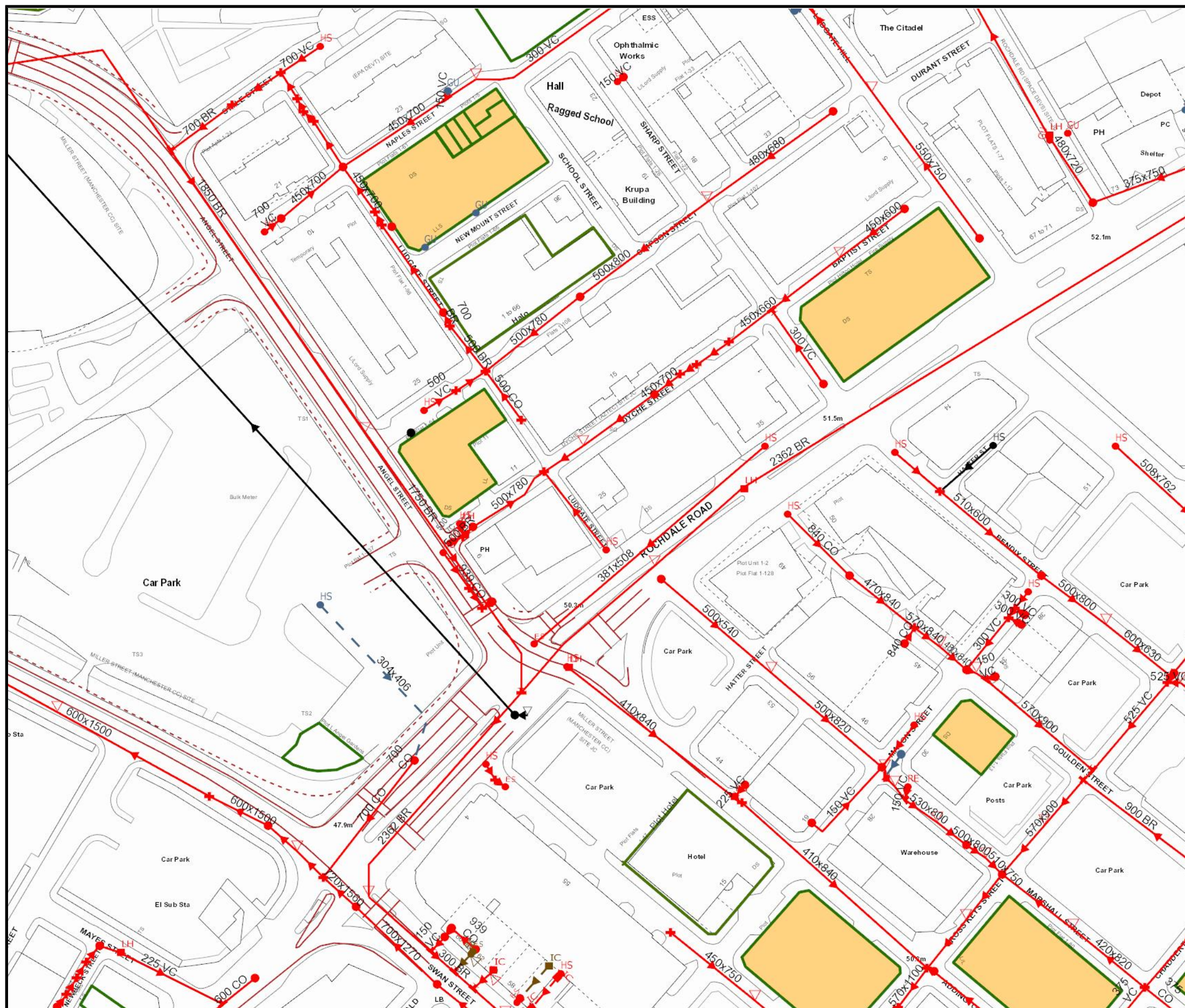
Rochdale Rd 25 Rochdale Rd,
Manchester,

Scale: 1:1250
Date: 08/04/2020

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.

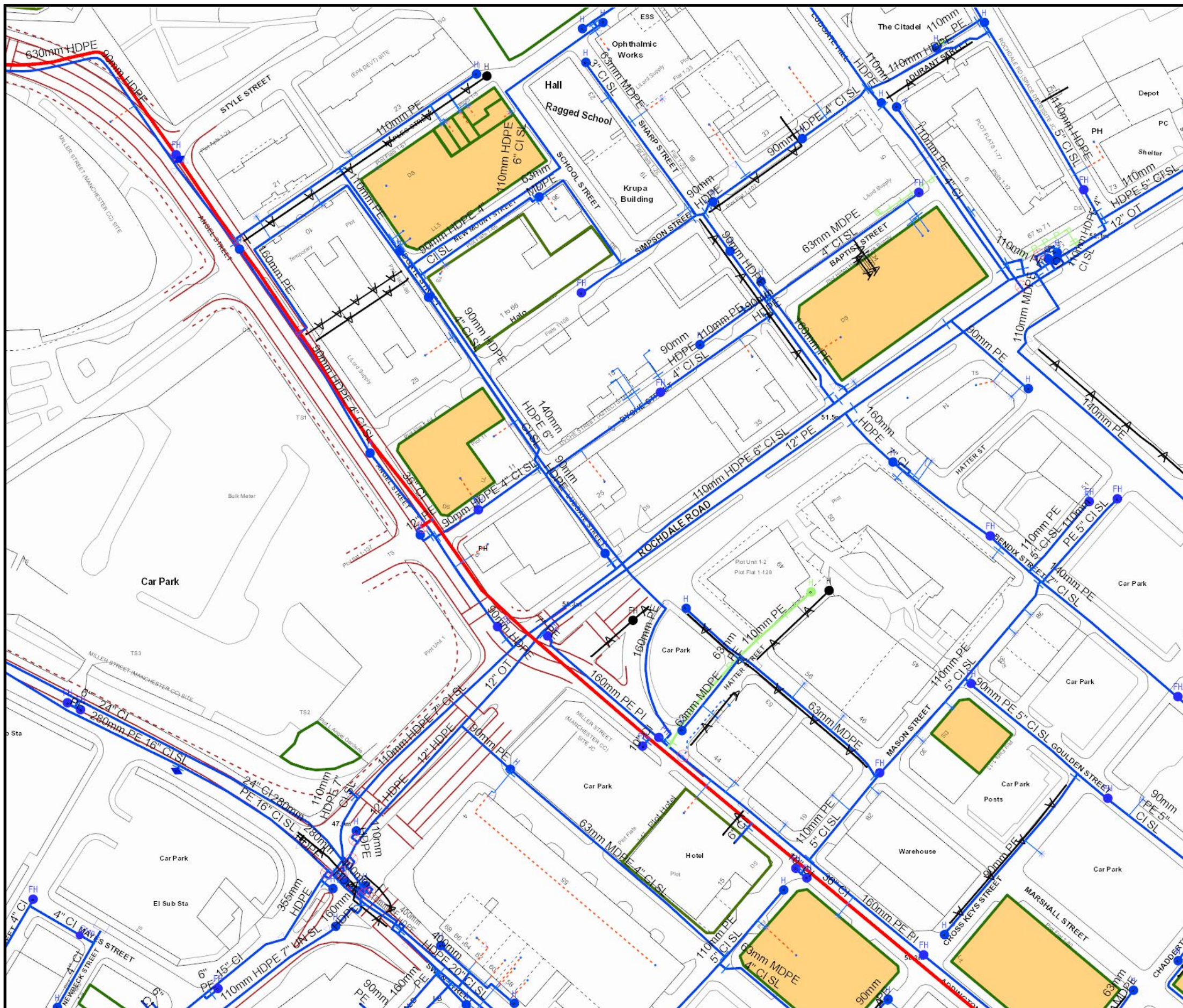
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Clean Water Symbolology

Proposed	Abandoned	Live	
			Distribution Main
			Trunk Main
			Comms Pipe
			Private Pipe
			Concessionary Service
			Raw Water
			LDTM Raw Water
			LDTM Treated Water
			Air Valve
			AC Valve, open
			AC Valve, closed
			CC Valve, open
			CC Valve, closed
			Non Return Valve
			Pressure Management Valve
			OMS Valve
			Stop Tap
			Flow Meter
			Domestic Meter
			Commercial Meter
			Pump
			Hydrant
			Fire Hydrant
			Anode
			Chlorination Point
			De-chlorination Point
			Strainer Point
			Access Point
			Hatch Box
			IP Point
			Sampling Station
			Logger Box
			Bore Hole
			Inlet Point
			Bulk Supply Point
			End Cap
			Site Termination
			Change of Characteristic
			Condition Report
			<u>Property Types</u>
			Water Tower
			Valve House
			Booster Pumping Station
			Intake Pumping Station
			Water Treatment Works
			Supply Reservoir
			Service Reservoir
			Impounding Reservoir
			Pipe Bridge

Symbology for proposed assets is the same as above, but shown in **green**
Symbology for abandoned assets is the same as above, but shown in **black**



WATER MAIN RECORDS

Address or Site Reference

Rochdale Rd 25 Rochdale Rd,
Manchester,

Scale: 1:1250
Date: 08/04/2020

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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Appendix C – Surface Water Drainage Calculations

Job No.
870-02

Sheet No
01

Project
25 Rochdale Road

Engineer
Claudia Ross

Date
24.08.22

Element
Surface Water Calculations

Checked by
NH

Date
24.08.22

Reference	Calculation	Output
N/A	Introduction The purpose of the calculations is to establish the pre-development peak 1 in 1-year surface water run-off rate for the 25 Rochdale Road development and to calculate what attenuation volume will be required, if the surface water run-off from the proposed site were to be restricted to gl/s (a 50% betterment of the existing) Surface water Catchment/ Impermeable Areas Overall site drainage areas (ha): Pre-Development Impermeable area (ha): Post-Development Impermeable area (ha): Surface water calculation Variables Date to calculate the pre-development 1 in 1-year surface water run-off rates. M5-60 Rainfall Depths (mm): 'r' Ratio (M5-60 / M5-2day): CV (Summer & Winter): Time of Entry: Climate Change Pre-Development: Climate Change Post-Development Pre-Development Peak 1 in 1-year Surface Water Run-off Based on the above variables, and calculations undertaken on Causeway flow by creating an existing drainage model using the information provided from the CCTV survey and topographical survey, the pre-development surfacer water run-off rate is as follows: Pre-Development 1 in 1-Year Rate (l/s):	0.15 0.15 0.15 17 0.4 0.84 5 0 40% 17.9

Reference	Calculation	Output
	Post Development Restricted Surface Water Run-Off Rate The surface water from the proposed development is to be restricted by a flow control, in this case a Hydro-Brake has been proposed, Post-Development SW Run-off Rate (l/s): (50% Betterment of existing) Surface water Attenuation Volumes The required surface water attenuation volume for a 1 in 100-year (plus 40% climate change allowance) event is as follows: 1 in 100-Year Event +CC (m³) This has been achieved using an attenuation tank with a surface area of 36m² and a depth of 1.0m. Additional storage has been achieved within the pipes. The proposed outline Surface water drainage strategy has been developed and is presented in Appendix D.	9 36

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	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)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.840	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)
4	0.093	5.00	50.820	1200	384520.835	398986.362	1.120
3	0.061	5.00	50.520	1200	384542.336	399001.546	1.120
2			50.520	1800	384541.074	399003.919	1.154
1			50.520	1200	384538.666	399005.641	1.302

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)
1.002	2	1	2.960	0.600	49.366	49.218	0.148	20.0	225	5.69	50.0
1.001	3	2	2.688	0.600	49.400	49.366	0.034	80.0	225	5.67	50.0
1.000	4	3	23.566	0.600	49.700	49.648	0.052	450.0	225	5.64	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)
1.002	2.939	116.8	23.4	0.929	1.077	0.154	0.0	68	2.311
1.001	1.463	58.2	23.4	0.895	0.929	0.154	0.0	99	1.384
1.000	0.610	24.2	14.1	0.895	0.647	0.093	0.0	123	0.633

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)
1.002	2.960	20.0	225	Circular	50.520	49.366	0.929	50.520	49.218	1.077
1.001	2.688	80.0	225	Circular	50.520	49.400	0.895	50.520	49.366	0.929
1.000	23.566	450.0	225	Circular	50.820	49.700	0.895	50.520	49.648	0.647

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	2	1800	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.001	3	1200	Manhole	Adoptable	2	1800	Manhole	Adoptable
1.000	4	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
4	384520.835	398986.362	50.820	1.120	1200		0	1.000	49.700	225
3	384542.336	399001.546	50.520	1.120	1200		1	1.000	49.648	225
							0	1.001	49.400	225
2	384541.074	399003.919	50.520	1.154	1800		1	1.001	49.366	225
							0	1.002	49.366	225
1	384538.666	399005.641	50.520	1.302	1200		1	1.002	49.218	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	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 %)
100	40	0	0

Node 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	49.366	Product Number	CTL-SHE-0137-9000-1148-9000
Design Depth (m)	1.148	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	9.0	Min Node Diameter (mm)	1200

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.90	Time to half empty (mins)	54

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	36.0	0.0	1.000	36.0	0.0	1.001	0.0	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	4	51	50.355	0.655	25.4	1.8273	0.0000	SURCHARGED
60 minute winter	3	51	50.353	0.953	40.1	32.9863	0.0000	FLOOD RISK
60 minute winter	2	51	50.351	0.985	10.9	2.5064	0.0000	FLOOD RISK
15 minute summer	1	1	49.218	0.000	9.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	4	1.000	3	46.5	1.191	1.917	0.9372	
15 minute winter	3	1.001	2	13.7	0.755	0.236	0.1069	
120 minute summer	2	Hydro-Brake®	1	9.0				67.2

Design Settings

Frequency of use (kDU)	0.50	Minimum Velocity (m/s)	1.00
Flow per dwelling per day (l/day)	4000	Connection Type	Level Soffits
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	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
8	50.520	Adoptable	384548.249	399012.378	1.350
7	50.820	Adoptable	384524.808	398974.349	1.350
6	50.820	Adoptable	384560.037	399002.511	1.350
5	50.820	Adoptable	384523.260	398976.553	1.913
4	49.920	Adoptable	384518.045	398983.920	1.126
3	50.820	Adoptable	384538.745	398998.542	2.343
2	50.520	Adoptable	384538.657	399005.670	2.232
1	50.040	Adoptable	384537.310	399014.654	1.866

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.004	2	1	9.084	1.500	48.288	48.174	0.114	80.0	250
3.000	8	2	11.705	1.500	49.170	49.024	0.146	80.0	150
1.003	3	2	7.129	1.500	48.477	48.388	0.089	80.0	150
1.002	4	3	25.343	1.500	48.794	48.477	0.317	80.0	150
1.001	5	4	9.026	1.500	48.907	48.794	0.113	80.0	150
2.000	7	5	2.693	1.500	49.470	49.436	0.034	80.0	150
1.000	6	5	45.015	1.500	49.470	48.907	0.563	80.0	150

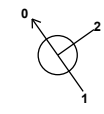
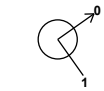
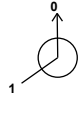
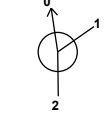
Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
1.004	0.000	1.376	67.6	0.0	1.982	1.616	0.000	0	0.0	0.0	0	0.000
3.000	0.000	0.980	17.3	0.0	1.200	1.346	0.000	0	0.0	0.0	0	0.000
1.003	0.000	0.980	17.3	0.0	2.193	1.982	0.000	0	0.0	0.0	0	0.000
1.002	0.000	0.980	17.3	0.0	0.976	2.193	0.000	0	0.0	0.0	0	0.000
1.001	0.000	0.980	17.3	0.0	1.763	0.976	0.000	0	0.0	0.0	0	0.000
2.000	0.000	0.980	17.3	0.0	1.200	1.234	0.000	0	0.0	0.0	0	0.000
1.000	0.000	0.980	17.3	0.0	1.200	1.763	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)
1.004	9.084	80.0	250	Circular	50.520	48.288	1.982	50.040	48.174	1.616
3.000	11.705	80.0	150	Circular	50.520	49.170	1.200	50.520	49.024	1.346
1.003	7.129	80.0	150	Circular	50.820	48.477	2.193	50.520	48.388	1.982
1.002	25.343	80.0	150	Circular	49.920	48.794	0.976	50.820	48.477	2.193
1.001	9.026	80.0	150	Circular	50.820	48.907	1.763	49.920	48.794	0.976
2.000	2.693	80.0	150	Circular	50.820	49.470	1.200	50.820	49.436	1.234
1.000	45.015	80.0	150	Circular	50.820	49.470	1.200	50.820	48.907	1.763

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	2	1200	Manhole	Adoptable	1	1200	Manhole	Adoptable
3.000	8	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.003	3	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.002	4	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.001	5	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
2.000	7	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.000	6	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	384548.249	399012.378	50.520	1.350	1200		3.000	49.170	150
7	384524.808	398974.349	50.820	1.350	1200		2.000	49.470	150
6	384560.037	399002.511	50.820	1.350	1200		1.000	49.470	150
5	384523.260	398976.553	50.820	1.913	1200		2.000 1.000	49.436 48.907	150 150
4	384518.045	398983.920	49.920	1.126	1200		1.001 1.002	48.907 48.794	150 150
3	384538.745	398998.542	50.820	2.343	1200		1.002 1.003	48.477 48.477	150 150
2	384538.657	399005.670	50.520	2.232	1200		3.000 1.003 1.004	49.024 48.388 48.288	150 150 250

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	384537.310	399014.654	50.040	1.866	1200	1	1.004	48.174	250



Simulation Settings

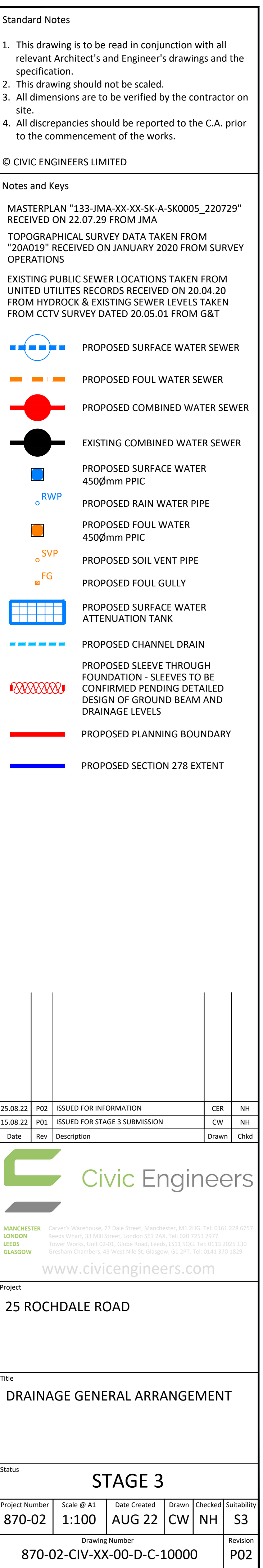
Analysis Speed	Normal	Drain Down Time (mins)	240
Skip Steady State	x	Foul Event Duration (mins)	30

Results for Foul Event Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
Foul Event	8	1	49.170	0.000	0.0	0.0000	0.0000	OK
Foul Event	7	1	49.470	0.000	0.0	0.0000	0.0000	OK
Foul Event	6	1	49.470	0.000	0.0	0.0000	0.0000	OK
Foul Event	5	1	48.907	0.000	0.0	0.0000	0.0000	OK
Foul Event	4	1	48.794	0.000	0.0	0.0000	0.0000	OK
Foul Event	3	1	48.477	0.000	0.0	0.0000	0.0000	OK
Foul Event	2	1	48.288	0.000	0.0	0.0000	0.0000	OK
Foul Event	1	1	48.174	0.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
Foul Event	8	3.000	2	0.0	0.000	0.000	0.0000	
Foul Event	7	2.000	5	0.0	0.000	0.000	0.0000	
Foul Event	6	1.000	5	0.0	0.000	0.000	0.0000	
Foul Event	5	1.001	4	0.0	0.000	0.000	0.0000	
Foul Event	4	1.002	3	0.0	0.000	0.000	0.0000	
Foul Event	3	1.003	2	0.0	0.000	0.000	0.0000	
Foul Event	2	1.004	1	0.0	0.000	0.000	0.0000	0.0

Appendix D – Surface Water Drainage Strategy Drawing



Appendix E – CCTV Drainage Survey

Project

Project Name: GR8488_CCTV
Project Description: Cleansing & CCTV Inspection
Project Status: Complete
Project Date: 27/04/2020
Inspection Standard: MSCC5 Sewers & Drainage GB (SRM5 Scoring)





Table of Contents

Project Name	Project Number	Project Date
GR8488 CCTV		27/04/2020

Project Information	P-1
Section: 1; EX MH1 > PIPE X (EX MH1X)	1



Project Information

Project Name
GR8488 CCTV**Project Number****Project Date**
27/04/2020

Client

Company: Gardiner & Theobald
Contact: Jamie Lenahan
Department: Associate
Street: 2 Bond Street
Town or City: Leeds
County: West Yorkshire
Post Code: LS1 2JZ
Phone: 0113 2848900
Mobile: 07867 493078
Email: j.lenahan@gardiner.com

Site

Description: CCTV Inspection at 25 Rochdale Road
Contact: Jamie Lenahan
Department: Site Contact
Street: 25 Rochdale Road
Town or City: Manchester
Post Code: M4 4HT
Mobile: 07867 493078

Contractor

Company: Subscan UDS Limited
Description: Subscan House
Contact: Ross Holmes
Department: CCTV Coordinator
Street: 126 Whitehall Road
Town or City: Leeds
County: West Yorkshire
Post Code: LS12 1AE
Phone: 0344 499 5220
Email: ross.holmes@subscan.com

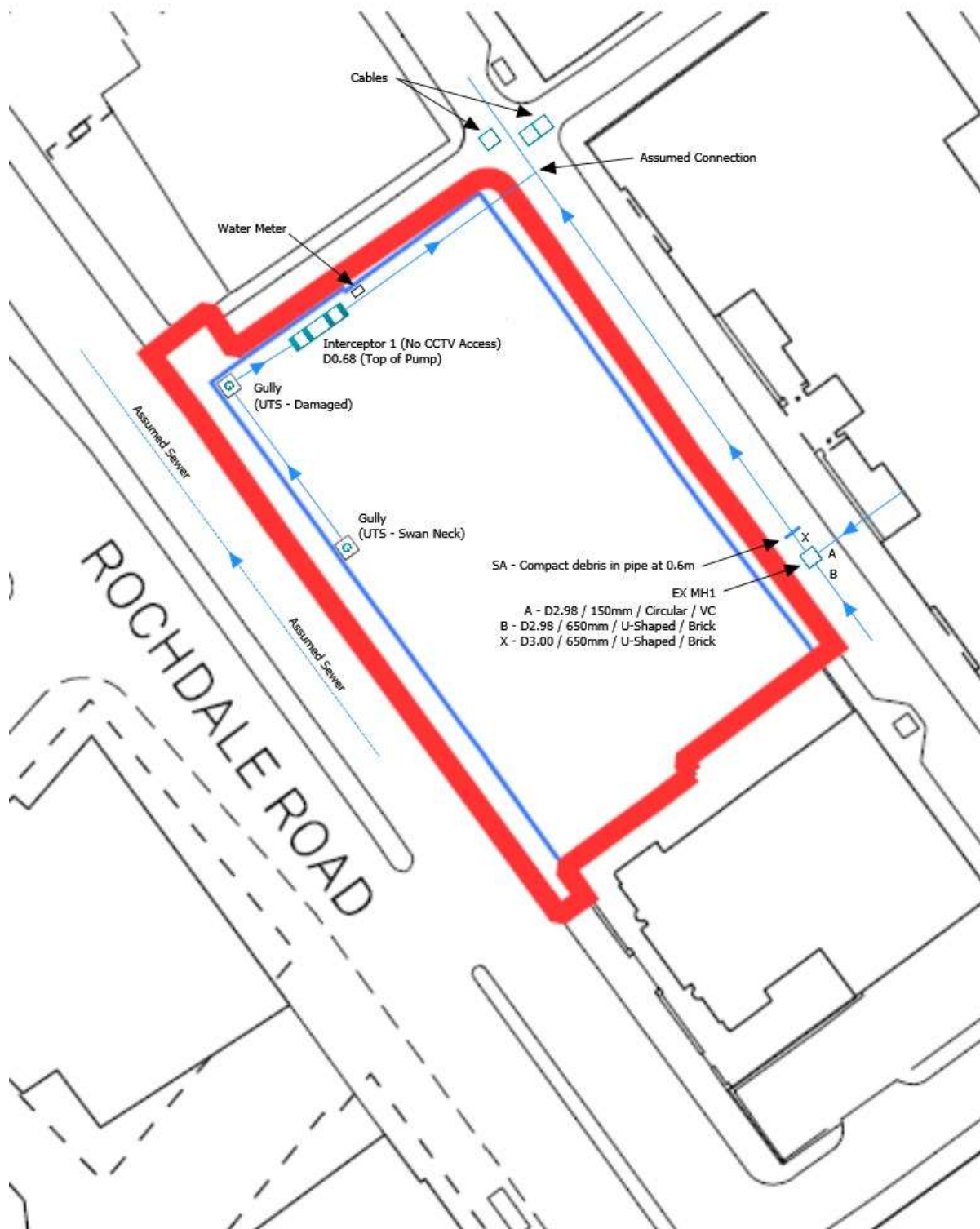
Project Information

Project Name
 GR8488 CCTV

Project Number

Project Date
 27/04/2020

Project Drawing

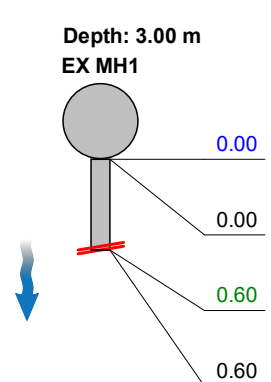


Section Inspection - 27/04/2020 - EX MH1X

Section 1	Inspection 1	Date 27/04/20	Time 9:32	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned Yes	PLR EX MH1X
Operator SS-AM		Vehicle VEHICLE 1		Camera Camera 1	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:	Manchester	Inspection Direction:	Downstream	Upstream Node:	EX MH1
Road:	25 Rochdale Road	Inspected Length:	0.60 m	Upstream Pipe Depth:	3.000 m
Location:	Property or buildings	Total Length:	0.60 m	Downstream Node:	PIPE X
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	U-Shaped with flat top		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	650 mm		
Year Constructed:		Material:	Brick		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:	
Recommendations:	

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
							
		0.00	MH	Start node type, manhole, reference number: EX MH1	00:00:00		
		0.00	WL	Water level, 10% of the vertical dimension	00:00:19		
		0.60	DEC	Settled deposits, hard or compacted, 25% cross-sectional area loss: COMPACT DEBRIS / CONCRETE	00:00:19	1	4
		0.60	SA	Survey abandoned: UNABLE TO PASS BLOCKAGE	00:00:19		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	8.3	5.0	5.0

Section Pictures - 27/04/2020 - EX MH1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	EX MH1X		GR8488



1, 00:00:19, 0.60 m
 Settled deposits, hard or compacted, 25% cross-sectional area loss, COMPACT DEBRIS /
 CONCRETE

Manchester

Carver's Warehouse
77 Dale Street
Manchester M1 2HG
+44 (0)161 228 6757

London

Reeds Wharf
33 Mill Street
London SE1 2AX
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Glasgow

Gresham Chambers
45 West Nile Street
Glasgow G1 2PT
+44 (0)141 370 1829