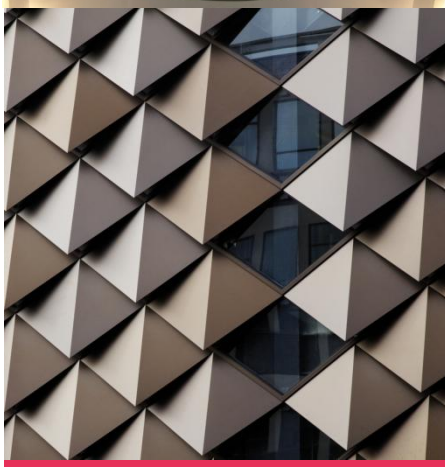




Sparkle Street, Manchester

Flood Risk Assessment and Drainage Strategy

Curtins Ref: SPS-CUR-ZZ-ZZ-RP-C-83-0001

Revision: P05

Issue Date: 12 December 2025

Client Name: Foras (Sparkle Street) Limited.

Site Address: Sparkle Street, Manchester,



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Control Sheet

Rev	Description	Issued by	Checked	Date
V01	Draft Issue for Planning	PG	CG	07/07/2023
V02	Issued for Planning	CG	CG	14/07/2023
V03	Updated to suit Deloitte Comments	CG	CG	19/07/2023
V04	Updated to suit latest layouts	CS	CG	19/04/2024
P05	Renumbered to Align with Project Requirements	ATL	MW	12/12/2025

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Table of contents

1.0 Introduction 5
1.1 Project Background 5
1.2 Scope of Assessment 5
1.3 Proposed Development 6
2.0 Existing Site Details 7
2.1 History and Current Use 7
2.2 Existing Watercourses and Other Waterbodies 7
2.3 Existing Drainage 8
2.4 Topography 8
2.5 Geology 9
3.0 Development and Flood Risk 10
3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance 10
3.2 Site Specific NPPF Flood Risk Categorisation 14
3.3 Site Specific Flood Zone Compatibility 14
4.0 Hydrological Assessment 15
4.1 Sources of Flood Risk 15
4.2 Fluvial Flooding (Rivers and Streams) 15
4.3 Tidal Flooding (Coastal or Estuarine) 16
4.4 Reservoir Flooding 16
4.5 Canal Flooding 17
4.6 Groundwater Flooding 18
4.7 Public Sewers or Highway Drainage Flooding (Infrastructure Failure) 19
4.8 Surface Water Flooding to the site 19
4.9 Surface Water Flooding from the site 20
4.10 Historical Flooding 21
4.11 Summary of Flood Risk 21
5.0 Mitigation 22

5.1 Canal Flooding to the site Mitigation 22
5.2 Surface Water Flooding to the site Mitigation 22
6.0 Drainage Strategy 24
6.1 Existing Drainage 24
6.2 Proposed Foul Water Drainage 25
6.3 Proposed Surface Water Drainage 26
6.4 Sustainable Drainage Systems and Green Infrastructure 29
6.5 Maintenance 33

Appendices

Appendix A

Proposed Site Layout – Ground Level

Proposed Site Layout – Podium Level

Appendix B

Drainage Strategy – Ground Level

Drainage Strategy – Podium Level

Appendix C

United Utilities Sewer Records

Appendix D

CCTV / GPR Drainage Survey

Appendix E

Topographical Survey

Appendix F

Environment Agency Flood Map for Planning

Appendix G

Existing Surface Water Drainage Calculations – 1, 30, 100 Year

Appendix H

United Utilities Correspondence

Manchester LLFA Correspondence

Appendix J

Proposed Surface Water Calculations – 1, 30, 100 Year +45% cc

Proposed Surface Water Calculations – 100 Year +45% cc with Surcharged Outfall Check

1.0 Introduction

1.1 Project Background

1.1.1 Curtins has been appointed by Foras (Sparkle Street) Limited to provide a Flood Risk Assessment (FRA) and Drainage Strategy for the proposed residential scheme known as 'Sparkle Street', located at land bound by Store Street to the north, Sparkle Street to the west, residential apartments to the south and vacant land to the east.

1.1.2 The report provides information on the nature of flood risk at the site and follows Government guidance regarding development and flood risk.

1.1.3 The report is based on currently available information and preliminary discussions.

1.1.4 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

1.1.5 Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Scope of Assessment

1.2.1 The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).

1.2.2 The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding,
- Consider design proposals to mitigate any potential risk of flooding determined to be present; and
- Consider foul and surface water drainage proposals for the proposed development.

1.2.3 The total site area is approximately 0.25 ha and following scrutiny of the Environment Agency flood maps it has been identified that site lies within Flood Zone 1. However, the Manchester Strategic Flood Risk Assessment (SFRA) has designated the site within a Critical Drainage Area (CDA), therefore a Flood Risk Assessment is required to support a planning application.

1.2.4 In April 2015, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SuDS) a material consideration in the determination of planning applications for all developments.

1.2.5 A Drainage Strategy will therefore be required as part of the Planning Application for the development, as the site is considered to be 'major' development by the Town and Country Planning Order 2015.

1.2.6 This Flood Risk Assessment and Drainage Strategy reviews the following information:

- Environment Agency flood maps for rivers and sea flooding.
- UK Government Flood Warning Information Service maps for surface water flooding and reservoir flooding.
- Manchester City, Salford City and Trafford Councils Level 1 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2010.
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, User Guide, Final, dated May 2010.
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2011.
- Preliminary Flood Risk Assessment (PFRA) for Manchester County Council dated May 2011.
- Manchester City Council SuDS Requirements for New Developments.
- United Utilities Public Sewer Records dated March 2023.
- Topographical Survey by Malcolm Hughes Land Surveyors dated April 2023.
- A combined CCTV & GPR Sonar Trace survey by Survey Malcolm Hughes Land Surveyors dated April – June 2023.
- Curtins Phase 2 Site Investigation Report 082142-CUR-XX-XX-RP-G-001 Dated June 2023.

1.3 Proposed Development

1.3.1 The proposed scheme is for demolition of existing low rise commercial units and erection of ground plus 29 storey residential development with supporting residential amenity, private terraces, and private shared garden. The scheme will also encompass 100% cycle parking provision.

1.3.2 The Proposed Site Layout Ground and Podium levels are enclosed in *Appendix A.*

2.0 Existing Site Details

2.1 History and Current Use

2.1.1 The site is bounded by Sparkle Street to the southwest, Store Street to the north, unmade vacant land to the east and Piccadilly Railway Station located beyond residential apartments to the south. The site area is approximately 0.25 hectares.

2.1.2 The site is largely unoccupied, with its former use being a telephone exchange along with surface car parking and two buildings that are partly used for storage and distribution. The buildings are screened from the road on two sides by existing vegetation and an access route for vehicles is provided from Store Street.

Figure 1: Aerial Photograph (© Google 2023)



2.2 Existing Watercourses and Other Waterbodies

2.2.1 The nearest identified waterbody within a short distance of the proposed site is the Ashton Canal forming part of the Cheshire ring situated some 30m to the northeast of the site along Store Street.

2.2.2 A 900mm diameter culverted watercourse is identified on the United Utilities sewer records within Store Street adjacent the site to the north and out falling to a 900mm diameter brick surface water public sewer to the northwest of the site. Manchester City Council/United Utilities records suggest that the watercourse is a 'hidden watercourse' called Shooters Brook.

2.2.3 The closest identified main watercourse is the River Medlock is located approximately 430m south of the Site at Mayfield Park.

2.3 Existing Drainage

2.3.1 The United Utilities public sewer records have been obtained for the site and surrounding area and are enclosed in *Appendix C.*

2.3.2 The sewer records confirm that there is a short length of 300x400mm brick egg sewer passing across the northeast corner within the site boundary from the junction of Jutland Street/Store Street towards Sparkle Street.

2.3.3 There are no further public sewers recorded on site.

2.3.4 The records indicate that the following public sewers are located within the vicinity of the site:

- There is a 225mm diameter combined sewer within Sparkle Street to the southwest of the site flowing in a north westerly direction into the larger sewer in Store Street.
- There is a 1550/1900mm diameter brick combined sewer, within Store Street to the north of the site, flowing in a south-westerly direction.
- There is a 900mm diameter surface water sewer running parallel with the 1500/1900mm diameter combined sewer in Store Street.

2.3.5 There are various sewers in the wider vicinity of the site, however they are not considered of direct relevance to the development works.

2.3.6 A CCTV / GPR sonar trace survey of the site was carried out by Malcolm Hughes in April 2023. The survey identified various private drainage on site, which connects to a 300mm diameter existing combined water drain passing northwards through the centre of the site and outfalling to the 1500/1900mm diameter combined sewer in Store Street.

2.3.7 The CCTV / GPR Drainage Survey is enclosed in *Appendix D.*

2.3.8 Further assessment of the existing private drainage and the public sewer on site is discussed in further detail in Section 6 of this report.

2.4 Topography

2.4.1 A Topographical Survey has been completed at the site and is enclosed in *Appendix E.*

2.4.2 The Survey was completed in April 2023 by Malcolm Hughes Land Surveyors.

2.4.3 The topographical survey confirms that the ground levels are relatively flat across the site at circa 37.1m in the north-east corner and AOD to 38.1m AOD in the south-west corner. The ground then banks up to Sparkle Street to the southwest boundary and steeper to the apartment blocks to the south-east

where there is an existing retaining wall along the south-eastern boundary. Store Street generally falls down at a moderate grade in a north easterly direction.

2.5 Geology

2.5.1 The British Geological Survey (BGS) map confirms that the superficial deposits are listed as Till, Devensian – Diamicton.

2.5.2 The bedrock geology is described as the Chester Formation – Sandstone.

2.5.3 The Phase 2 Site Investigation completed on site in 2023 confirms that Made Ground was encountered down to 4m depth with Glacial Till from 3.65m - 8.14m and Sandstone between 8m - 10m.

2.5.4 The site is not located within a Groundwater Source Protection Zone.

3.0 Development and Flood Risk

3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance

3.1.1 In July 2022, the Department of Communities and Local Government published the National Planning Policy Framework document (NPPF), and the Planning Practice Guidance was published in March 2012 and updated in December 2023, which provides guidance on how flood risk should be assessed during the planning and development process.

Table 1: (Extract from Planning Practice Guidance) Flood Zone Classifications

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	**This zone comprises land where water has to flow or be stored in times of flood.** Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 2: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable • Police, ambulance and fire stations which are **not** required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-Compatible Development • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3: (Extract from Planning Practice Guidance) Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

3.2 Site Specific NPPF Flood Risk Categorisation

3.2.1 To assess the NPPF flood risk classification for the site, the first step was to inspect the UK Government web based 'Flood Map for Planning' which is used to inform planning of a site's Flood Zone(s) and the probability of flooding from rivers or sea (not taking into account the presence of flood defences or climate change). However, the web based 'Long Term Flood Risk Assessment for Locations in England' should also be used to identify the long-term flood risks from rivers and seas, surface water and reservoirs.

3.2.2 The Flood Map for Planning report is enclosed in *Appendix F*, and it can be seen that the site is classified as entirely within Flood Zone 1.

3.2.3 Further site-specific review of the flood risk to the site is provided in section 4.

3.3 Site Specific Flood Zone Compatibility

3.3.1 The proposals for the development site are likely to fall within the following category:

- Buildings used for Dwellings houses.

3.3.2 Dwellings are classed as 'More Vulnerable' development in the Flood Risk Vulnerability Classification (Table 2).

3.3.3 The site is located within Flood Zone 1 for which a 'More Vulnerable' development is deemed to be appropriate. Therefore, the development does not trigger the requirement for a sequential test/exception test (refer to the Flood Zone compatibility table in the NPPF technical guidance).

4.0 Hydrological Assessment

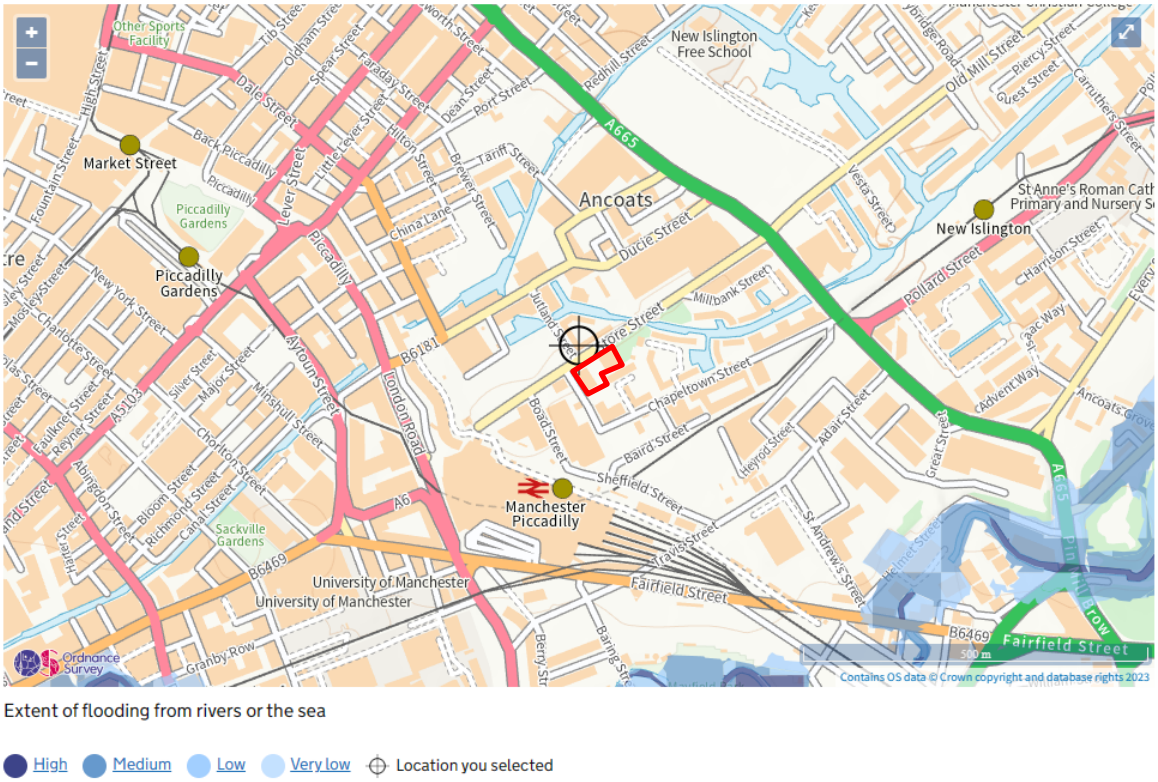
4.1 Sources of Flood Risk

4.1.1 This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

4.2 Fluvial Flooding (Rivers and Streams)

4.2.1 Flooding to the site from rivers and sea is indicated below in Figure 2, taken from the UK Government's Long-Term Flood Risk Information.

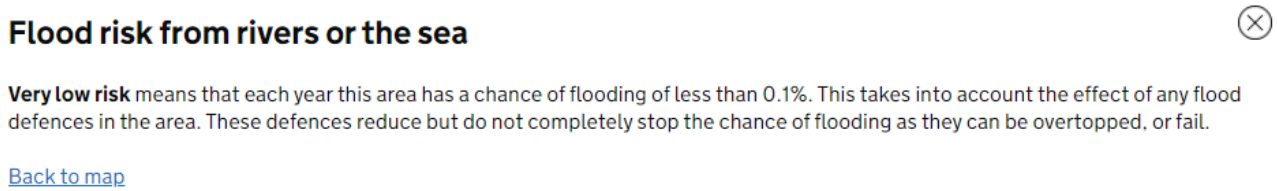
Figure 2 - Long Term Flood Risk Assessment Map – Flood Risk from Rivers or Sea (© Crown Copyright)



4.2.2 It can be seen that the entire site sits in an area of very low risk from fluvial and river flooding (

4.2.3 Figure 3 for definition). Therefore, the proposed site is considered to be at very low risk from fluvial flooding.

Figure 3 - Long Term Flood Risk Assessment (Detailed Information) – Flood Risk from Rivers or Sea (© Crown Copyright)



4.3 Tidal Flooding (Coastal or Estuarine)

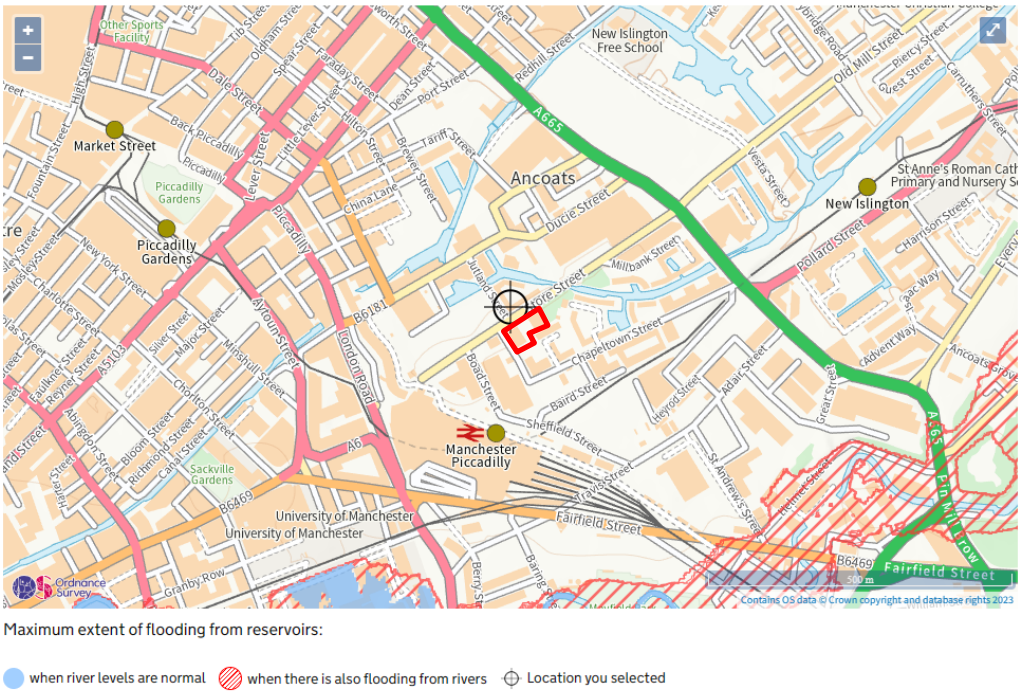
4.3.1 There is currently no flood risk identified on the Environment Agency flood maps for the site and it is therefore regarded to be at low risk from tidal flooding.

4.4 Reservoir Flooding

4.4.1 Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

4.4.2 The Long-Term Flood Risk Assessment (Flood Risk from Reservoirs) map shows that the site is not a risk of flooding from reservoirs (Figure 4).

Figure 4 - Long Term Flood Risk Assessment Map – Flood Risk from Reservoirs (© Crown Copy Right)



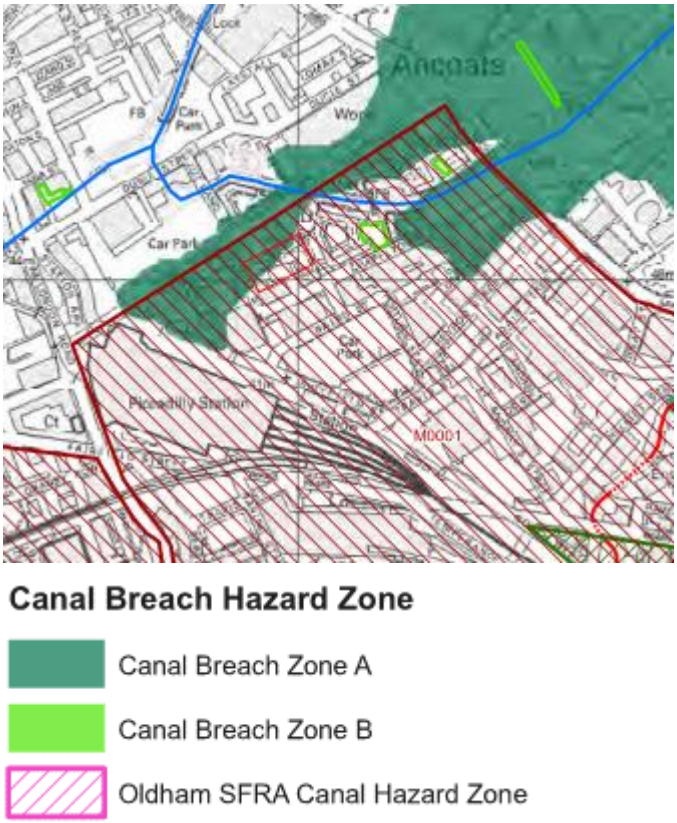
4.5 Canal Flooding

4.5.1 The nearest canal to the site is the Ashton Canal located 25m beyond the north-eastern boundary.

4.5.2 The canals are identified in the Manchester SFRA as not generally posing a direct flood risk as they are a controlled water body. Therefore, the residual risk of canal flooding is usually associated with lower probability events such as overtopping and/or the breaching of embankments.

4.5.3 The Canal Flood Mapping within the Manchester SFRA indicates that the site is not located partially within a Canal Breach Zone, as shown in Figure 5.

Figure 5 – Canal Hazard Mapping Extract – Manchester SFRA



4.5.4 Considering the above information, the risk of canal flooding to the site is generally considered to be low to medium and requires further assessment in Section 5.

4.6 Groundwater Flooding

4.6.1 There is no mention of significant groundwater issues in the surrounding area in the Manchester SFRA.

4.6.2 The site is shown to be within an area of medium to low risk of groundwater flooding according to the groundwater flooding map shown within the Governments online 'Magic' maps website.

4.6.3 At this time, the full ground water level results are awaited from the final Phase 2 Site Investigation, following completion of all ongoing gas monitoring works (due August 2023); however, it is noted that no groundwater was encountered during initial Site Investigation works and gas monitoring visits to date indicate dry until 10m deep.

4.6.4 Based on the current site investigation information, the proposed building being elevated above existing levels, and that there are no basements proposed within the development, it can be considered that the site is at a low risk of groundwater flooding.

4.7 Public Sewers or Highway Drainage Flooding (Infrastructure Failure)

4.7.1 There is existing onsite private drainage serving the buildings and hard paved areas which outfalls to the United Utilities combined sewer network in Store Street.

4.7.2 United Utilities maps show that there is a short length of 300x400 combined sewer crossing the north-western corner of the site, however this sewer does not appear to be present on site.

4.7.3 Further sewers are located within the adjoining highways and sewer defects encountered during the survey will be reported to United Utilities.

4.7.4 There are no records of and highway drainage in the vicinity of the site, however gullies within the adjacent highway are present and assumed to connect to the public sewer system/culverted watercourse.

4.7.5 Providing United Utilities and Manchester City Council maintain their drainage assets within the vicinity of the site, if any, the risk of flooding to the proposed development site from public sewers or highway drainage is considered as low.

4.8 Surface Water Flooding to the site

4.8.1 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 with flooding occurring, principally from manholes and gullies. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

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

- Where a site is located in a dark blue shaded zone, this indicates that the site is at high risk of flooding, where flooding occurs as a result of rainfall with a greater than 1 in 30 (3.3%) chance in any given year.
- Where a site is located in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding, where flooding occurs as a result of rainfall of between 1 in 100 (1%) and 1 in 30 (3.3%) chance in any given year.
- Where a site is located in a light blue shaded zone, this indicates that the site is at low risk of flooding, where flooding occurs as a result of rainfall of between 1 in 1000 (0.1%) and 1 in 100 (1%) chance in any given year.
- Where a site is located in a clear (unshaded) area; this indicates that the site is at very low risk of flooding, where flooding occurs as a result of rainfall with less than 1 in 1000 (0.1%) chance in any given year.

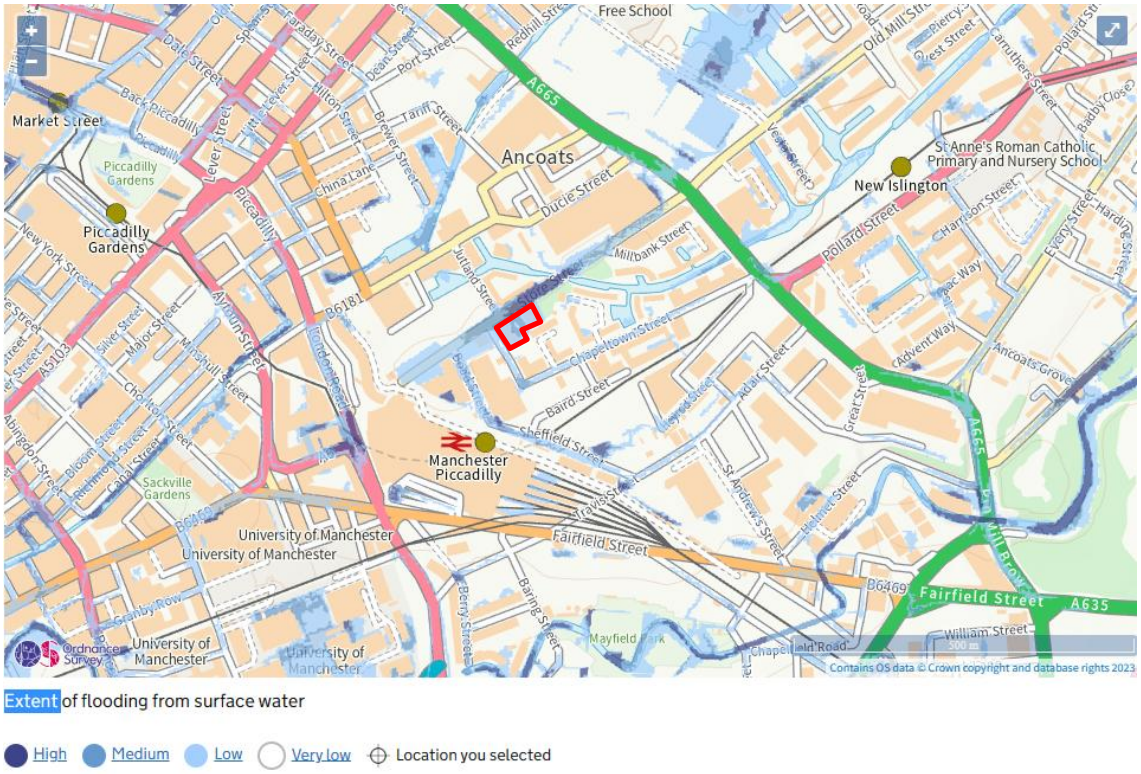
4.8.3 The extent of flooding to the site from surface water is indicated in Figure 6 and it can be seen that the full area of the site is identified as being at 'low' and 'medium' risk of flooding from surface water.

4.8.4 The adjoining Store Street highway is identified to be at 'medium' and 'high' risk of flooding from surface water.

4.8.5 The flood identified to both areas is affiliated to surface water runoff from adjacent areas flowing along the highways and reaching a low topographical area immediately north of the site in Store Street.

4.8.6 Considering the above information, the risk of surface water flooding to the site is generally considered to be low to medium and requires further assessment in Section 5.

Figure 6 - Risk of Flooding from Surface Water - Extent of Flooding



4.9 Surface Water Flooding from the site

4.9.1 Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. Where new development is proposed, the new surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.

4.9.2 As part of the development, a positive drainage network has been designed and will be installed to mitigate the risk from surface water flooding to the building and the surrounding site.

4.9.3 An assessment of the proposed surface flows is carried out within the drainage strategy in Section 6 of this report.

4.9.4 Overall, the surface water flooding from the site to surrounding areas is considered very low.

4.10 Historical Flooding

4.10.1 No historic records of flooding for the site were received at the time of writing this report.

4.11 Summary of Flood Risk

4.11.1 From the evidence collated and subsequent negotiations the site can be found to be at very low risk of flooding from all sources except for Canal Flooding and Surface Water to the site, to which the mitigation measures are discussed in more detail within the Section 5.

5.0 Mitigation

5.1 Canal Flooding to the site Mitigation

5.1.1 As noted in Section 4.5, the site is partially located within a Canal Hazard Breach Zone.

5.1.2 The canals are identified in the Manchester SFRA as not generally posing a direct flood risk as they are a controlled water body. Therefore, the residual risk of canal flooding is usually associated with lower probability events such as overtopping and/or the breaching of embankments.

5.1.3 The extent of Canal Breach is mainly along the Store Street Elevation indicating that flood water in the current arrangement would be of limiting depths in comparison to existing site levels.

5.1.4 The proposed development floor levels are generally above existing ground levels, with levels along the Store Street elevation being higher than existing footpath levels along Store Street. There are also no proposals for basements. Therefore, the site is considered to be at low risk of Canal Flooding.

5.2 Surface Water Flooding to the site Mitigation

5.2.1 The UK Government Long Term Flood Risk Assessment surface water flood maps indicate that the site is at low to medium risk of flooding from surface water. These areas are related to the topography of the ground levels both in the site and the local area as taken from LIDAR (Laser Imaging, Detection, and Ranging) 3d aerial mapping. This is used as the basis for the EA flood maps and picks up these lower lying levels to then generate contours that tie back up to the higher ground levels beyond in all directions. The mapping then assumes that any rainfall would be retained on the surface and potentially cause localised flooding.

5.2.2 It must be clearly noted that the maps do not take account that the drainage infrastructure serving these areas on the current site and the gullies serving the adopted Store Street highway that will actually reduce and more than likely actually negate the surface flooding identified.

5.2.3 To ensure that a ‘very low’ risk can be maintained post development it is recommended that external ground levels across the site should fall away from the proposed building in a manner which does not create low points where water might collect unintentionally. Should this be the case the appropriate drainage infrastructure such as gullies and channel drains are installed to ensure that any surface water will not flow towards the proposed buildings. The proposed surface water drainage network shall be designed to accommodate flows generated from within the site.

5.2.4 Furthermore, the finished floor levels of the proposed building and town houses accessed off Store Street are suitably raised so that any potential overland flows do not reach up to the threshold levels. Generally, finished floor levels are at a higher elevation to the existing footpath on Store Street. Existing

footpath levels are between 37.72m to 37.15m AOD and adjacent finished floor levels are proposed between 38m to 37.25m AOD indicating between 0.1-0.3m level change falling away from thresholds.

5.2.5 It is assumed that the surface water drainage outside of the site boundary will be subject to the relevant sewerage authority and highway authority regular drainage maintenance schedule such that they are free flowing at all times and the risk of blockage is removed.

5.2.6 Providing the above measures are implemented the flooding risk to the development site from surface water is therefore considered low post development.

6.0 Drainage Strategy

6.1 Existing Drainage

6.1.1 The United Utilities public sewer records have been obtained for the site and surrounding area and are enclosed in *Appendix C*.

6.1.2 The sewer records confirm that there is a short length of 300x400mm brick egg sewer passing across the northeast corner within the site boundary from the junction of Jutland Street/Store Street towards Sparkle Street.

6.1.3 However, various investigations have been carried out to locate the public sewer on site and based on information to date, it confirms that the section within the site boundary does not exist. The survey information suggests that this sewer has either been previously capped off and reconnected to the combined sewer in Store Street or the sewer potentially did not ever flow in the direction shown on the mapping.

6.1.4 The sewer investigations currently confirm that the 300 400mm combined sewer within Jutland Street flows into Manhole 9003 at the junction of Store Street and this connects to the 1900mm brick combined sewer in Store Street. The incoming connection to Manhole 9002 at Sparkle Street exists, however this has been capped off at circa 0.8m upstream of the manhole and does not indicate any active incoming flows.

6.1.5 We have discussed the survey findings with United Utilities, and they have confirmed that they are satisfied that the sewer is capped and we can now confirm that based on the information to date:

- No sewer diversion works are required.
- A sewer abandonment agreement (Section 116) is required to abandon the sewer and confirm this can be removed off the sewer records.
- The proposed building/foundations are >3m from the sewer/manhole centreline.

6.1.6 There are no further public sewers recorded on site.

6.1.7 The records indicate that the following public sewers are located within the vicinity of the site:

- There is a 225mm diameter combined sewer within Sparkle Street to the southwest of the site flowing in a north westerly direction into the larger sewer in Store Street.
- There is a 1550/1900mm diameter brick combined sewer, within Store Street to the north of the site, flowing in a south-westerly direction.
- There is a 900mm diameter surface water sewer running parallel with the 1500/1900mm diameter combined sewer in Store Street.

6.1.8 There are various sewers in the wider vicinity of the site, however they are not considered of direct relevance to the development works.

6.1.9 A CCTV / GPR sonar trace survey of the site was carried out by Malcolm Hughes in April 2023. The survey identified various private drainage on site, which connects to a 300mm diameter existing combined water drain passing northwards through the centre of the site and out falling to the 1500/1900mm diameter combined sewer in Store Street.

6.1.10 The CCTV / GPR Drainage Survey is enclosed in *Appendix D.*

6.1.11 The existing drainage system has broadly been modelled and confirms that the existing site is likely to discharge up to the following flows to the combined sewer network in Store Street:

- 1 year = 24.2 l/s
- 30 Year = 59.1 l/s
- 100 Year = 75.6 l/s

6.1.12 The existing surface water calculations are enclosed in *Appendix G*.

6.1.13 The existing drainage network will be removed as part of the redevelopment works and a fully separate foul and surface water network is proposed.

6.2 Proposed Foul Water Drainage

6.2.1 The proposed drainage has been designed as a separate foul and surface water drainage system.

6.2.2 The foul water is proposed to discharge to the 1550mm diameter combined water sewer via a new saddle connection located to the north of the proposed site, within Store Street. The method of connection should be agreed with United Utilities under a section 106 Agreement.

6.2.3 At this moment, the detailed design for the foul drainage is to be determined. This peak flow rate requires confirming by others once the final internal layouts and number of appliances are confirmed, however based on broad assessment in accordance with the Design and Construction of Foul and Surface water sewers, based on 4000 litres per dwelling per day, flows are approximately 16.9 l/s.

6.2.4 United Utilities have confirmed in their pre-development response that their preferred point of discharge for foul water flows would be to the 1550mm diameter combined public sewer, to the north of the site, within Store Street and can be discharged at an unrestricted rate. Refer to the United Utilities correspondence enclosed in *Appendix H.*

6.2.5 It is assumed the site will remain under one ownership and therefore the drainage system will remain private within the development boundary.

6.2.6 The connection to the public sewer network will be subject to a Section 106 Agreement with United Utilities.

6.2.7 The proposed Drainage Layout is enclosed in *Appendix B.*

6.3 Proposed Surface Water Drainage

6.3.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services.

6.3.2 In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nationwide allowances, each area will have its own peak rainfall allowances. In the case of the Manchester area, this is the Irwell Management Catchment peak rainfall allowances. Table 4 demonstrates the climate change allowances with central and upper end allowances being considered.

Table 4: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Irwell Management Catchment peak rainfall allowances

3.3% annual exceedance rainfall event

Epoch	Central allowance	Upper end allowance
2050s	25%	35%
2070s	30%	40%

1% annual exceedance rainfall event

Epoch	Central allowance	Upper end allowance
2050s	25%	40%
2070s	30%	45%

*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

6.3.3 Based on the nature of the development, a lifespan in excess of 100 years is anticipated. Therefore, the potential climate change allowance for the 2070's ranges between 30% for the central allowance

and 45% for the upper end allowance. As such, an allowance of 45% for climate change on peak rainfall intensity will be included in calculations.

6.3.4 In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Infiltration

6.3.5 The ground conditions comprise of made ground overlaying firm to stiff clay, therefore due to the limiting permeability of the clay, infiltration is not considered suitable.

6.3.6 Based on the development proposals, it is unlikely that there will be sufficient space on site to infiltrate with minimum offsets from boundaries and proposed building foundations in excess of 5m.

6.3.7 Infiltration is therefore not considered a viable solution.

Watercourse

6.3.8 The nearest watercourse is the 900mm diameter culvert (Shooters Brook) located within Store Street immediately north of the site. Invert levels and site arrangement would permit a new connection to the watercourse, subject to agreement with the LLFA. A new saddle connection to the culverted watercourse will be subject to Land Drainage Consent with Manchester City Council.

Surface Water Sewer

6.3.9 The 900mm diameter culverted watercourse, outfalls to a United Utilities adopted 900mm diameter surface water sewer in Store Street, preference is to connect to the watercourse section within Store Street.

Combined Water sewer

6.3.10 There are existing combined water sewers in both Sparkle Street to the southwest and Store Street to the north. Following the drainage hierarchy, there are more sustainable options available.

6.3.11 Table 5 summarises the options for surface water disposal.

Table 5: Surface Water Disposal

Surface Water Disposal	Potential	Description
Infiltration	✗	It is assumed that the site will not be suitable for infiltration SuDS.
Watercourse	✓	A new connection to the 900mm diameter culverted watercourse in Store Street is proposed.
Surface Water Public Sewer	✓	The culverted watercourse outfalls to the surface water sewer immediately north of the site. Preference is to connect to the watercourse section.
Combined Public Sewer	✗	More sustainable options are available.

6.3.12 Details of the existing drainage indicate that surface water from the existing building footprint is positively draining to the existing public combined sewer in Store Street.

6.3.13 As noted in section 6.1.13, the existing drainage system has broadly been modelled and confirms that the existing site is likely to discharge up to the following flows to the combined sewer network in Store Street:

- 1 year = 24.2 l/s
- 30 Year = 59.1 l/s
- 100 Year = 75.6 l/s

6.3.14 As part of a sustainable approach to surface water disposal, 100% of the existing surface water flows will be removed from the combined sewer network, with flows being proposed to the watercourse section (Shooters Brook) within Store Street, which connects to the surface water sewer network approximately 20 metres downstream.

6.3.15 Manchester City Council Lead Local Flood Authority (LLFA) have been consulted on surface water connection location and proposed discharge rates, however currently due to volumes of consultations, they have been unable to respond to specific queries on the site.

6.3.16 Manchester City Council LLFA correspondence is enclosed in *Appendix H*.

6.3.17 United Utilities have also been consulted on proposed connection locations and proposed discharge rates and they have confirmed that providing that infiltration is sufficiently discounted, a connection to the surface water sewer or via the culverted watercourse (subject to connect via the LLFA) a 50%

surface water betterment would be acceptable, subsequent discussions confirm United Utilities would relate 50% betterment up to the 1 in 30-year flows for all design events.

6.3.18 Taking the above into account, we have therefore proposed to connect to the watercourse section within Store Street up to a maximum of the following flows:

- 1 year = 12.1 l/s (50% of 1 year existing)
- 30 Year = 29.6 l/s (50% of 30 year existing)
- 100 Year +45% climate change = 29.6 l/s (50% of 30 year existing/61% of 100 year existing)

6.3.19 United Utilities have confirmed the flows would be acceptable.

6.3.20 Refer to *Appendix H* for LLFA/United Utilities correspondence to date.

6.3.21 Attenuation requirements are assessed within the sustainable drainage assessment, Section 6.4 (below).

6.3.22 It is proposed that all sewers within the site boundary will remain private and therefore where sewers remain private, connection to the public sewer network will be subject to Land Drainage consent with Manchester LLFA.

6.3.23 The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Manchester City Council and United Utilities.

6.4 Sustainable Drainage Systems and Green Infrastructure

6.4.1 Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Access roads and pedestrian footways are considered as a low hazard in terms of contamination. Figure 7 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

Figure 7: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

TABLE 26.2 Pollution hazard indices for different land use classifications

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]

6.4.2 Figure 8 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015)

Figure 8: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	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.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **http://tinyurl.com/qf7yuj7**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

6.4.3 The selection of treatment should ensure that the SuDS mitigation component index (Figure 8) exceeds the pollution hazard index (Figure 7).

6.4.4 In accordance with the National Planning Policy Framework (NPPF) a sustainable drainage system (SuDS) should be provided unless demonstrated to be inappropriate. The following options have been considered for the site:

Infiltration Systems:

6.4.5 Systems such as infiltration trenches and soakaways were considered as part of the surface water management strategy however, the ground conditions and spatial constraints, therefore, infiltration systems are not considered suitable for the site.

Green/Blue roofs:

6.4.6 Green/Blue roofs were considered for the site however, found not viable due plant requirements and limited maintenance access. Refer to permeable paving section for podium slab drainage proposals.

Swales, Wetlands and Attenuation Ponds:

6.4.7 Due to the small nature of the site and the limited space available, pre-treatment steps and retention systems such as swales, wetlands and ponds are not considered suitable for the site due to their space requirements.

Permeable Paving

6.4.8 Permeable Paving is proposed above the podium slab which is anticipated to incorporate a layer of attenuation crates over the podium slab which will be located below a permeable surface build-up of either soft landscaping of permeable paving. Further co-ordination of the detail and capacity is required with the Landscape Architect.

6.4.9 Permeable tarmac is also proposed to the maintenance access strip to the eastern façade of the building.

Rain Gardens and Drained Soft Landscaping

6.4.10 It is currently proposed to drain some of the external terraced areas to the rain gardens/soft landscaping which will require positive under drainage. Further co-ordination of the detail and capacity is required with the Landscape Architect.

Other SuDS Considerations:

6.4.11 There may be an opportunity to incorporate some rainwater retention with some of the upper roof levels, where planters are considered feasible. Further review of this will be completed through detailed design with the Landscape Architect.

SuDS Conclusion

6.4.12 The development is proposing to include permeable paving and rain gardens/drained soft landscaping sustainable drainage features. There will also be a requirement to introduce additional storage to provide sufficient attenuation volume capacity.

6.4.13 Attenuation volumes have been calculated at c.55m³ within an attenuation tank, 35m³ within a permeable paving/crate system above the podium slab and 11m³ within a permeable paving within the maintenance access strip. This is based on volumes generated for up to the 100-year event with 45% climate change discharging a maximum of 29l/s.

6.4.14 Refer to *Appendix B* for the Drainage GA plan and *Appendix J* for the proposed drainage calculations.

6.5 Maintenance

6.5.1 A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

6.5.2 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event. Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.

6.5.3 A management company may be required for maintenance of attenuation and SuDS facilities.

Appendix A

Proposed Site Layout – Ground Level

Proposed Site Layout – Podium Level



0001 01 Landscape General Arrangement Plan 1:200
Ground Level

N

Scale
0m 5m 10m 20m

Key

- Planning application boundary
- Paving type 01 — Concrete flags to adoptable stanards To be agreed with MCC
- Paving type 02 — Small unit concrete blocks To private terraces
- Macadam surfacing With marked parking bays
- Proposed 700mm flat bar railing to private terraces
- Proposed 2400mm boundary fence
- Proposed tree planter (800mm height) within build out kerbs
- Proposed planter to private terraces
- Proposed brick pier to private terraces
- Proposed 2m high screen for wind mitigation (50% perforation) — WS
- Proposed street bench
- Proposed Sheffield cycle stands
- Existing trees to be removed
- Proposed tree in soft landscape
- Proposed feature tree
- Proposed feature shrub
- Proposed street planting mix
- Proposed hedge planting
- +2.200 — Proposed levels
- +2.200(e) — Existing levels

Notes

1. All dimensions in mm, unless otherwise stated.
2. Scaling from drawing if printed incorrectly may lead to errors.
3. All information outside red line boundary shown for contextual purpose only.
4. All hatch patterns are indicative only unless stated otherwise.
5. This drawing is to be read in conjunction with the following re-form landscape architecture documentation:
   - 1006-RFM-XX-01-DR-L-0002-Landscape GA Plan Podium Level
   - 1006-RFM-XX-10-DR-L-0003-Landscape GA Plan Roof Terrace Level

   AND all relevant documentation from the design team
6. Levels information on this drawing illustrates the design intent only.

Date	Description of revision	Drawn by	Checked by	Approved by	Revision
10.04.24	Minor alterations based on updated architectural layout	JR	DL	DL	P06

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Project
SPARKLE STREET, MANCHESTER
RF23-1006

Client
CENTRAL & URBAN - JRL

Document title
LANDSCAPE GENERAL ARRANGEMENT PLAN
GROUND LEVEL

Paper size
A1

Scale
1:200

Status
FOR REVIEW AND COMMENT

S3

Drawing number
1006-RFM-XX-00-DR-L-0001

Revision
P06

© re-form landscape architecture



0002 01 Landscape General Arrangement Plan 1:200
Podium Level

N

Scale
0m 5m 10m 20m

Key

- Planning application boundary
- Paving type 03 Porcelain tiles on pedestal system
- Paving type 04 Porcelain tiles on pedestal system
- Paving type 05 Wood-effect porcelain tiles on pedestal system
- Proposed stepping stones
- Proposed 700mm flat bar railing to private terraces
- Proposed 2000mm boundary fence
- Proposed 1100mm perimeter balustrade
- Raised planter with integrated timber seating edge (600mm height)
- Timber seating deck with louvered sides (500mm height)
- Proposed festoon lighting
- Proposed boundary planting mix
- Proposed podium/roof terrace planting mix
- Proposed lawn
- Proposed tree in soft landscape
- Proposed feature shrub
- +2.200 Proposed levels
- Extent of internal cycle store and plant room (at ground floor level)

Notes
1. All dimensions in mm, unless otherwise stated.
2. Scaling from drawing if printed incorrectly may lead to errors.
3. All information outside red line boundary shown for contextual purpose only.
4. All hatch patterns are indicative only unless stated otherwise.
5. This drawing is to be read in conjunction with the following re-form landscape architecture documentation:
   - 1006-RFM-XX-00-DR-L-0001-Landscape GA Plan Ground Level
   - 1006-RFM-XX-10-DR-L-0003-Landscape GA Plan Roof Terrace Level

   AND all relevant documentation from the design team
6. Levels information on this drawing illustrates the design intent only.

Date	Description of revision	Drawn by	Checked by	Approved by	Revision
10.04.24	Minor alteration to private terrace layout based on updated architectural layout.	JR	DL	DL	P05

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Project
SPARKLE STREET, MANCHESTER
RF23-1006

Client
CENTRAL & URBAN - JRL

Document title
LANDSCAPE GENERAL ARRANGEMENT PLAN
PODIUM LEVEL

Paper size
A1

Scale
1:200

Status
FOR REVIEW AND COMMENT

S3

Drawing number
1006-RFM-XX-01-DR-L-0002

Revision
P05

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Appendix B

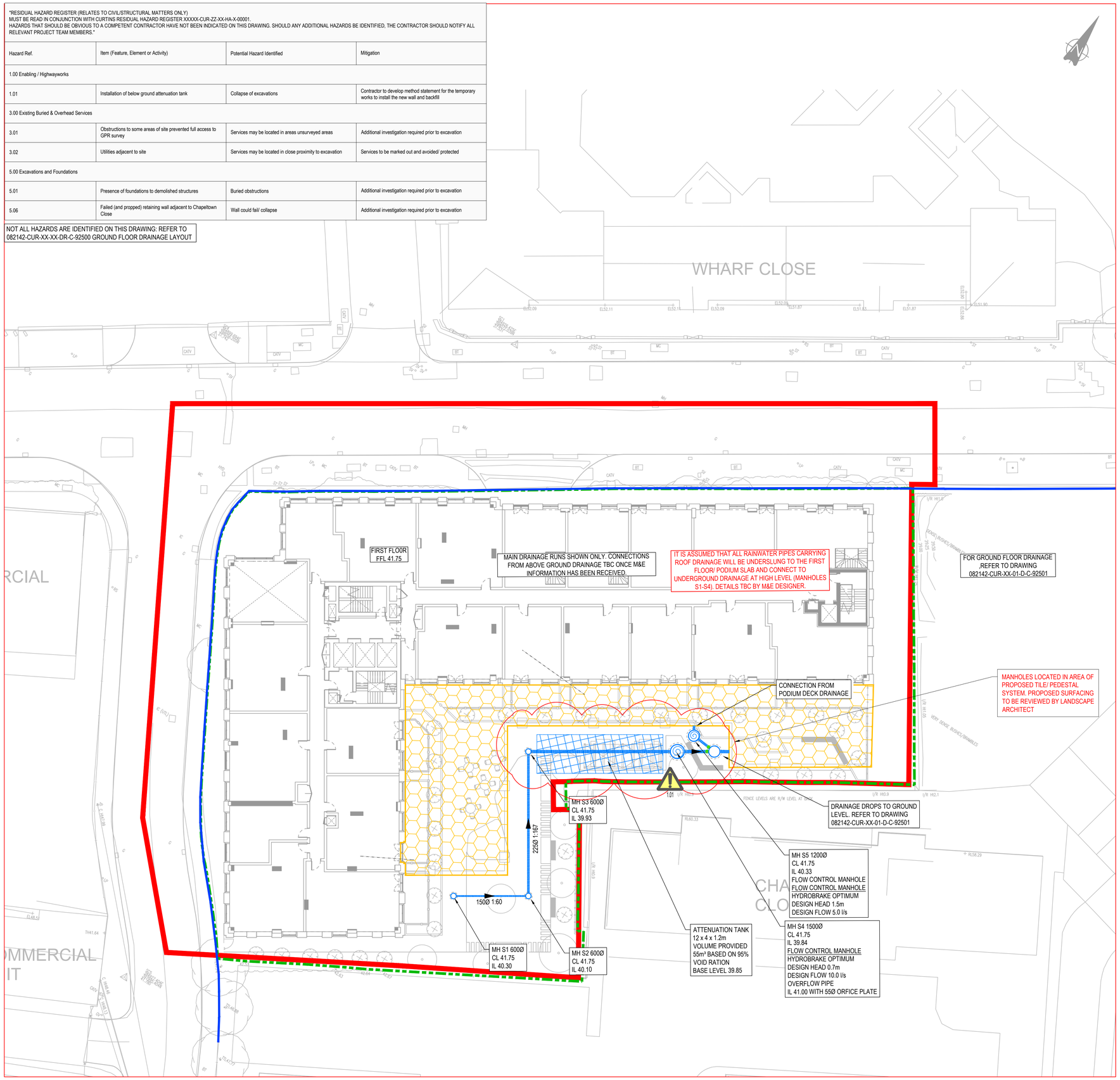
Drainage Strategy – Ground Level

Drainage Strategy – Podium Level

"RESIDUAL HAZARD REGISTER (RELATES TO CIVIL/STRUCTURAL MATTERS ONLY)
MUST BE READ IN CONJUNCTION WITH CURTINS RESIDUAL HAZARD REGISTER XXXXX-CUR-ZZ-XX-HA-X-00001.
HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR HAVE NOT BEEN INDICATED ON THIS DRAWING. SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED, THE CONTRACTOR SHOULD NOTIFY ALL RELEVANT PROJECT TEAM MEMBERS."

Hazard Ref.	Item (Feature, Element or Activity)	Potential Hazard Identified	Mitigation
1.00 Enabling / Highwayworks			
1.01	Installation of below ground attenuation tank	Collapse of excavations	Contractor to develop method statement for the temporary works to install the new wall and backfill
3.00 Existing Buried & Overhead Services			
3.01	Obstructions to some areas of site prevented full access to GPR survey	Services may be located in areas unsurveyed areas	Additional investigation required prior to excavation
3.02	Utilities adjacent to site	Services may be located in close proximity to excavation	Services to be marked out and avoided/ protected
5.00 Excavations and Foundations			
5.01	Presence of foundations to demolished structures	Buried obstructions	Additional investigation required prior to excavation
5.06	Failed (and propped) retaining wall adjacent to Chapeltown Close	Wall could fail/ collapse	Additional investigation required prior to excavation

NOT ALL HAZARDS ARE IDENTIFIED ON THIS DRAWING: REFER TO 082142-CUR-XX-XX-DR-C-92500 GROUND FLOOR DRAINAGE LAYOUT



DESIGN PHILOSOPHY

SURFACE WATER DESIGN
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 45% CLIMATE CHANGE EVENT.
SW FLOW RATES:
- 1 YEAR - 12.1l/s
- 30 YEAR - 29.6 l/s
- 100 YEAR +45% CLIMATE CHANGE - 29.6L/S

APPROXIMATE STORAGE PROVISIONS:
- CELLULAR ATTENUATION - 55m³
- PERMAVOID PODIUM DRAINAGE ATTENUATION - 35m³ BASED ON 85mm DEEP SYSTEM
- PERMEABLE SUB-BASE UNDER POROUS ASPHALT - UP TO 11m³ BASED ON 300mm THICK STORAGE LAYER

OUTFALL: DRAINAGE TO DISCHARGE TO CULVERTED WATERCOURSE IN STORE ST (TO BE AGREED WITH LLFA)
LEVELS INDICATE THAT PUMPING /WILL NOT BE REQUIRED.

POLLUTION TREATMENT: MAINTENANCE/ SERVICE AREA SUBJECT TO VEHICULAR LOADING IS POROUS ASPHALT PERMEABLE SUB-BASE.

INFILTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN
FW PEAK FLOW RATE: 16.9L/S (BASED ON 4000 l/DAY PER PROPERTY, IN LINE WITH THE DCG. FINAL DISCHARGE UNIT LOADINGS TBC BY M&E DESIGNERS

OUTFALL: DRAINAGE TO DISCHARGE TO PUBLIC COMBINED SEWER IN STORE ST (S106 AGREEMENT REQUIRED WITH UU)
LEVELS INDICATE THAT PUMPING WILL NOT BE REQUIRED.

DRAWING BASED ON:

SURVEY INFORMATION
- 60159-1TOPOGRAPHICAL SURVEY BY MALCOLM HUGHES DATED MAY 2023
- TOPOGRAPHICAL SURVEY BY SEP S15724-T
- 60159-UG1 & UG2 GPR SURVEY BY MALCOLM HUGHES DATED MAY 2023
- PJ00478370 CCTV SURVEY BY LANES GROUP (FOR MALCOLM HUGHES) DATED MAY 2023

HIGHWAY BOUNDARY INFORMATION
- NFORMATION RECEIVED FROM MANCHESTER CC HIGHWAYS MAY 2023

ARCHITECT'S PLANS
- 10413-SHP-Z1-A-G200-PL-00-001 REV P07 GA GROUND FLOOR
- 10413-SHP-Z1-A-G200-PL-00-001 REV P05 GA FIRST FLOOR
- 10413-SHP-Z1-A-G200-PL-RF-001 REV P03 GA ROOF LEVEL

LANDSCAPE ARCHITECT'S PLANS
- 1006-RFM-XX-00-DR-L-0001 REV P06 LANDSCAPE GA GROUND LEVEL
  1006-RFM-XX-01-DR-L-0002 REV P05 LANDSCAPE GA PODIUM

FOUNDATIONS
- 082142-CUR-Z1-FN-D-S-16100 WIP FOUNDATION LAYOUT RECEIVED 10.07.23

KEY:

- PLANNING APPLICATION BOUNDARY TAKEN FROM DRAWING 10413-SHP-Z1-A-G200-PL-00-001.
- SITE OWNERSHIP BOUNDARY TAKEN FROM DRAWING 10413-SHP-Z1-A-G200-PL-00-001.
- HIGHWAY BOUNDARY, BASED ON INFORMATION RECEIVED FROM MANCHESTER CC HIGHWAYS.
- EXTENT OF RETAINING WALL
- EXISTING COMBINED DRAINAGE
- EXISTING FOUL DRAINAGE
- EXISTING SURFACE WATER DRAINAGE
- PROPOSED FOUL DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED FLOW CONTROL MANHOLE
- BACKDROP
- PROPOSED PERMAVOID ATTENUATION TO PODIUM DECK
- PROPOSED CELLULAR ATTENUATION TANK

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN. ALL EXISTING SEWERS, CONNECTIONS, PIPE SIZES AND INVERT LEVELS TO BE CONFIRMED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS TO ENSURE CONNECTIVITY. ANY VARIANCE FROM THE INFORMATION SHOWN SHOULD BE REPORTED TO THE ENGINEER FOR REVIEW.
3. DO NOT SCALE THIS DRAWING. ALL DETAILS AND DIMENSIONS ARE TO BE CHECKED BY THE CONTRACTOR. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
4. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
5. WHERE EXISTING DRAINAGE IS BEING USED, ALLOWANCES SHOULD BE MADE TO REMEDIATE THIS DRAINAGE IN LINE WITH AVAILABLE CCTV SURVEY INFORMATION. IF NO SURVEY IS AVAILABLE, IT IS ADVISED TO OBTAIN ONE PRIOR TO COMMENCEMENT OF WORKS.
6. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.
7. ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS. THESE ARE TO BE CONFIRMED ONCE A DETAILED CAPACITY CHECK HAS BEEN UNDERTAKEN AT A LATER DESIGN STAGE.
8. OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

Rev:	Description:	Date:	By:	Chkd:
P03	STAGE 2 UPDATE	19.04.24	CS	CG
P02	ISSUED FOR STAGE 2	14.07.23	ATL	CG
P01	ISSUED FOR DRAFT FRA	07.07.23	ATL	CG

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Status: SUITABLE FOR INFORMATION — S2

Project: SPARKLE STREET, MANCHESTER

Drg Title: DRAINAGE LAYOUT PODIUM LEVEL

Drawn By	Designed By	Checked By
ATL	ATL	CG
	Date: 07/07/23	Scales @ A1: 1:200

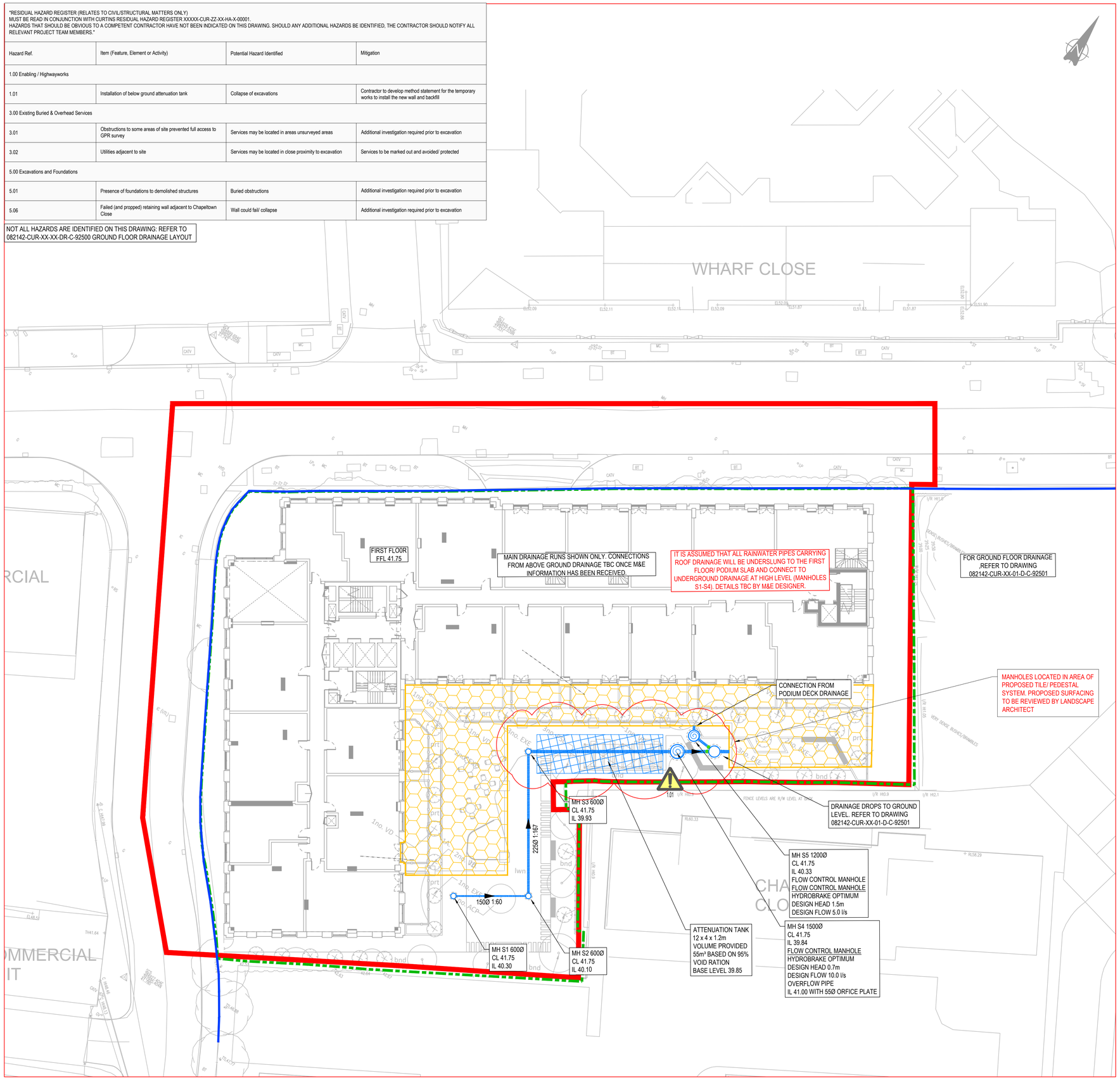
Project No - Originator - Function - Spatial - Form - Discipline - Number	Revision
082142 - CUR - XX - XX - D - C - 92501	P03

\\ma-fs-1\Projects\082001 - 083000\082142 - Central & Urban BTR\Q4-Production\4A-Models-Drawings\CCAD\92501

"RESIDUAL HAZARD REGISTER (RELATES TO CIVIL/STRUCTURAL MATTERS ONLY)
MUST BE READ IN CONJUNCTION WITH CURTINS RESIDUAL HAZARD REGISTER XXXXX-CUR-ZZ-XX-HA-X-00001.
HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR HAVE NOT BEEN INDICATED ON THIS DRAWING. SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED, THE CONTRACTOR SHOULD NOTIFY ALL RELEVANT PROJECT TEAM MEMBERS."

Hazard Ref.	Item (Feature, Element or Activity)	Potential Hazard Identified	Mitigation
1.00 Enabling / Highwayworks			
1.01	Installation of below ground attenuation tank	Collapse of excavations	Contractor to develop method statement for the temporary works to install the new wall and backfill
3.00 Existing Buried & Overhead Services			
3.01	Obstructions to some areas of site prevented full access to GPR survey	Services may be located in areas unsurveyed areas	Additional investigation required prior to excavation
3.02	Utilities adjacent to site	Services may be located in close proximity to excavation	Services to be marked out and avoided/ protected
5.00 Excavations and Foundations			
5.01	Presence of foundations to demolished structures	Buried obstructions	Additional investigation required prior to excavation
5.06	Failed (and propped) retaining wall adjacent to Chapeltown Close	Wall could fail/ collapse	Additional investigation required prior to excavation

NOT ALL HAZARDS ARE IDENTIFIED ON THIS DRAWING: REFER TO 082142-CUR-XX-XX-DR-C-92500 GROUND FLOOR DRAINAGE LAYOUT



DESIGN PHILOSOPHY

SURFACE WATER DESIGN
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 45% CLIMATE CHANGE EVENT.
SW FLOW RATES:
- 1 YEAR - 12.1l/s
- 30 YEAR - 29.6 l/s
- 100 YEAR +45% CLIMATE CHANGE - 29.6L/S

APPROXIMATE STORAGE PROVISIONS:
- CELLULAR ATTENUATION - 55m³
- PERMAVOID PODIUM DRAINAGE ATTENUATION - 35m³ BASED ON 85mm DEEP SYSTEM
- PERMEABLE SUB-BASE UNDER POROUS ASPHALT - UP TO 11m³ BASED ON 300mm THICK STORAGE LAYER

OUTFALL: DRAINAGE TO DISCHARGE TO CULVERTED WATERCOURSE IN STORE ST (TO BE AGREED WITH LLFA)
LEVELS INDICATE THAT PUMPING /WILL NOT BE REQUIRED.

POLLUTION TREATMENT: MAINTENANCE/ SERVICE AREA SUBJECT TO VEHICULAR LOADING IS POROUS ASPHALT PERMEABLE SUB-BASE.

INFILTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN
FW PEAK FLOW RATE: 16.9L/S (BASED ON 4000 l/DAY PER PROPERTY, IN LINE WITH THE DCG. FINAL DISCHARGE UNIT LOADINGS TBC BY M&E DESIGNERS

OUTFALL: DRAINAGE TO DISCHARGE TO PUBLIC COMBINED SEWER IN STORE ST (S106 AGREEMENT REQUIRED WITH UU)
LEVELS INDICATE THAT PUMPING WILL NOT BE REQUIRED.

DRAWING BASED ON:

SURVEY INFORMATION
- 60159-1TOPOGRAPHICAL SURVEY BY MALCOLM HUGHES DATED MAY 2023
- TOPOGRAPHICAL SURVEY BY SEP S15724-T
- 60159-UG1 & UG2 GPR SURVEY BY MALCOLM HUGHES DATED MAY 2023
- PJ00478370 CCTV SURVEY BY LANES GROUP (FOR MALCOLM HUGHES) DATED MAY 2023

HIGHWAY BOUNDARY INFORMATION
- NFORMATION RECEIVED FROM MANCHESTER CC HIGHWAYS MAY 2023

ARCHITECT'S PLANS
- 10413-SHP-Z1-A-G200-PL-00-001 REV P07 GA GROUND FLOOR
- 10413-SHP-Z1-A-G200-PL-00-001 REV P05 GA FIRST FLOOR
- 10413-SHP-Z1-A-G200-PL-RF-001 REV P03 GA ROOF LEVEL

LANDSCAPE ARCHITECT'S PLANS
- 1006-RFM-XX-00-DR-L-0001 REV P06 LANDSCAPE GA GROUND LEVEL
  1006-RFM-XX-01-DR-L-0002 REV P05 LANDSCAPE GA PODIUM

FOUNDATIONS
- 082142-CUR-Z1-FN-D-S-16100 WIP FOUNDATION LAYOUT RECEIVED 10.07.23

KEY:

- PLANNING APPLICATION BOUNDARY TAKEN FROM DRAWING 10413-SHP-Z1-A-G200-PL-00-001.
- SITE OWNERSHIP BOUNDARY TAKEN FROM DRAWING 10413-SHP-Z1-A-G200-PL-00-001.
- HIGHWAY BOUNDARY, BASED ON INFORMATION RECEIVED FROM MANCHESTER CC HIGHWAYS.
- EXTENT OF RETAINING WALL
- EXISTING COMBINED DRAINAGE
- EXISTING FOUL DRAINAGE
- EXISTING SURFACE WATER DRAINAGE
- PROPOSED FOUL DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED FLOW CONTROL MANHOLE
- BACKDROP
- PROPOSED PERMAVOID ATTENUATION TO PODIUM DECK
- PROPOSED CELLULAR ATTENUATION TANK

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN. ALL EXISTING SEWERS, CONNECTIONS, PIPE SIZES AND INVERT LEVELS TO BE CONFIRMED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS TO ENSURE CONNECTIVITY. ANY VARIANCE FROM THE INFORMATION SHOWN SHOULD BE REPORTED TO THE ENGINEER FOR REVIEW.
3. DO NOT SCALE THIS DRAWING. ALL DETAILS AND DIMENSIONS ARE TO BE CHECKED BY THE CONTRACTOR. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
4. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
5. WHERE EXISTING DRAINAGE IS BEING USED, ALLOWANCES SHOULD BE MADE TO REMEDIATE THIS DRAINAGE IN LINE WITH AVAILABLE CCTV SURVEY INFORMATION. IF NO SURVEY IS AVAILABLE, IT IS ADVISED TO OBTAIN ONE PRIOR TO COMMENCEMENT OF WORKS.
6. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.
7. ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS. THESE ARE TO BE CONFIRMED ONCE A DETAILED CAPACITY CHECK HAS BEEN UNDERTAKEN AT A LATER DESIGN STAGE.
8. OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

Rev:	Description:	Date:	By:	Chkd:
P03	STAGE 2 UPDATE	19.04.24	CS	CG
P02	ISSUED FOR STAGE 2	14.07.23	ATL	CG
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Status: SUITABLE FOR INFORMATION **S2**

Project: SPARKLE STREET, MANCHESTER

Drg Title: DRAINAGE LAYOUT PODIUM LEVEL

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ATL	ATL	CG
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Project No - Originator - Function - Spatial - Form - Discipline - Number	Revision
082142 - CUR - XX - XX - D - C - 92501	P03

\\ma-fs-1\Projects\082001 - 083000\082142 - Central & Urban BTR\04-Production\4A-Models-Drawings\CCAD\92501

Appendix C

United Utilities Sewer Records

United Utilities
Water for the North West

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

Curtins Consulting Ltd

51-55
Tithebarn Street,
Liverpool,
L2 2SB

FAO:

Your Ref: B082142 PO No 4892
Our Ref: UUPS-ORD-473611
Date: 22/03/2023

Dear Sirs

Location: Sparkle street

I acknowledge with thanks your request dated 21/03/2023 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,

[redacted]

Karen McCormack
Property Searches Manager

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

Water for the North West

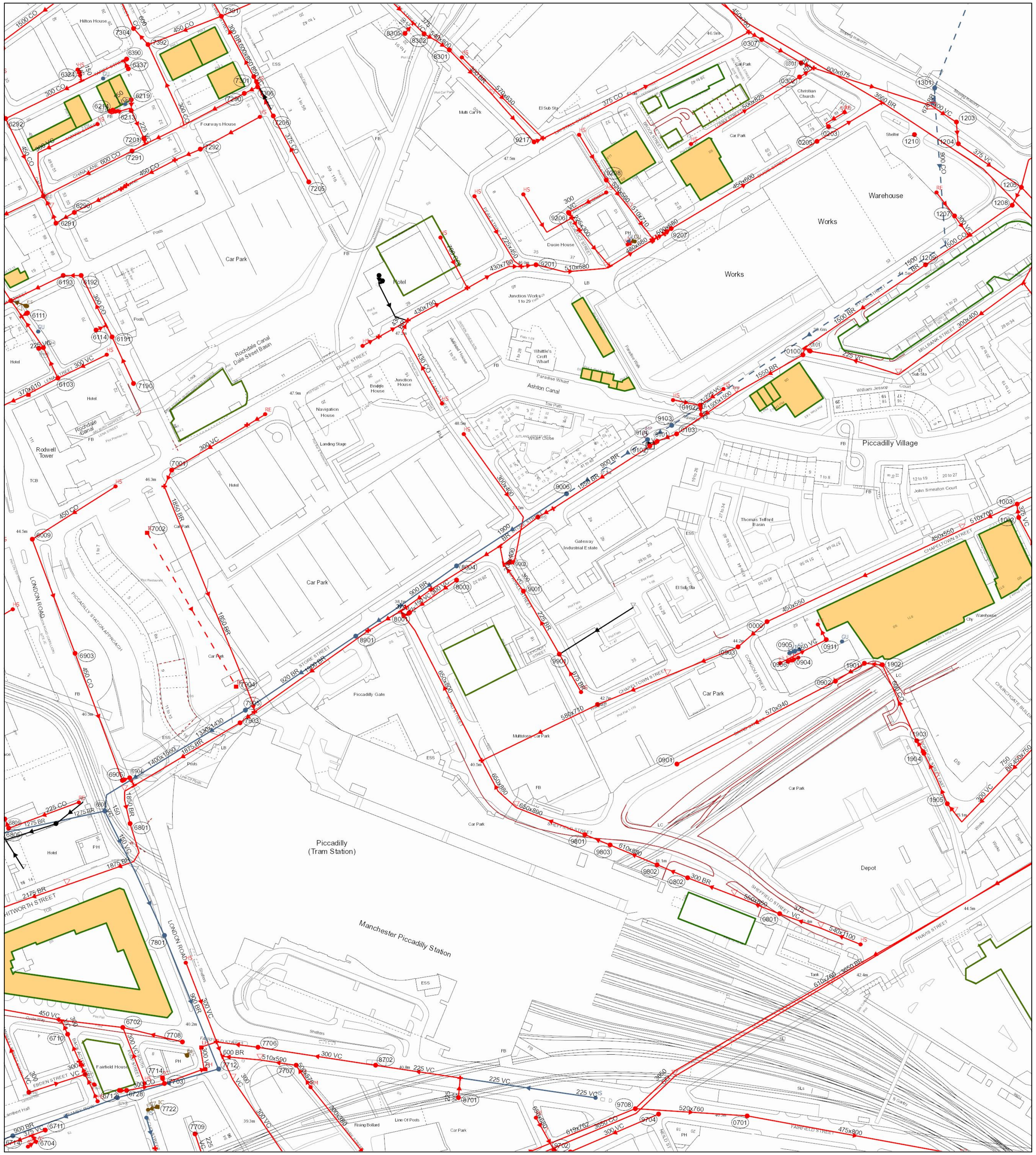
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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



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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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
9704	40.88	CO	35.04	300			VC	53.31041	
7391	48.03	CO	45.04	450			CO	43.56176	1 in 50
6213		CO		225			VC	16.88902	
0802	41.7	CO	37.47	300			BR	18.36797	1 in 37
0102	37.18	CO	33.72	225			VC	5.099003	
6808	39.59	SW	29.25	1275			BR	122.1995	1 in 52
6009		CO		450			CO	67.53614	
0903		CO	0	450			VC	42.15448	
7703	40.45	CO	34.33	300			VC	45.06176	
9006	37.22	SW	33.22	900			BR	72.94518	1 in 130
6702	40.11	CO	32.69	450			VC	72.87384	
7201		CO		225			VC	3.359119	
6706	40.88	CO	33.28	300			VC	32.57299	1 in 112
7392	47.97	CO	43.52	600			CO	12.04159	1 in 109
8302	48.56	CO	41.09	750			BR	8.062258	
1903	45.32	CO	40.27	600			CO	46.09772	1 in 105
6809	33.25	CO	32.65	300			CO	12.07021	1 in 151
0101	39.24	CO	35.25	225			VC	3.605551	
0902	45.18	CO	0	570			CO	99.29753	
6219		CO		150			VC	5.942734	
6705	40.96	CO	38.14	300			VC	8.944272	1 in 2
6713	40.85	SW	28.46	900			BR	61.68468	1 in 411
1204	43.57	CO	36	375			VC	42.43819	1 in 44
7905	38.95	SW	31.17	1330			BR	44.41846	
6192	46.93	CO	43.2	300			CO	10	1 in 67
9201	45.67	CO	41.97	510			BR	39.57922	
8004	37.76	SW	32.63	900			BR	38.01316	
0701	40.65	CO	0	475			BR	122	
7290	47.22	CO	43.84	300			CO	37.81025	1 in 158
6728	40.96	CO	38.41	300			CO	21.37756	1 in 5
0100	39.21	CO	33.83	1550			BR	42.54409	
9708	40.85	CO	37.49	520			BR	62.1289	
7301	47.3	CO	45.5	600			BR	18.76307	1 in 171
1208	44.2	CO	32.45	1500			CO	58.25529	
7708	40.02	CO	32.88	450			VC	33.95585	1 in 179
7706	40.38	CO	35.96	300			VC	23.19483	
7304	48.07	CO	43.39	600			CO	38.48376	
6904		CO		450			CO	4.97611	
1205	44.33	CO	35.03	1500			CO	11.18034	1 in 4
9002	38.03	CO	33.32	225			VC	4.123106	
7001	46.21	CO	44.06	300			VC	9.848858	
9005	37.34	CO	32.29	1900			BR	71.34517	
6292	47.4	CO	44.46	450			CO	47.85394	1 in 78
0205		CO		450			BR	42.18551	
0301	45.79	CO	0	600			BR	7.615773	
7707	40.54	CO	37.69	510			BR	20.22375	
7306	47.19	CO	43.87	375			CO	8.376329	1 in 419
7291	47.3	CO	42.94	600			CO	55.00909	1 in 85
8901	38.41	SW	32.05	920			BR	73.4983	1 in 119
9207	45.26	CO	41.04	450			BR	94.06869	
9001	39.49	CO	34.98	300			VC	28.79911	
6191	46.68	CO	43.75	300			CO	38.01316	1 in 70
1902	45.39	CO	39.76	600			CO	10.04988	1 in 77
6714	41.23	SW	28.31	900			BR	79.47956	1 in 248
6390	47.87	CO	45.6	300			CO	74.68601	1 in 68
9217		CO	0	375			CO	5.385165	
9802		CO	37.14	610			BR	28.23111	1 in 66
6805	33.93	CO	32.69	300			CO	5.435485	1 in 136
6104	46.02	CO	43.16	300			CO	31.62278	1 in 42
9101	36.79	CO	32.65	1550			BR	4.699571	1 in 26
7205	45.73	CO	44.04	375			CO	41.58804	1 in 416
1203	43.84	CO	36.16	375			VC	12.04159	1 in 75
1003		CO	44.59	510			BR	33.77514	1 in 10
9901	42.06	CO	37.53	225			BR	40.31129	1 in 16
6103	45.93	CO	43.09	370			BR	56.20773	1 in 54
7712	40.01	SW	0	900			BR	58.24088	
0302	45.94	CO	41.45	825			BR	9.433981	
1207	42.92	CO	36.89	300			VC	13.60147	
6103	45.93	CO	0	300			VC	18.78829	
9801	40.8	CO	36.49	650			BR	40.8534	
1301		SW		900			CO	87.22192	
8001	38.05	CO	33.64	375			VC	3.605551	
1002		CO		375			VC	7.592588	
6202	46.99	CO	42.27	600			CO	46.32707	1 in 71
6337		CO		150			VC	5.335555	
0000	44.45	CO	37.64	450			VC	21.26029	
7292	47.35	CO	43.5	450			CO	15.23155	
6903		CO		450			CO	75.14354	
6905		CO		450			CO	4.358779	
6194	46.2	CO	42.26	600			CO	47.96355	
7903	38.9	CO	31.44	1875			BR	74.43118	
6108		CO		225			VC	2.670141	
8301	48.37	CO	41.16	300			BR	34.65545	
0911		CO		150			VC	9.659894	
6290	47	CO	42.64	450			CO	11.6619	1 in 97
6291	46.98	CO	42.51	450			CO	8.544003	
8702	40.77	CO	36.51	300			VC	65.76473	1 in 120
9206		CO	0	300			CO	3.605551	
8701	40.81	CO	36.62	225			VC	11.04536	
6712	41	CO	38.02	300			VC	4	1 in 10
6707	40.67	CO	32.99	300			VC	5.385165	
9902	42.3	CO	36.35	580			BR	71.11259	
9208	46.97	CO	43.22	520			BR	20.61553	
9103		SW		900			BR	15.61097	
9104		SW	33.72	900			BR	27.13899	1 in 113
9102	36.83	CO	32.57	1550			BR	63.84415	
6214		CO		150			VC	13.83322	
1901	45.22	CO	39.58	600			CO	18.86796	1 in 270
6706	40.88	CO	33.28	300			VC	51.07837	
7206	46.77	CO	43.93	375			CO	18.37468	1 in 367
6808	39.59	SW	29.25	150			VC	38.01316	1 in 422
0801	42.32	CO	37.99	550			BR	26.92582	1 in 112
6711		CO	0	375			VC	31.01612	
1904	45.31	CO	40.45	350			CO	4.472136	1 in 50
1905	45.1	CO	40.67	370			CO	15.23155	1 in 138
9702	39.84	CO	34.18	510			BR	1.414214	
8003	37.66	CO	33.09	300			VC	15.81139	
7801	39.93	SW	29	900			BR	79.84986	
6193	46.78	CO	43.03	300			CO	32.20248	1 in 52
6324		CO		150			VC	4.940213	
7190	46.86	CO	44.65	300			CO	28.63564	1 in 33
0307	46.64	CO	39.59	600			BR	25.45944	
9803	41.09	CO	36.97	610			BR	15.24851	1 in 32
8305	45.88	CO	42.74	150			VC	7.301441	1 in 20
7709	39.81	CO	35.3	225			VC	25.29822	1 in 7
6801	39.58	CO	31.14	1875			BR	61.81135	
1209	42.01	CO	34.42	1500			BR	85.39426	1 in 145
0103	36.75	CO	33.87	1550			BR	11.68867	1 in 10

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

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

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

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular
EG Egg
OV Oval
FT Flat Top
RE Rectangular
SQ Square
TR Trapezoidal
AR Arch
BA Barrel
HO HorseShoe
UN Unspecified

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culverted
PSC Plastic / Steel Composite
GRC Glass Reinforecd Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:

Sparkle street,

Scale: 1:1250 **Date:** 22/03/2023

Sheet: 1 of 1

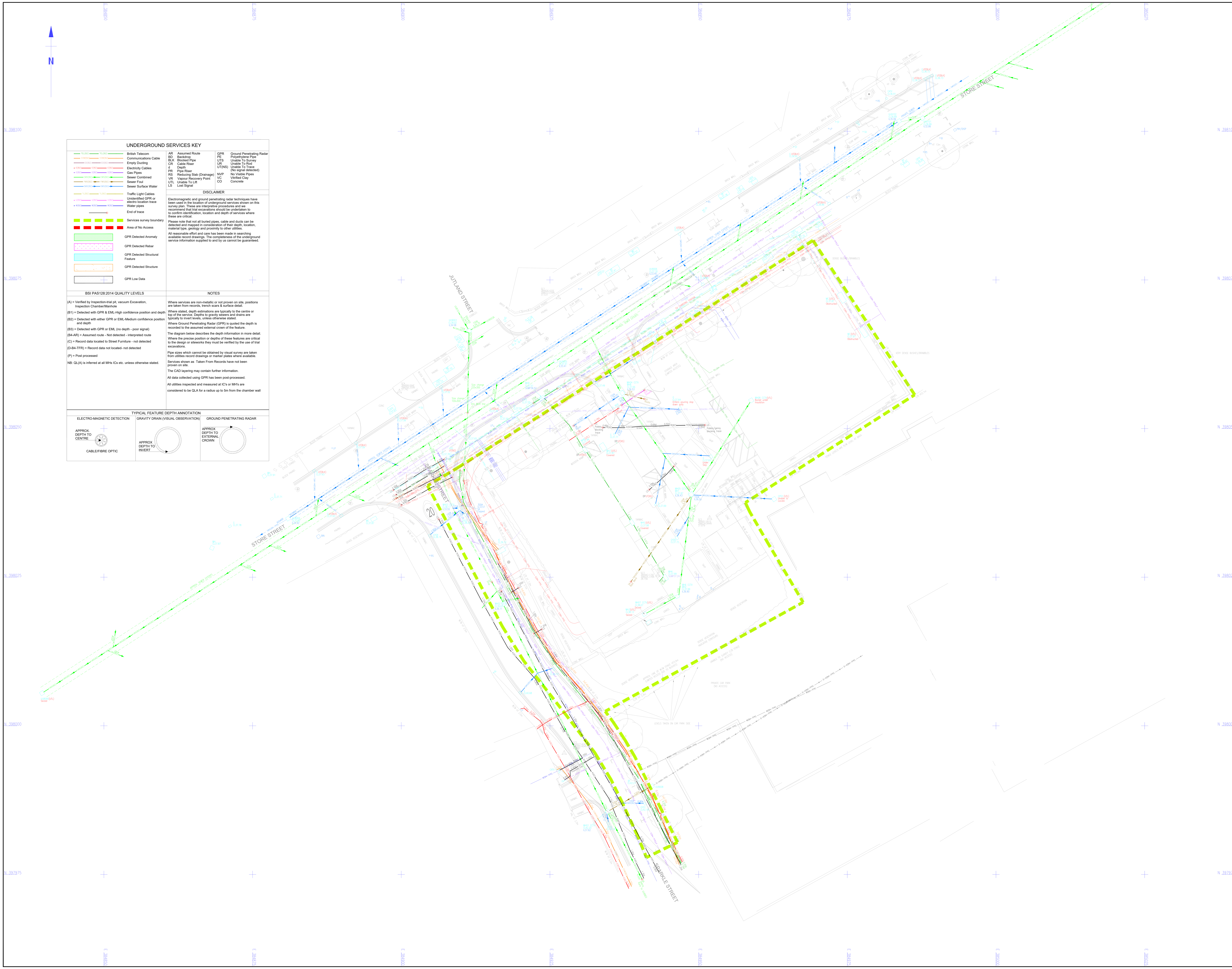
Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

Appendix D

CCTV / GPR Drainage Survey



UNDERGROUND SERVICES KEY

Line	Service
TEL(B2)	British Telecom
COM(B2)	Communications Cable
ED(B2)	Empty Ducting
E(B2)	Electricity Cables
G(B2)	Gas Pipes
CWS(B2)	Sewer Combined
FWS(B2)	Sewer Foul
SWS(B2)	Sewer Surface Water
TL(B2)	Traffic Light Cables
U(B2)	Unidentified GPR or electro location trace
W(B2)	Water pipes
	End of trace
	Services survey boundary
	Area of No Access
	GPR Detected Anomaly
	GPR Detected Rebar
	GPR Detected Structural Feature
	GPR Detected Structure
	GPR Low Data

AR	Assumed Route	GPR	Ground Penetrating Radar
BD	Backdrop	PE	Polyethylene Pipe
BLK	Blocked Pipe	UTS	Unable To Survey
CR	Cable Riser	UR	Unable To Rod
d	Depth	UT(NS)	Unable To Trace (No signal detected)
PR	Pipe Riser	NVP	No Visible Pipes
RS	Reducing Slab (Drainage)	VC	Vitrified Clay
VR	Vapour Recovery Point	CO	Concrete
UTL	Unable To Lift		
LS	Lost Signal		

DISCLAIMER

Electromagnetic and ground penetrating radar techniques have been used in the location of underground services shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to to confirm identification, location and depth of services where these are critical.

Please note that not all buried pipes, cable and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

BSI PAS128:2014 QUALITY LEVELS

(A) = Verified by Inspection-trial pit, vacuum Excavation, Inspection Chamber/Manhole

(B1) = Detected with GPR & EML-High confidence position and depth

(B2) = Detected with either GPR or EML-Medium confidence position and depth

(B3) = Detected with GPR or EML (no depth - poor signal)

(B4-AR) = Assumed route - Not detected - interpreted route

(C) = Record data located to Street Furniture - not detected

(D-B4-TFR) = Record data not located- not detected

(P) = Post processed

NB: QL(A) is inferred at all MHs ICs etc. unless otherwise stated.

NOTES

Where services are non-metallic or not proven on site, positions are taken from records, trench scars & surface detail.

Where stated, depth estimations are typically to the centre or top of the service. Depths to gravity sewers and drains are typically to invert levels, unless otherwise stated.

Where Ground Penetrating Radar (GPR) is quoted the depth is recorded to the assumed external crown of the feature.

The diagram below describes the depth information in more detail.

Where the precise position or depths of these features are critical to the design or siteworks they must be verified by the use of trial excavations.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as Taken From Records have not been proven on site.

The CAD layering may contain further information.

All data collected using GPR has been post-processed.

All utilities inspected and measured at IC's or MH's are considered to be QLA for a radius up to 5m from the chamber wall

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC	APPROX DEPTH TO INVERT	APPROX DEPTH TO EXTERNAL CROWN

Survey Notes

Grid: Local Plane Grid fixed to National Grid at Survey Control Station SC1

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Related to job 59157

Topographical Survey Legend

BUILDINGS AND WALLS: Building; Building Open Sided; Ruin (RUIN); Passage; Wall with Height (Wall Ht1.3m); Retaining Wall (R/W)

FENCE STYLES AND DESCRIPTIONS: Close Boarded C/B; Corrugated Iron C/I; Chestnut Paling C/P; Chainlink C/L; Handrail H/R; Interwoven IWN; Iron Railings I/R; Lattice L/F; Miscellaneous Misc; Palisade PAL; Post & Chain P/C; Post & Rail P/R; Post & Wire P/W; Post & Barbed Wire B/W; Wire mesh W/M; Stile; Gate; Fence linestyle

ROADS: Kerbs; Edge of Surfacing; Pedestrian Crossing (PC); Track; Footpath (FP)

STREET FURNITURE: Belisha Beacon BB; Bus Stop BS; Bollard B; Cats Eye CE; Coal Chute CC; Closed Circuit TV CCTV; Drain DR; Electricity Pole EP; Flood Light FL; Flag Staff FS; Lamp Post LP; Letter Box LB; Name Plate (street) NP; Mooring Ring MR; Mile Post or Mooring Post MP; Service Marker MK; Mile Stone MS; Post P; Parking Meter PM; Reflector Post RP; Rodding Eye RE; Road Sign RS; Speed Camera S/CAM; Information Sign SIGN; Stay SY; Traffic Light TL; Telegraph Pole TP; Traffic Light Push Button Post TLP; Traffic Light Control TLC/P; Control Box C/BOX; British Telecom Box BT BOX; Electricity Box EL BOX; Gas Box GAS BOX

INSPECTION CHAMBERS AND PIPES: Inspection Cover IC; Inspection Cover (Elec) IC/EL; Manhole MH; British Telecom Cover BT; Inspection Cover (Comms) IC/COM; Cable TV CATV; Inspection Cover Traffic Signals IC/TL; Gully G; Kerb Outlet KO; Mercury Cable Cover MC; Vent Pipe VP; Down Pipe DP; Rain Water Pipe RWP; Soil Pipe SVP; Gas Pipe G-PIPE; Unable to lift cover UTL; Stop Tap ST; Stop Valve SV; Lamphole LH; Hydrant HYD; Earth Rod ER; Gas Valve GV; Water Meter WM; Washout WO; Rodding Eye RE

GEOTECHNICAL INFORMATION: Borehole BH; Trial Pit TP; Monitor Pin MON; Probe Hole PH; Window Sample WS

GENERAL INFORMATION: Petrol Pump PP; Basement Light BL; Footbridge FB; Dish Type Channel D.CH; Slot Type Channel S.CH; Grate Type Channel G.CH; Tactile Paving TAC; Crash Barrier C/BR; Column COL; Stanchion STAN; Car Vacuum VAC; Offset Fill OF; Air Valve AV; Trough TR; Chimney CHY; Telephone Call Box TCB

OVERHEAD FEATURES: Electricity Pylon E.PYLON; Electricity ETL; Telephone OTL

WATER FEATURES: Canal; Stream; Ditch; Weir; Culvert (C Cul); Grip (Land Drain); Spring SPR

RELIEF AND VEGETATION: Hedge; Edge of wood/Bushes; Stump STUMP; Individual Tree; Slopes with Height Greater than 1m; Cliff Face; Marsh; Reeds

LEVEL AND HEIGHT INFORMATION: Standard Spot Height +123.45; Precision Spot Height +123.456; Bed Level +BL23.92; Water Level +WL24.92; Soffit Level +SL25.92; Threshold Level +TH26.98; Cover Level +CL26.45; Invert Level +IL25.15; Pipe Soffit Level +PSL5.00; Floor Level +FL6.00; Finished Floor Level +FFL6.00; Top of Tank Level +TT7.00; Eave Level +EL7.00; Ridge Level +RL9.00; Roof Hip Level +RHL8.50; Flat Roof Level +FRL7.00; Top of Canopy Level +TOP/C7.00; Underside of Canopy Level +SOF/C6.50; Window Sill Level +WSL8.00; Window Head Level +WHL9.00; Springing Level +SPL8.50; Arch Level +AL7.00; Cable Level +CHT8.55; Top of Wall Level +TWL10.00; Underside of Beam Level +UBL9.55; General Height +HT9.00

SURVEY INFORMATION SIGNS: Permanent Ground Marker; O.S. Trig Station; O.S. Bench Mark

Sheet Index

Rev.	Date	Description
A	06/06/23	Additional CCTV information added

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CHARTERED LAND SURVEYORS

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www.malcolmhughes.co.uk
survey@mhls.co.uk

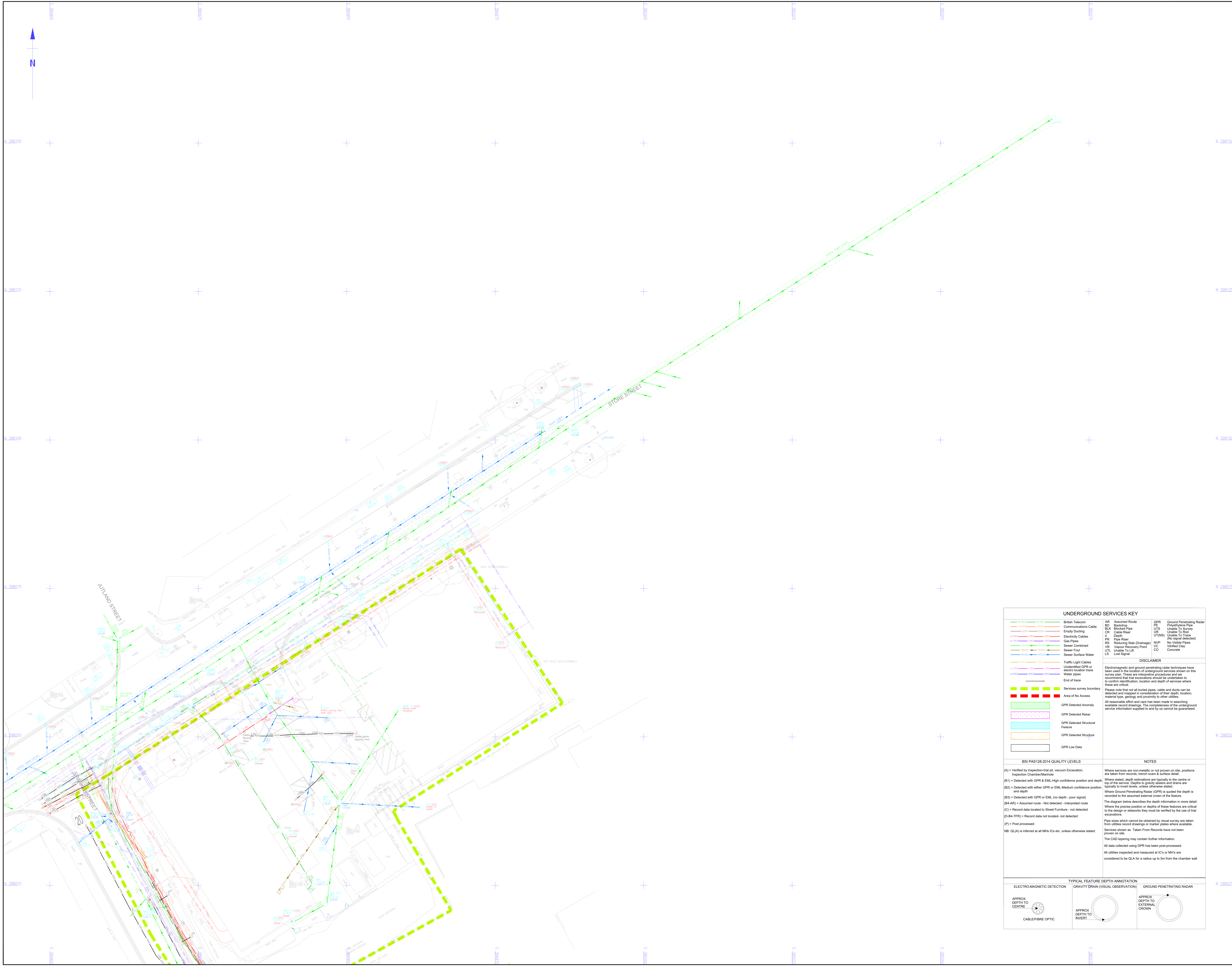
Accreditations: RICS; THE SURVEY ASSOCIATION; chartered ices; RIBOS QUALIFIED; bsi ISO 9001 Quality Management FS 14126

Client
Central and Urban Management Limited
Delta Place, 27 Bath Road
Cheltenham GL53 7TH

Project
Sparkle Street
Manchester M1 2NA

Drawing Title
Utility Survey
Sheet 1/2

Drawn By	IV	25/05/23	Survey Date	APRIL 2023
Checked by	CR	25/05/23	Scale	A0@1:200
Drawing No	60159/UG1		Revision	A



Survey Notes

Grid: Local Plane Grid fixed to National Grid at Survey Control Station SC1

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Related to job 59157

Topographical Survey Legend

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SURVEY INFORMATION SIGNS
Permanent Ground Marker; O.S. Trig Station; O.S. Bench Mark

Sheet Index

UNDERGROUND SERVICES KEY

Line	Service
TEL(B2)	British Telecom
COM(B2)	Communications Cable
ED(B2)	Empty Ducting
E(B2)	Electricity Cables
G(B2)	Gas Pipes
CWS(B2)	Sewer Combined
FWS(B2)	Sewer Foul
SWS(B2)	Sewer Surface Water
TL(B2)	Traffic Light Cables
U(B2)	Unidentified GPR or electro location trace
W(B2)	Water pipes
	End of trace
	Services survey boundary
	Area of No Access
	GPR Detected Anomaly
	GPR Detected Rebar
	GPR Detected Structural Feature
	GPR Detected Structure
	GPR Low Data

AR	Assumed Route	GPR	Ground Penetrating Radar
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GRAVITY DRAIN (VISUAL OBSERVATION): APPROX DEPTH TO INVERT
GROUND PENETRATING RADAR: APPROX DEPTH TO EXTERNAL CROWN

Rev.	Date	Description
A	06/06/23	Additional CCTV information added

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www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS; The Survey Association; chartered ices; FS 14126

Client
Central and Urban Management Limited
Delta Place, 27 Bath Road
Cheltenham GL53 7TH

Project
Sparkle Street
Manchester M1 2NA

Drawing Title
Utility Survey
Sheet 2/2

Drawn By	IV	25/05/23	Survey Date	APRIL 2023
Checked by	CR	25/05/23	Scale	A0@1:200

Drawing No: 60159/UG2 — Revision: A

Appendix E

Topographical Survey



Survey Notes
Grid: Local Plane Grid fixed to National Grid at Survey Control Station SC1
Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes
Extension to drawing "59157 2D TOPO RevB (25-10-22)"- additional survey information

Topographical Survey Legend

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SURVEY INFORMATION SIGNS
Permanent Ground Marker; O.S. Trig Station; O.S. Bench Mark

Sheet Index

Rev.	Date	Description

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Cheltenham GL53 7TH

Project
Sparkle Street
Manchester M1 2NA

Drawing Title
Topographical Survey
Sheet 1/1

Drawn By	YW	02/05/23	Survey Date	APRIL 2023
Checked by	ER	02/05/23	Scale	A0@1:200

Drawing No 60159/1 Revision

Appendix F

Environment Agency Flood Map for Planning

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**384949/398043**	**6 Jul 2023 21:14**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

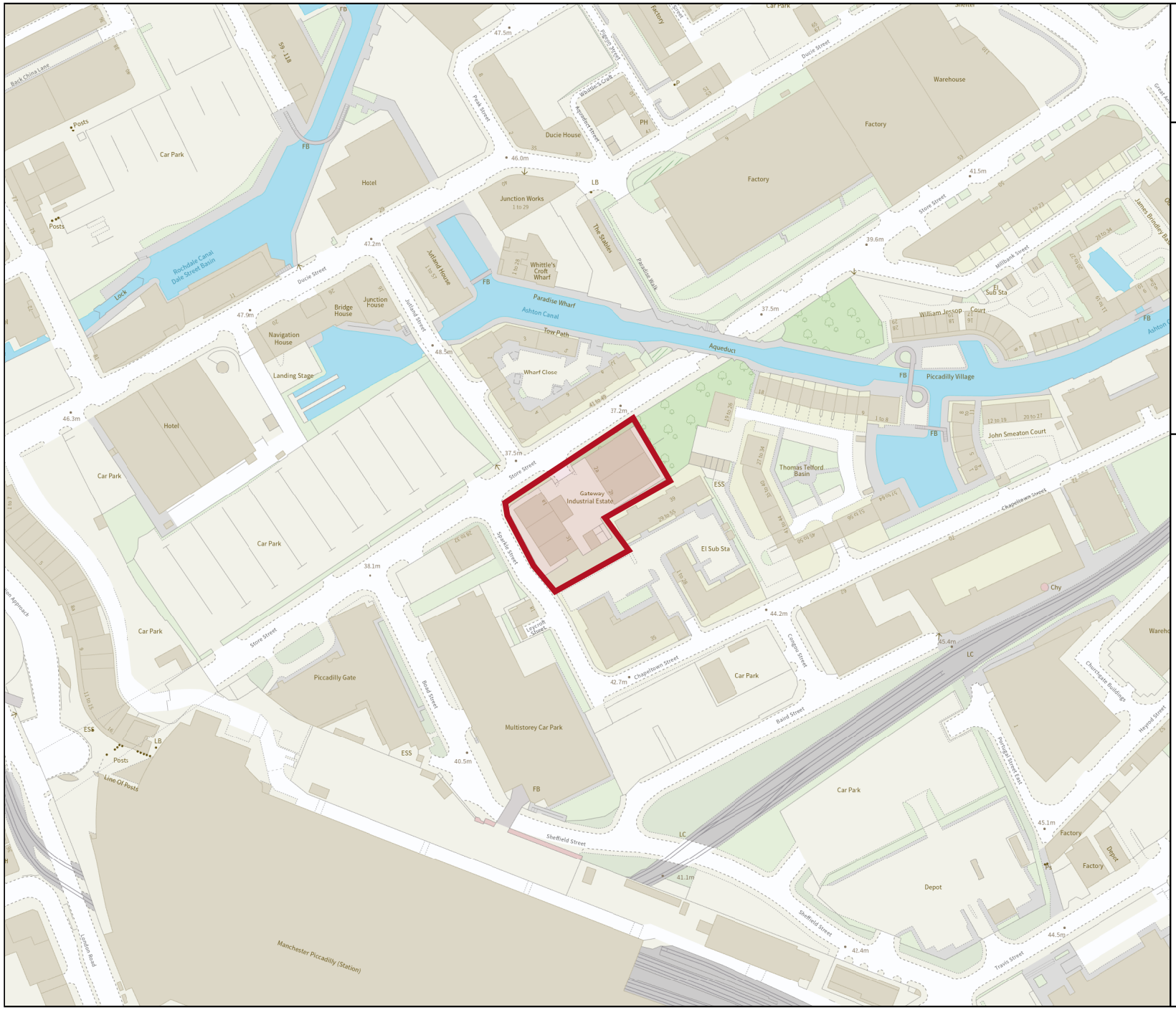
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. https://flood-map-for-planning.service.gov.uk/os-terms



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
384949/398043

Scale
1:2500

Created
6 Jul 2023 21:14

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

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Appendix G

Existing Surface Water Drainage Calculations – 1, 30, 100 Year

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

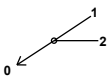
Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
EX06	0.022	5.00	37.990	1200	384946.413	398021.754	1.070
EX05	0.173	5.00	37.870	1200	384948.723	398038.990	1.280
EX04	0.024	5.00	37.660	1200	384937.021	398055.843	1.130
UU9101		5.00	36.860	2450	384987.662	398102.251	4.210
OF			37.350		384931.965	398065.316	5.025
UU9005			37.410	2450	384925.957	398061.398	5.120

Links (Input)

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	EX06	EX05	17.390	0.600	36.920	36.790	0.130	133.8	100	5.39	45.1
1.001	EX05	EX04	20.517	0.600	36.590	36.530	0.060	342.0	300	5.74	43.9
1.002	EX04	OF	10.740	0.600	36.530	33.525	3.005	3.6	300	5.91	43.3
2.000	UU9101	OF	66.831	0.600	32.650	32.325	0.325	205.6	1550	5.37	45.2
1.003	OF	UU9005	7.173	0.600	32.325	32.290	0.035	205.6	1550	5.95	43.2

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EX06	384946.413	398021.754	37.990	1.070	1200				
						0	1.000	36.920	100
EX05	384948.723	398038.990	37.870	1.280	1200		1.000	36.790	100
						0	1.001	36.590	300
EX04	384937.021	398055.843	37.660	1.130	1200		1.001	36.530	300
						0	1.002	36.530	300
UU9101	384987.662	398102.251	36.860	4.210	2450				
						0	2.000	32.650	1550
OF	384931.965	398065.316	37.350	5.025			1 2	2.000 1.002	32.325 33.525	1550 300
						0	1.003	32.325	1550

Flow+ v10.2 Copyright © 1988-2023 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
UU9005	384925.957	398061.398	37.410	5.120	2450	1 	1.003	32.290	1550

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	17.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

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

Node UU9005 Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	2.550	300	2.550	600	2.550	900	2.550	1200	2.550
60	2.550	360	2.550	660	2.550	960	2.550	1260	2.550
120	2.550	420	2.550	720	2.550	1020	2.550	1320	2.550
180	2.550	480	2.550	780	2.550	1080	2.550	1380	2.550
240	2.550	540	2.550	840	2.550	1140	2.550	1440	2.550

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	92.521	26.180	1 year 1440 minute summer	4.127	1.106
1 year 30 minute summer	60.022	16.984	30 year 15 minute summer	226.195	64.005
1 year 60 minute summer	40.398	10.676	30 year 30 minute summer	147.452	41.724
1 year 120 minute summer	24.980	6.602	30 year 60 minute summer	98.615	26.061
1 year 180 minute summer	19.271	4.959	30 year 120 minute summer	59.946	15.842
1 year 240 minute summer	15.301	4.043	30 year 180 minute summer	45.598	11.734
1 year 360 minute summer	11.775	3.030	30 year 240 minute summer	35.759	9.450
1 year 480 minute summer	9.342	2.469	30 year 360 minute summer	26.939	6.932
1 year 600 minute summer	7.682	2.101	30 year 480 minute summer	20.981	5.545
1 year 720 minute summer	6.859	1.838	30 year 600 minute summer	17.039	4.661
1 year 960 minute summer	5.653	1.489	30 year 720 minute summer	15.093	4.045

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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 960 minute summer	12.278	3.233	100 year 240 minute summer	46.975	12.414
30 year 1440 minute summer	8.788	2.355	100 year 360 minute summer	35.264	9.075
100 year 15 minute summer	291.766	82.560	100 year 480 minute summer	27.350	7.228
100 year 30 minute summer	191.982	54.324	100 year 600 minute summer	22.137	6.055
100 year 60 minute summer	129.253	34.158	100 year 720 minute summer	19.562	5.243
100 year 120 minute summer	78.836	20.834	100 year 960 minute summer	15.851	4.174
100 year 180 minute summer	59.966	15.431	100 year 1440 minute summer	11.278	3.023

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Results for 1 year Critical Storm Duration. Lowest mass balance: 96.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX06	11	36.969	0.049	2.5	0.0758	0.0000	OK
15 minute summer	EX05	10	36.715	0.125	22.0	0.4792	0.0000	OK
15 minute summer	EX04	10	36.572	0.042	24.3	0.0655	0.0000	OK
1440 minute summer	UU9101	1680	32.984	0.334	0.9	1.5752	0.0000	OK
1440 minute summer	OF	1650	32.984	0.659	1.9	0.0000	0.0000	OK
15 minute summer	UU9005	1	34.840	2.550	0.0	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 summer	EX06	1.000	EX05	2.4	0.646	0.468	0.0655	
15 minute summer	EX05	1.001	EX04	21.6	1.353	0.362	0.3471	
15 minute summer	EX04	1.002	OF	24.2	4.124	0.041	0.0631	
1440 minute summer	UU9101	2.000	OF	-0.9	-0.004	0.000	35.3835	
1440 minute summer	OF	1.003	UU9005	0.0	0.000	0.000	9.4737	0.0

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Results for 30 year Critical Storm Duration. Lowest mass balance: 96.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX06	11	37.030	0.110	6.1	0.1694	0.0000	SURCHARGED
15 minute summer	EX05	10	36.791	0.201	53.3	0.7693	0.0000	OK
15 minute summer	EX04	10	36.596	0.066	59.3	0.1026	0.0000	OK
1440 minute summer	UU9101	1680	33.447	0.797	1.9	3.7584	0.0000	OK
1440 minute summer	OF	1680	33.447	1.122	4.0	0.0000	0.0000	OK
15 minute summer	UU9005	1	34.840	2.550	0.0	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 summer	EX06	1.000	EX05	5.7	0.759	1.093	0.1245	
15 minute summer	EX05	1.001	EX04	52.7	1.740	0.882	0.6325	
15 minute summer	EX04	1.002	OF	59.1	5.314	0.100	0.1194	
1440 minute summer	UU9101	2.000	OF	-1.9	-0.004	0.000	81.2980	
1440 minute summer	OF	1.003	UU9005	0.0	0.000	0.000	11.9726	0.0

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Results for 100 year Critical Storm Duration. Lowest mass balance: 96.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX06	11	37.113	0.193	7.8	0.2971	0.0000	SURCHARGED
15 minute summer	EX05	10	36.824	0.234	68.2	0.8953	0.0000	OK
15 minute summer	EX04	10	36.605	0.075	75.9	0.1167	0.0000	OK
1440 minute summer	UU9101	1680	33.748	1.098	2.6	5.1770	0.0000	OK
1440 minute summer	OF	1680	33.748	1.423	5.2	0.0000	0.0000	OK
15 minute summer	UU9005	1	34.840	2.550	0.0	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 summer	EX06	1.000	EX05	6.9	0.895	1.334	0.1294	
15 minute summer	EX05	1.001	EX04	67.4	1.848	1.128	0.7462	
15 minute summer	EX04	1.002	OF	75.6	5.686	0.128	0.1429	
1440 minute summer	UU9101	2.000	OF	-2.6	-0.003	0.000	108.0204	
1440 minute summer	OF	1.003	UU9005	0.0	0.000	0.000	13.2255	0.0

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Appendix H

United Utilities Correspondence

Manchester LLFA Correspondence

Chloé Grimsley

From: seweradoptions@uuplc.co.uk
Sent: 06 July 2023 10:24
To: Chloé Grimsley
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Good Morning Chloe,

Thank you for your email – I have sent you a MS Teams request for Monday afternoon.

I look forward to discussing further.

Regards

Anthony

United Utilities
Water for the North West

[redacted]

unitedutilities.com

---------- Original Message ----------
From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 05/07/2023 14:59
[redacted]
Subject: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Good Afternon Chloe

Thank you for your enquiry for site Land at Sparkle Street/Store Street, Manchester, M1 2WA, Reference 04015363 , this has been logged with Anthony Laithwaite his contact number is [redacted] should no need to speak to him

Kind Regards

Amanda Harding
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 233186
Tel: 0345 072 6067
unitedutilities.com

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---------- Original Message ----------
From: Chloé Grimsley [redacted]
Sent: 04/07/2023 20:27
To: seweradoptions@uuplc.co.uk
Cc: [redacted]
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Hi Anthony,

Thanks for your comments below.

With regards to the existing sewer, the surveyor has been back to site and cleared the drain confirming that the pipe is fully capped off.

I'm awaiting the camera footage but expect this to be back within the next day or so. Is it possible to schedule a call say Friday 7th, Monday 10th or Tuesday 11th to review? I'm keen to close this out asap as were looking at planning submission by 14th July.

I'm currently free:

Friday 12-4pm

Monday 1.30-4pm

Tuesday 10-4pm.

Kind Regards,

Chloé

Chloé Grimsley
Principal Civil Engineer
[redacted]

[redacted]

Hi Chloe,

Thank you for the information, please see comments below:

Land at Sparkle Street/Store Street, Manchester, M1 2WA

Surface Water Flows:

Should SuDS systems be ruled out then the new development must discharge to either the 900dia public surface water sewer or culverted watercourse upstream (consent would be required from the LLFA for the watercourse) in regards to flow rates a 50% betterment should be provided to that of the existing run off

Existing Sewer:

The capped off section is concerning, as this was not an activity completed by United Utilities we have no clarity that the length of sewer in question is not catering for any blind connections, water could easily drain through the rubble that has been used for the cap.

The length of sewer in question will need further investigation works to understand its location and if there are any live connections, should the sewer be proven to not serve anything we would be happy to remove this from the sewer records following our abandonment process

As per our discussions it has also become clear that the sewer arrangement further upstream of the asset in question is not as per the Public Sewer records - once a full understanding of the sewers are understood we can arrange for the records to be updated correctly via the abandonment process.

Regards

Anthony

Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services
[redacted]

---------- Original Message ----------
From: Chloé Grimsley [redacted]
Sent: 14/06/2023 19:45
To: wastewaterdeveloperservices@uuplc.co.uk
[redacted]
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

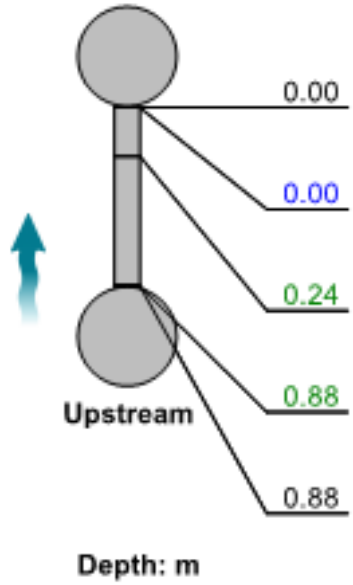
Hi Anthony,

Thanks for your time again today.

Please see below link to the footage for the capped connection. It actually looks like a backdrop that has been capped and looks like there is material in the pipe where we originally thought the cap was.

Please let me know what you think and whether this gives you confidence now that the cap is in place.

https://we.tl/t-ZsGJY0Z8fZ

Scale: 1:50	Position [m]	Code	Observation	Grade
Depth: m MH03				
	0.00	MH	Start node, manhole, reference: MH03	
	0.00	WL	Water level, 5% of the vertical dimension	
	0.24	DEC	Settled deposits, hard or compacted, 40% cross-sectional area loss	4
	0.88	LU	Line deviates up	
	0.88	OCF	Finish node, other special chamber, reference: Upstream: Looks to be capped	
Depth: m				

.

In terms of discharge to the watercourse/surface water sewer, as discussed at the last meeting a 50% reduction on brownfield rates up is required to the 1 in 30 year brownfield rate.

We are in the process of modelling the existing network but will propose:

1 year flow – equivalent 50% existing brownfield **1 year** flow

30 year flow – equivalent 50% existing brownfield **30 year** flow

100 year flow – equivalent 50% existing brownfield **30 year** flow

Kind Regards,

Chloé

[redacted]

[redacted]

Good Morning

Your teams meeting request has been logged with Anthony our engineer he will respond to you on or before 24.05.2023.

Kind Regards Lucie

Lucie Gaskell
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 429037
Tel: 0345 072 6067
unitedutilities.com

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[redacted]

Morning Anthony,

Thank you for your comments below.

I have tried to call you this morning, hopefully to setup a team call next week. I have some survey information which I think would be useful to share with you as it indicates the sewer on site is capped.

If possible, could you let me know if you have availability within the below times and I will set something up. 30mins should suffice.

Monday 22nd – 2-4pm

Wednesday 24th 9-1pm

Friday 26th 9-4pm.

Thanks

Chloé

[redacted]

[redacted]

Good Afternoon Chloe,

Thank you for your Pre Development Enquiry, please see our response to your specific questions below:

Land at Sparkle Street/Store Street, Manchester, M1 2WA

Existing Combined Sewer:

The required easement for the 300 x 400 sewer would be 3m either side from the centre line of the sewer, building within this strip or over the sewer would not be permitted due to its criticality.

Should a diversion be required we would need to be provided with a rough high level mock-up of your proposals, this could then be reviewed internally and a decision made if this would be a UU or Developer led diversion, I would recommend once you understand more following the CCTV and survey work that you contact me to discuss

Foul Connection:

There is no objection to connecting to the public combined sewer in Store Street

Surface Water:

Should SuDS systems be ruled out then the new development must discharge to either the 900dia public surface water sewer or culverted watercourse upstream (consent would be required from the LLFA for the watercourse) in regards to flow rates a 50% betterment should be provided to that of the existing run off.

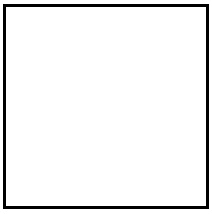
I also note your email regarding a meeting, unfortunately this week my calendar is full however if you would like to discuss this further please contact me and we can arrange a suitable date.

Regards

Anthony

United Utilities
Water for the North West

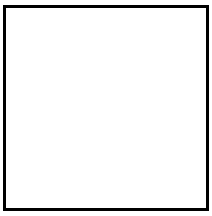
Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services
[redacted]

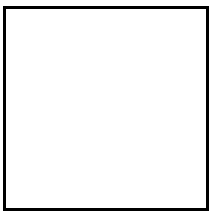


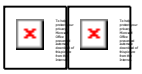
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Chloé Grimsley

From: Chloé Grimsley
Sent: 21 June 2023 10:06
To: seweradoptions@uuplc.co.uk
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA
Attachments: Existing Brownfield Runoff Model and Results.pdf; Malcolm Hughes Land Surveyors Ltd - Sparkle Street - PJ00478370 - Plan.pdf

Good Morning Anthony,

Just to update you on the above scheme, we have instructed further cleaning of the 'capped line' and will re-camera this line. Hopefully this will be completed in the next week or so.

With regards to the proposed surface water, we have now modelled the existing drainage system and the likely flows discharging based on the catchments currently draining are:
1 year = 24.2 l/s
30 Year = 59.1 l/s
100 Year = 75.6 l/s

Therefore, proposed flows will be restricted as follows:
1 year = 12.1 l/s
30 Year = 29.6 l/s
100 Year +45% climate change = 29.6 l/s

Kind Regards,
Chloé

[redacted]

Hi Chloe,

Thank you for the information, please see comments below:

Land at Sparkle Street/Store Street, Manchester, M1 2WA

Surface Water Flows:

Should SuDS systems be ruled out then the new development must discharge to either the 900dia public surface water sewer or culverted watercourse upstream (consent would be required from the LLFA for the watercourse) in regards to flow rates a 50% betterment should be provided to that of the existing run off

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Regards

Anthony

Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services
[redacted]

---------- Original Message ----------

[redacted]

Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

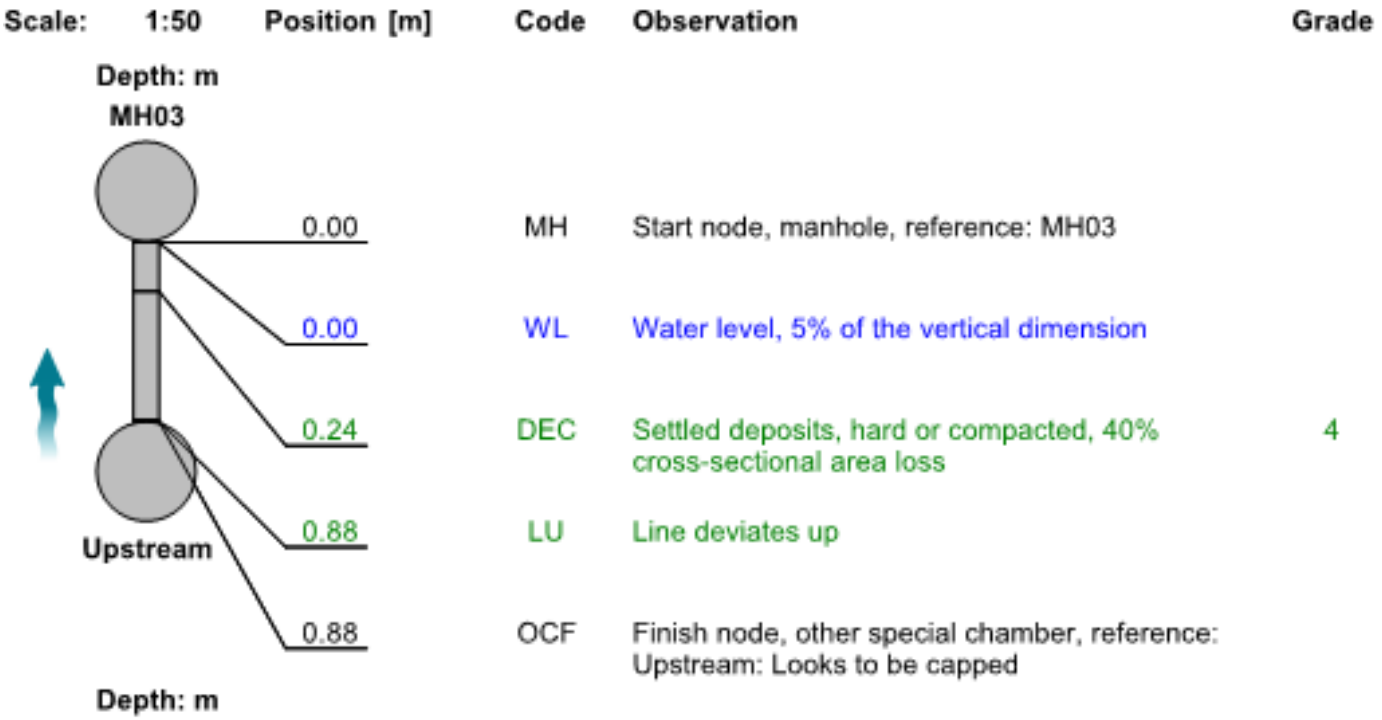
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100 year flow – equivalent 50% existing brownfield **30 year** flow

Kind Regards,

Chloé

[redacted]

[redacted]

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Kind Regards Lucie

Lucie Gaskell
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 429037
Tel: 0345 072 6067
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---------- Original Message ----------

[redacted]

Morning Anthony,

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Friday 26th 9-4pm.

Thanks

Chloé

[redacted]

[redacted]

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Land at Sparkle Street/Store Street, Manchester, M1 2WA

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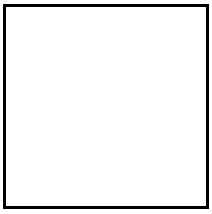
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Regards

Anthony

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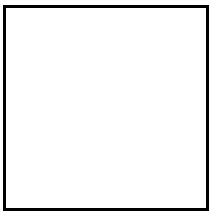
Anthony Laithwaite
Ww Lead - ICS / Portal Project
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[redacted]

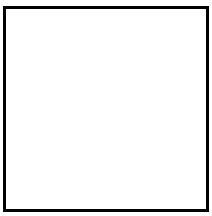


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Chloé Grimsley

From: seweradoptions@uuplc.co.uk
Sent: 10 July 2023 16:02
To: Chloé Grimsley
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Hi Chloe,

As discussed I can see that the sewer is capped from the CCTV, can you please submit a formal Section 116 for full full technical assessment.

Regards

Anthony

---------- Original Message ----------
From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 07/07/2023 14:28
[redacted]
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Thanks Chloe,

I look forward to the meeting - have a good weekend :)

Anthony

[redacted]
Sent: 06/07/2023 16:03
To: seweradoptions@uuplc.co.uk
[redacted]
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Hi Anthony,

In advance Of Mondays meeting, please see below and attached manhole images, report (and a link to the footage) which has been taken following jetting out of the line which previously contained the debris.

The main line and dropper appears to be concrete capped.

https://we.tl/t-DbNIsQyh4E





Kind Regards

Chloé Grimsley
Principal Civil Engineer

[redacted]

From: Chloé Grimsley
Sent: Thursday, July 6, 2023 10:27 AM
To: seweradoptions@uuplc.co.uk
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Thanks Anthony

Chloé Grimsley
Principal Civil Engineer
[redacted]

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Thursday, July 6, 2023 10:24 AM
[redacted]>
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Good Morning Chloe,

Thank you for your email – I have sent you a MS Teams request for Monday afternoon.

I look forward to discussing further.

Regards

Anthony

United Utilities
Water for the North West

Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services

[redacted]
unitedutilities.com

---------- Original Message ----------
From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 05/07/2023 14:59
To: [redacted]
Subject: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Good Afternon Chloe

Thank you for your enquiry for site Land at Sparkle Street/Store Street, Manchester, M1 2WA, Reference 04015363 , this has been logged with Anthony Laithwaite his contact number is [redacted] should no need to speak to him

Kind Regards

United Utilities
Water for the North West

Amanda Harding
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 233186
Tel: 0345 072 6067
unitedutilities.com

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---------- Original Message ----------

[redacted]

Hi Anthony,

Thanks for your comments below.

With regards to the existing sewer, the surveyor has been back to site and cleared the drain confirming that the pipe is fully capped off.

I'm awaiting the camera footage but expect this to be back within the next day or so. Is it possible to schedule a call say Friday 7th, Monday 10th or Tuesday 11th to review? I'm keen to close this out asap as were looking at planning submission by 14th July.

I'm currently free:

Friday 12-4pm

Monday 1.30-4pm

Tuesday 10-4pm.

Kind Regards,

Chloé

Chloé Grimsley
Principal Civil Engineer

[redacted]

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Friday, June 16, 2023 11:52 AM
[redacted]
Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Hi Chloe,

Thank you for the information, please see comments below:

Land at Sparkle Street/Store Street, Manchester, M1 2WA

Surface Water Flows:

Should SuDS systems be ruled out then the new development must discharge to either the 900dia public surface water sewer or culverted watercourse upstream (consent would be required from the LLFA for the watercourse) in regards to flow rates a 50% betterment should be provided to that of the existing run off

Existing Sewer:

The capped off section is concerning, as this was not an activity completed by United Utilities we have no clarity that the length of sewer in question is not catering for any blind connections, water could easily drain through the rubble that has been used for the cap.

The length of sewer in question will need further investigation works to understand its location and if there are any live connections, should the sewer be proven to not serve anything we would be happy to remove this from the

sewer records following our abandonment process

As per our discussions it has also become clear that the sewer arrangement further upstream of the asset in question is not as per the Public Sewer records - once a full understanding of the sewers are understood we can arrange for the records to be updated correctly via the abandonment process.

Regards

Anthony

Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services
[redacted]

[redacted]

Subject: RE: UU REF - 04015363 Land at Sparkle Street/Store Street, Manchester, M1 2WA

Hi Anthony,

Thanks for your time again today.

Please see below link to the footage for the capped connection. It actually looks like a backdrop that has been capped and looks like there is material in the pipe where we originally thought the cap was.

Please let me know what you think and whether this gives you confidence now that the cap is in place.

https://we.tl/t-ZsGJY0Z8fZ

Scale: 1:50	Position [m]	Code	Observation	Grade
Depth: m MH03				
	0.00	MH	Start node, manhole, reference: MH03	
	0.00	WL	Water level, 5% of the vertical dimension	
	0.24	DEC	Settled deposits, hard or compacted, 40% cross-sectional area loss	4
Upstream	0.88	LU	Line deviates up	
	0.88	OCF	Finish node, other special chamber, reference: Upstream: Looks to be capped	
Depth: m				

.

In terms of discharge to the watercourse/surface water sewer, as discussed at the last meeting a 50% reduction on brownfield rates up is required to the 1 in 30 year brownfield rate.

We are in the process of modelling the existing network but will propose:

1 year flow – equivalent 50% existing brownfield **1 year** flow

30 year flow – equivalent 50% existing brownfield **30 year** flow

100 year flow – equivalent 50% existing brownfield **30 year** flow

Kind Regards,

Chloé

[redacted]

[redacted]

Good Morning

Your teams meeting request has been logged with Anthony our engineer he will respond to you on or before 24.05.2023.

Kind Regards Lucie

Lucie Gaskell
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 429037
Tel: 0345 072 6067
unitedutilities.com

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[redacted]

Morning Anthony,

Thank you for your comments below.

I have tried to call you this morning, hopefully to setup a team call next week. I have some survey information which I think would be useful to share with you as it indicates the sewer on site is capped.

If possible, could you let me know if you have availability within the below times and I will set something up. 30mins should suffice.

Monday 22nd – 2-4pm

Wednesday 24th 9-1pm

Friday 26th 9-4pm.

Thanks

Chloé

[redacted]

[redacted]

Good Afternoon Chloe,

Thank you for your Pre Development Enquiry, please see our response to your specific questions below:

Land at Sparkle Street/Store Street, Manchester, M1 2WA

Existing Combined Sewer:

The required easement for the 300 x 400 sewer would be 3m either side from the centre line of the sewer, building within this strip or over the sewer would not be permitted due to its criticality.

Should a diversion be required we would need to be provided with a rough high level mock-up of your proposals, this could then be reviewed internally and a decision made if this would be a UU or Developer led diversion, I would recommend once you understand more following the CCTV and survey work that you contact me to discuss

Foul Connection:

There is no objection to connecting to the public combined sewer in Store Street

Surface Water:

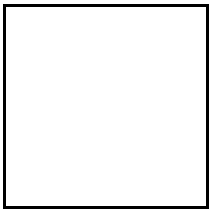
Should SuDS systems be ruled out then the new development must discharge to either the 900dia public surface water sewer or culverted watercourse upstream (consent would be required from the LLFA for the watercourse) in regards to flow rates a 50% betterment should be provided to that of the existing run off.

I also note your email regarding a meeting, unfortunately this week my calendar is full however if you would like to discuss this further please contact me and we can arrange a suitable date.

Regards

Anthony

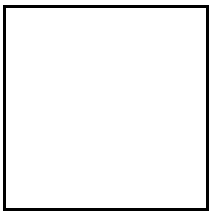
[redacted]
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services
[redacted]

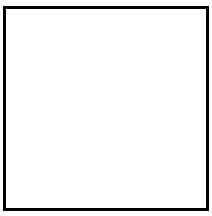


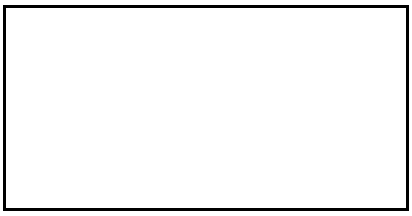
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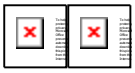
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Chloé Grimsley

From: Laura Peacock <[redacted]>
Sent: 05 May 2023 09:36
To: Chloé Grimsley; Talha Esmail
Subject: RE: Pre-Planning Advice

Good Morning Chloé,

Thank you for your emails, I hope you're well and apologies for the delay in response.

This inbox is still the correct address. Unfortunately we have had to suspend pre-app consultations at the moment, unless there is specific direction from the MCC planning officer that something is required. This is due to the volume of live planning applications currently allocated to us.

This should now be in the auto-response generated by the inbox, but it may not have been there when you sent your earlier enquiry.

Apologies for the inconvenience at this time,

Kind Regards,
Laura

Laura Peacock
Flood Risk Engineer – LLFA

Highways Service,
Growth and Neighbourhoods Directorate
Manchester City Council
PO Box 532
Town Hall
Manchester
M60 2LA
Web: http://www.manchester.gov.uk
****
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[redacted]

Sent: 05 May 2023 08:50
[redacted]>
Cc: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Subject: RE: Pre-Planning Advice

Some people who received this message don't often get email from chloe.grimsley@curtins.com. Learn why this is important

Good Morning Laura/Talha,

Please could you confirm my queries in the email below.

I'm looking to submit an enquiry next week for site at Sparkle Street/Store Street, Manchester City Centre and there is a culverted watercourse in the adjacent highway (Store Street) so we would need consultation advice if we can connect surface water to the culvert. I just want to make sure we are sending through enquiries correctly.

Kind Regards,
Chloé

[redacted]

Subject: Pre-Planning Advice

Good Afternoon Laura/Talha,

I hope you are both well?

I'm just enquiring in general regarding pre-planning advice and if we are still approaching for advice correctly.

I have issued an enquiry on a site at Granby Row a couple of weeks back but didn't receive any responses so wondered if the process may have changed.

We are currently looking at a new site at Sparkle Street, Manchester so would like to get our pre-application requests in soon so it would be good to understand if the process has changed?
We are currently issuing email requests to floodriskmanagement@manchester.gov.uk

Kind Regards,
Chloé

[redacted]

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Chloé Grimsley

From: Chloé Grimsley
Sent: 10 May 2023 20:41
To: floodriskmanagement@manchester.gov.uk
Subject: Sparkle Street/Store, Manchester

Good Afternoon,

We are currently in the early stages of preparing a Flood Risk Assessment and Drainage Strategy for a new development site located on Sparkle Street/Store Street, Manchester.
Proposals are currently for a new residential scheme consisting of an apartment block with basement level plus 27 storeys.

Please see below location and the nearest postcode is M1 2WA:



The existing site is developed and there is likely to be drainage present on site. A GPR and CCTV Drainage Survey has been commissioned however this has not yet been completed. Following receipt of the surveys we will review whether any of the drainage on site can be utilised, however at this stage we will assume that new connections off site will be required.

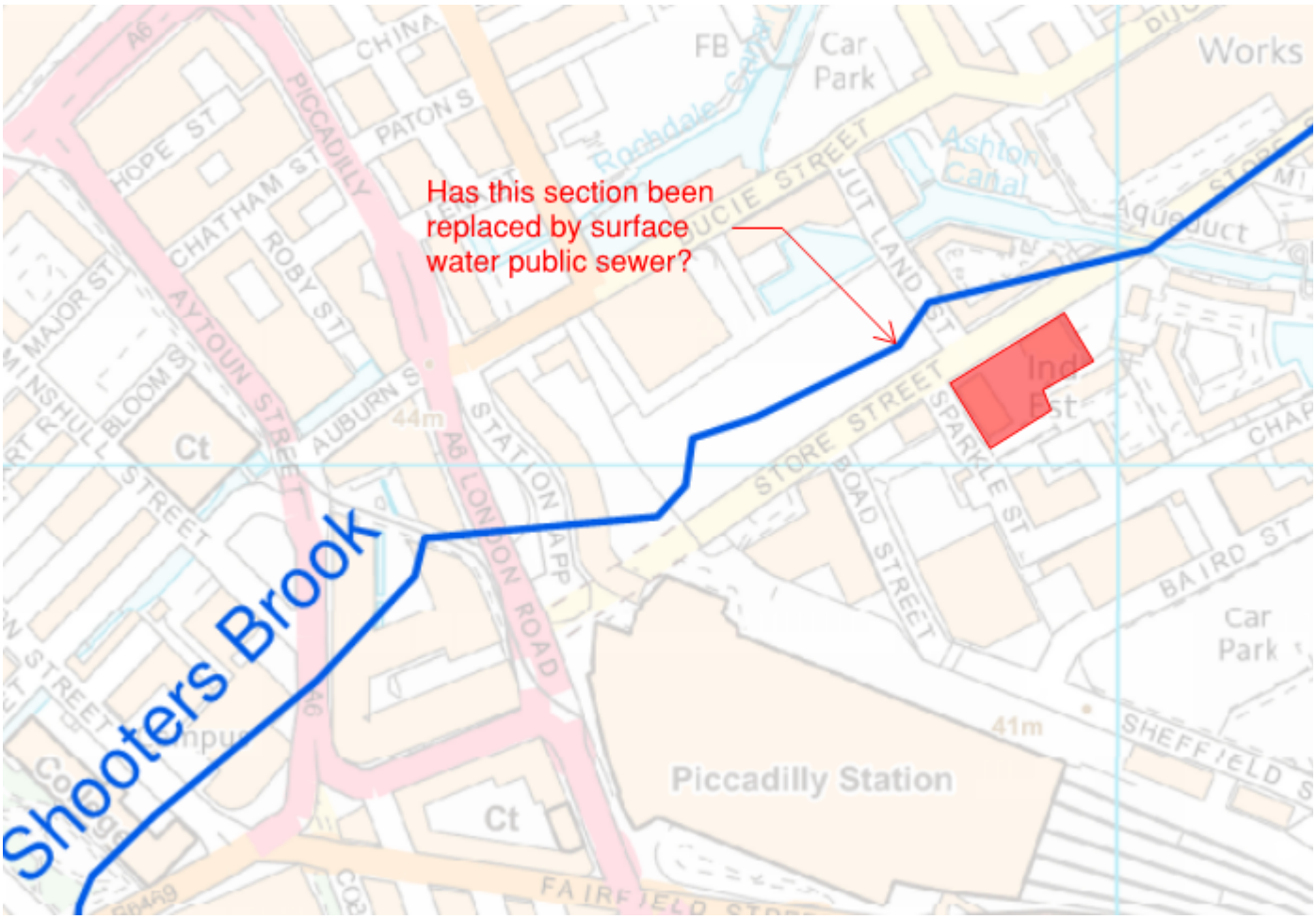
We have assessed the discharge of surface water in accordance with the SuDS Hierarchy:

Infiltration
Intrusive Site Investigations have not yet been undertaken, however based on the BGS Data, it suggests that the site is underlain by Superficial deposits – Glacial Till (Diamicton) and Bedrock – Chester Formation (Sandstone).
BGS Nearby boreholes suggest the area is made ground over clays and sandstone. Groundwater levels are also unconfirmed.
Based on the development proposals, it is unlikely that there will be sufficient space on site to infiltrate with minimum offsets from boundaries and proposed building foundations in excess of 5m.

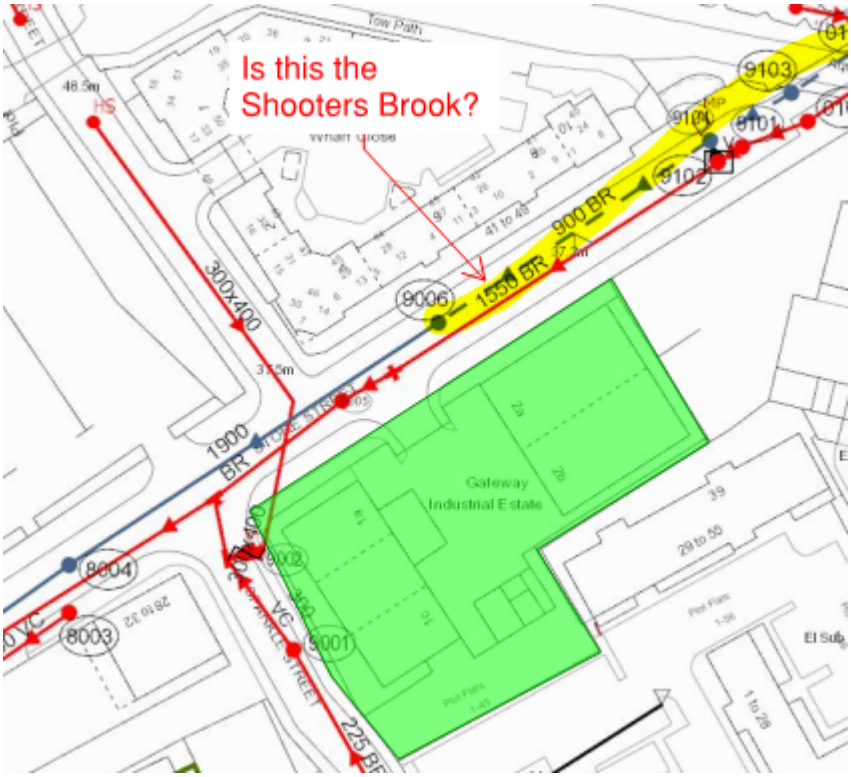
Based on this information, infiltration is not currently proposed as a viable solution for discharge, however further assessment will be undertaken following completion of intrusive site investigation works.

Watercourse
Based on MCC Records, it appears that the Shooters Brook is located in Store Street. However, based on the UU records, they indicate that the Shooters Brook terminates mid-way along Store Street where this has been replaced by a surface water public sewer (at manhole UU reference 9006). See below extracts:

MCC Watercourse Records



UU Sewer Records



Please could you confirm this is correct?

Based on the site layout, connection would be preferable along the eastern boundary, which would require a direct connection to the culverted watercourse (upstream of UU manhole 9006). We would therefore seek approval to discharge to the culverted watercourse via land drainage consent – subject to surveys confirming whether there is an existing connection which could be utilised.



Surface Water Sewer

As there is a culverted watercourse located in Store Street, it is assumed that levels will allow a connection to the watercourse (subject to surveys) connection to the surface water sewer system has therefore been discounted, although it is noted that the watercourse appears to connect to the surface water sewer downstream of our site. We have issued an enquiry with UU regarding this.

Combined Sewer
As there is a culverted watercourse located in Store Street, it is assumed that levels will allow a connection to the watercourse (subject to surveys) connection to the combined sewer system has therefore been discounted.

Based on the above, we are therefore proposing to connect to the culverted watercourse (Shooters Brook) within Store Street. Please could you confirm if a 50% reduction of brownfield rates could be applied or if any further limitation is necessary?

Please could you provide any further advice or information which would need to be addressed within the FRA/Drainage Strategy Report.

Kind Regards,
Chloé

[redacted]

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Appendix J

Proposed Surface Water Calculations – 1, 30, 100 Year +45% cc

Proposed Surface Water Calculations – 100 Year +45% cc with Surcharged Outfall Check

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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	0.750	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.	0.045	5.00	41.750	600	384951.538	398020.635	1.450
S2	0.015	5.00	41.750	600	384958.049	398024.771	1.654
S3	0.110	5.00	41.750	600	384950.066	398037.337	1.818
S4	0.087	5.00	41.750	1500	384963.028	398045.571	1.910
S5	0.086	10.00	41.750	1200	384963.611	398047.865	1.425
S6			41.750	1500	384966.245	398047.615	5.450
S7	0.027	5.00	37.150	1200	384982.156	398058.315	0.978
S8			37.150	1800	384968.901	398079.543	1.500
OF			37.050		384961.811	398084.319	1.980

Links (Input)

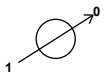
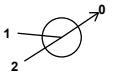
Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1.	S2	7.714	0.600	40.300	40.171	0.129	60.0	150	5.10	46.3
1.001	S2	S3	14.887	0.600	40.096	40.007	0.089	167.0	225	5.34	45.3
1.002	S3	S4	15.356	0.600	39.932	39.840	0.092	167.0	300	5.56	44.5
1.003	S4	S6	3.811	0.600	39.840	39.667	0.173	22.0	300	5.57	44.5
2.000	S5	S6	2.646	0.600	40.325	40.193	0.132	20.0	225	10.02	33.0
1.004	S6	S7	19.174	0.600	36.300	36.172	0.128	150.0	300	10.26	32.6
1.005	S7	S8	25.026	0.600	36.172	35.650	0.522	47.9	300	10.45	32.3
1.006	S8	OF	8.549	0.600	35.650	35.070	0.580	14.7	300	10.45	32.3

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1.	384951.538	398020.635	41.750	1.450	600				
						0	1.000	40.300	150
S2	384958.049	398024.771	41.750	1.654	600		1.000	40.171	150
						0	1.001	40.096	225
S3	384950.066	398037.337	41.750	1.818	600	1	1.001	40.007	225
									
						0	1.002	39.932	300

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S4	384963.028	398045.571	41.750	1.910	1500	1	1.002	39.840	300
									
						0	1.003	39.840	300
S5	384963.611	398047.865	41.750	1.425	1200				
						0	2.000	40.325	225
S6	384966.245	398047.615	41.750	5.450	1500	1	2.000	40.193	225
						2	1.003	39.667	300
									
						0	1.004	36.300	300
S7	384982.156	398058.315	37.150	0.978	1200	1	1.004	36.172	300
									
						0	1.005	36.172	300
S8	384968.901	398079.543	37.150	1.500	1800	1	1.005	35.650	300
									
						0	1.006	35.650	300
OF	384961.811	398084.319	37.050	1.980		1	1.006	35.070	300
									

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 %)
1	0	0	0
30	0	0	0
100	45	0	0

Node S4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	39.840	Product Number	CTL-SHE-0150-1000-0700-1000
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	10.0	Min Node Diameter (mm)	1200

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Node S4 Online Orifice Control

Flap Valve	x	Invert Level (m)	40.900	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.100		

Node S5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	40.325	Product Number	CTL-SHE-0098-5000-1500-5000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node S8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	35.650	Product Number	CTL-SHE-0162-1210-0800-1210
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	12.1	Min Node Diameter (mm)	1200

Node S8 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.600	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	17.5		
Invert Level (m)	36.450	Diameter (m)	0.125		

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	39.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	60

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	48.0	0.0	1.200	48.0	0.0	1.201	0.0	0.0

Node S5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	41.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	425.0	0.0	0.085	425.0	0.0	0.086	0.0	0.0

Node S8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	36.600	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	4	Depth (m)	0.300
Safety Factor	2.0	Width (m)	4.000	Inf Depth (m)	
Porosity	0.30	Length (m)	30.000		

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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	92.521	26.180
1 year 15 minute winter	64.927	26.180
1 year 30 minute summer	60.022	16.984
1 year 30 minute winter	42.121	16.984
1 year 60 minute summer	40.398	10.676
1 year 60 minute winter	26.839	10.676
1 year 120 minute summer	24.980	6.602
1 year 120 minute winter	16.596	6.602
1 year 180 minute summer	19.271	4.959
1 year 180 minute winter	12.527	4.959
1 year 240 minute summer	15.301	4.043
1 year 240 minute winter	10.165	4.043
1 year 360 minute summer	11.775	3.030
1 year 360 minute winter	7.654	3.030
1 year 480 minute summer	9.342	2.469
1 year 480 minute winter	6.207	2.469
1 year 600 minute summer	7.682	2.101
1 year 600 minute winter	5.249	2.101
1 year 720 minute summer	6.859	1.838
1 year 720 minute winter	4.609	1.838
1 year 960 minute summer	5.653	1.489
1 year 960 minute winter	3.745	1.489
1 year 1440 minute summer	4.127	1.106
1 year 1440 minute winter	2.773	1.106
30 year 15 minute summer	226.195	64.005
30 year 15 minute winter	158.733	64.005
30 year 30 minute summer	147.452	41.724
30 year 30 minute winter	103.475	41.724
30 year 60 minute summer	98.615	26.061
30 year 60 minute winter	65.517	26.061
30 year 120 minute summer	59.946	15.842
30 year 120 minute winter	39.827	15.842
30 year 180 minute summer	45.598	11.734
30 year 180 minute winter	29.640	11.734
30 year 240 minute summer	35.759	9.450
30 year 240 minute winter	23.758	9.450
30 year 360 minute summer	26.939	6.932
30 year 360 minute winter	17.511	6.932
30 year 480 minute summer	20.981	5.545
30 year 480 minute winter	13.940	5.545
30 year 600 minute summer	17.039	4.661
30 year 600 minute winter	11.642	4.661
30 year 720 minute summer	15.093	4.045
30 year 720 minute winter	10.143	4.045
30 year 960 minute summer	12.278	3.233
30 year 960 minute winter	8.133	3.233
30 year 1440 minute summer	8.788	2.355
30 year 1440 minute winter	5.906	2.355
100 year +45% CC 15 minute summer	423.061	119.712
100 year +45% CC 15 minute winter	296.885	119.712
100 year +45% CC 30 minute summer	278.374	78.770
100 year +45% CC 30 minute winter	195.350	78.770
100 year +45% CC 60 minute summer	187.417	49.529
100 year +45% CC 60 minute winter	124.515	49.529
100 year +45% CC 120 minute summer	114.312	30.209
100 year +45% CC 120 minute winter	75.946	30.209
100 year +45% CC 180 minute summer	86.951	22.375
100 year +45% CC 180 minute winter	56.520	22.375
100 year +45% CC 240 minute summer	68.114	18.001
100 year +45% CC 240 minute winter	45.253	18.001
100 year +45% CC 360 minute summer	51.133	13.158
100 year +45% CC 360 minute winter	33.238	13.158
100 year +45% CC 480 minute summer	39.658	10.480
100 year +45% CC 480 minute winter	26.348	10.480
100 year +45% CC 600 minute summer	32.099	8.780
100 year +45% CC 600 minute winter	21.932	8.780
100 year +45% CC 720 minute summer	28.365	7.602
100 year +45% CC 720 minute winter	19.063	7.602
100 year +45% CC 960 minute summer	22.984	6.052
100 year +45% CC 960 minute winter	15.225	6.052
100 year +45% CC 1440 minute summer	16.353	4.383
100 year +45% CC 1440 minute winter	10.990	4.383

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Results for 1 year Critical Storm Duration. Lowest mass balance: 95.05%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1.	10	40.352	0.052	5.4	0.0472	0.0000	OK
15 minute winter	S2	10	40.162	0.066	7.1	0.0306	0.0000	OK
30 minute winter	S3	24	40.077	0.145	15.5	6.8199	0.0000	OK
30 minute winter	S4	25	40.078	0.238	12.6	0.6384	0.0000	OK
15 minute winter	S5	17	40.818	0.493	6.9	1.1519	0.0000	SURCHARGED
30 minute winter	S6	33	36.422	0.122	14.9	0.2161	0.0000	OK
30 minute winter	S7	33	36.422	0.250	16.9	0.4214	0.0000	OK
30 minute winter	S8	33	36.420	0.770	16.9	1.9596	0.0000	SURCHARGED
15 minute summer	OF	1	35.070	0.000	12.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1.	1.000	S2	5.3	1.019	0.232	0.0403	
15 minute winter	S2	1.001	S3	7.0	0.747	0.173	0.1394	
30 minute winter	S3	1.002	S4	11.0	0.400	0.128	0.7143	
30 minute winter	S4	Hydro-Brake®	S6	10.0				
30 minute winter	S4	Orifice	S6	0.0				
15 minute winter	S5	Hydro-Brake®	S6	4.9				
30 minute winter	S6	1.004	S7	15.2	1.078	0.168	0.8609	
30 minute winter	S7	1.005	S8	16.9	0.708	0.105	1.6673	
30 minute winter	S8	Hydro-Brake®	OF	12.1				26.3
30 minute winter	S8	Orifice	OF	0.0				0.0

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Results for 30 year Critical Storm Duration. Lowest mass balance: 95.05%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	S1.	29	40.498	0.198	10.1	0.1784	0.0000	SURCHARGED
30 minute winter	S2	29	40.496	0.400	13.5	0.1858	0.0000	SURCHARGED
30 minute winter	S3	30	40.496	0.564	44.6	26.5445	0.0000	SURCHARGED
30 minute winter	S4	29	40.495	0.655	19.5	1.7550	0.0000	SURCHARGED
15 minute winter	S5	19	41.466	1.141	17.0	9.4954	0.0000	FLOOD RISK
180 minute winter	S6	100	36.537	0.237	14.8	0.4183	0.0000	OK
180 minute winter	S7	100	36.533	0.361	16.5	0.6083	0.0000	SURCHARGED
180 minute winter	S8	100	36.526	0.876	16.5	2.2300	0.0000	SURCHARGED
15 minute summer	OF	1	35.070	0.000	12.5	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)
30 minute winter	S1.	1.000	S2	10.1	1.192	0.440	0.1358	
30 minute winter	S2	1.001	S3	12.6	0.790	0.314	0.5921	
30 minute winter	S3	1.002	S4	9.3	0.370	0.108	1.0814	
30 minute winter	S4	Hydro-Brake®	S6	10.0				
30 minute winter	S4	Orifice	S6	0.0				
15 minute winter	S5	Hydro-Brake®	S6	4.9				
180 minute winter	S6	1.004	S7	14.7	1.059	0.163	1.2468	
180 minute winter	S7	1.005	S8	16.5	0.518	0.103	1.7623	
180 minute winter	S8	Hydro-Brake®	OF	12.6				101.7
180 minute winter	S8	Orifice	OF	3.9				7.7

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 95.05%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	S1.	43	41.592	1.292	12.8	1.1667	0.0000	FLOOD RISK
60 minute winter	S2	43	41.581	1.485	15.9	0.6891	0.0000	FLOOD RISK
60 minute winter	S3	43	41.577	1.645	56.8	53.4370	0.0000	FLOOD RISK
60 minute winter	S4	43	41.568	1.728	35.6	4.6289	0.0000	FLOOD RISK
60 minute winter	S5	56	41.499	1.174	23.0	22.8295	0.0000	FLOOD RISK
60 minute winter	S6	48	36.795	0.495	36.2	0.8754	0.0000	SURCHARGED
60 minute winter	S7	49	36.776	0.604	39.2	1.0157	0.0000	SURCHARGED
60 minute winter	S8	50	36.751	1.101	38.7	7.7183	0.0000	SURCHARGED
15 minute summer	OF	1	35.070	0.000	12.9	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)
60 minute winter	S1.	1.000	S2	11.6	1.131	0.505	0.1358	
60 minute winter	S2	1.001	S3	14.7	0.701	0.366	0.5921	
60 minute winter	S3	1.002	S4	21.2	0.369	0.247	1.0814	
60 minute winter	S4	Hydro-Brake®	S6	15.3				
60 minute winter	S4	Orifice	S6	16.4				
60 minute winter	S5	Hydro-Brake®	S6	4.9				
60 minute winter	S6	1.004	S7	35.8	1.057	0.395	1.3502	
60 minute winter	S7	1.005	S8	38.7	0.823	0.240	1.7623	
60 minute winter	S8	Hydro-Brake®	OF	14.1				115.5
60 minute winter	S8	Orifice	OF	15.9				40.0

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

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	45	0	0

Node OF Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to 100yr+45% CC 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 minute storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.300	300	1.300	600	1.300	900	1.300	1200	1.300
60	1.300	360	1.300	660	1.300	960	1.300	1260	1.300
120	1.300	420	1.300	720	1.300	1020	1.300	1320	1.300
180	1.300	480	1.300	780	1.300	1080	1.300	1380	1.300
240	1.300	540	1.300	840	1.300	1140	1.300	1440	1.300

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.07%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	S1.	43	41.594	1.294	12.8	1.1683	0.0000	FLOOD RISK
60 minute winter	S2	43	41.583	1.487	15.9	0.6899	0.0000	FLOOD RISK
60 minute winter	S3	43	41.578	1.646	56.8	53.4396	0.0000	FLOOD RISK
60 minute winter	S4	43	41.570	1.730	35.6	4.6335	0.0000	FLOOD RISK
60 minute winter	S5	56	41.499	1.174	23.0	22.9055	0.0000	FLOOD RISK
60 minute winter	S6	48	36.818	0.518	36.2	0.9159	0.0000	SURCHARGED
60 minute winter	S7	49	36.801	0.629	39.2	1.0580	0.0000	SURCHARGED
60 minute winter	S8	50	36.779	1.129	38.6	8.7737	0.0000	SURCHARGED
15 minute summer	OF	1	36.370	1.300	12.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	S1.	1.000	S2	11.6	1.131	0.505	0.1358	
60 minute winter	S2	1.001	S3	14.7	0.701	0.366	0.5921	
60 minute winter	S3	1.002	S4	21.2	0.368	0.247	1.0814	
60 minute winter	S4	Hydro-Brake®	S6	15.3				
60 minute winter	S4	Orifice	S6	16.4				
60 minute winter	S5	Hydro-Brake®	S6	4.9				
60 minute winter	S6	1.004	S7	35.7	1.007	0.395	1.3502	
60 minute winter	S7	1.005	S8	38.6	0.787	0.240	1.7623	
60 minute winter	S8	Hydro-Brake®	OF	12.1				93.4
60 minute winter	S8	Orifice	OF	16.8				57.2

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