





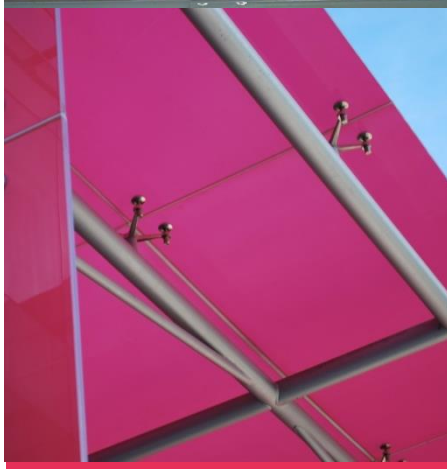

Phase 1B, Circle Square

Drainage and SUD's Strategy

Curtins Ref: ICMA0040/Drainage and SUD's

Revision: E

Issue Date: 24th October 2020

Client Name: Oxford Property Trading Ltd and Bruntwood

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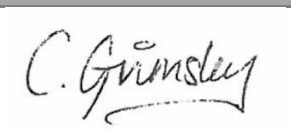
Chloé Grimsley BSc (Hons) Senior Engineer		24 Oct 2020

Revisions

Revision	Date/ by	Description of Revision
/	12/04/16	Issued for LLFA Approval
A	30/08/16	Updated to incorporate amended proposals for building 14
B	03/06/19	Updated following Final Construction Information for Plot 9
C	06/10/20	Updated following Final Construction Information for Plot 14
D	14/10/20	Updated following Final Construction Information for Plots 2-4
E	24/10/20	Plot 2-4 Filter Drain Photos Updated

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United Utilities S106 Approval (Foul Water)

United Utilities S106 Approval (Surface Water)

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1.0 Introduction

1.1 Project Background

1.1.1 Curtins was appointed on behalf of Oxford Property Trading Ltd and Bruntwood to provide a Drainage Strategy for the second phase of the proposed development of the former BBC site at Oxford Road, Manchester City Centre "Phase 1B".

1.1.2 This report has been updated following the construction of Plots 2-4 to reflect the 'Final Construction' Information for these buildings.

1.1.3 The assessment provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk.

1.1.4 A Verification section has also been included within this report.

1.1.5 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.

1.1.6 At the time of writing, only the building drainage and associated outfall routes from Plot 9 to outfall have been installed and completed. Therefore, it will be necessary for this report to be updated.

1.1.7 The Flood Risk Assessment referenced ICMA0040/FRA/P1B Rev A should be referred to for details in relation to Flood Risk, Flooding and Flood Compensation.

1.1.8 The Flood Emergency Response Plans for the various plots should be referred to for details in relation to Flood Risk procedures:

- CS-CUR-234-XX-RP-92001-V01_FERP (Plots 2-4)
- 049238-CUR-00-XX-RP-92001-V03_FERP (Plots 5-6)
- 049239-CUR-00-XX-RP-92001-V03_FERP (Plots 7-8)
- 062617-CUR-00-XX-RP-92001-V01_FERP (Plot 9)

Proposed Development

1.1.9 The proposed development forms the second phase of built development of the former BBC site masterplan referenced as 'Phase 1B', however this phase will be addressed via four separate planning applications, described as follows:-

1.1.10 Commercial 2, 4 and Pavilion 3- Erection of two buildings (18 and 14 storeys) comprising offices (Class B1) with ground and mezzanine floor commercial uses (Class A1.A2, A3, A4, B1, D1, D2) and all

associated access and servicing, alongside development of public realm, including public green space with pavilion building below at basement level. A Pavilion building incorporating uses within Classes A1, A3, A4, D1, D2 and all associated access and servicing.

1.1.11 PRS 5+6- Erection of C3 residential building, part 16, part 36 storey with ground and mezzanine floor residential amenity uses, plus commercial units (Class A1, A2, A3, A4, B1, D1, D2) and associated access, servicing, and landscaping.

1.1.12 PRS 7+8- Erection of C3 residential building of 16 storeys, with ground + mezzanine floor residential amenity uses, plus commercial units (Class A1, A2, A3, A4, B1, D1, D2) and associated access, servicing, and landscaping.

1.1.13 Building 14- MSCP, Hotel and Energy Centre- Demolition of any existing structures and erection of multi-storey car park (maximum 1,100 spaces including 55 spaces for disabled car users), hotel (150 beds) and energy centre in a part 12, part 18 storey building, with ground and mezzanine commercial uses (Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Café), A4 (drinking Establishment), B1 (Offices), D1 (Non-Residential Institutions Creche only) and D2 (Assembly and Leisure Gym only))

1.1.14 The Illustrative Masterplan references the buildings and is enclosed in Appendix A

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2.0 Existing Drainage

2.1 Existing Watercourses

2.1.1 The River Medlock; which is designated as a 'Main River' is located approximately 65m to the east of the site. The river flows in a south to north direction where it becomes culverted below Charles Street. The river generally flows in a western direction further downstream.

2.1.2 There is a lost watercourse approximately 100m north of the application site, which appears to connect to the River Medlock downstream of the site.

2.1.3 The Rochdale Canal is located approximately 230m North-west of the application site.

2.1.4 The Corn Brook is located approximately 600m south of the application site.

2.1.5 The River Irwell is located approximately 1.25km north-west of the application site.

2.2 Existing Drainage

2.2.1 The public sewer records have been obtained for the application site. The records indicate that the following public sewers are located within the site:

- There is an existing 225mm combined public sewer entering the site from the eastern boundary which crosses below the River Medlock prior to entering the site. The sewer flows in an east to west direction, before turning 90º, upsizing to 300mm diameter and flowing in a northern direction towards Charles Street. However the sewer has not been identified on site between manholes 3406 and 3402; and further investigations of invert levels of the sewer with United Utilities confirms that the invert level of 3406 is 29.480m AOD and the recorded water level of the River Medlock is 27.24m AOD. *Following consultation with United Utilities it has been advised that the sewer was removed as part of the previous development CIRCA 1970 and the sewer records where not updated to reflect this.*
- There is a node connection located towards the northern are of the application site. This is a 150mm combined public sewer connection which flows in a northern direction to Charles Street. The node within the site is referenced as 2410. *United Utilities confirm this is to be treated as an abandoned sewer.*

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2.2.2 The public sewer records have been obtained for the application site. The records indicate that the following public sewers are located within the vicinity of the site:

- There is a combined public sewer noted as a 690x610mm brick sewer and upsizing to a 750x620mm brick sewer within Cloak Street. The sewer flows in a west to east direction and turns 90º to flow in a south east direction along Upper Brook Street.
- There is a 300mm combined public sewer within Charles Street which flows in a north-east to south-west direction. The 300mm public sewer which crosses through the proposed application site connects into this sewer within Charles Street at manhole referenced 2405.
- There is a 150mm combined public sewer within Charles Street which flows in a south-west to north-east direction. The 150mm public sewer within the application site connects into this sewer within Charles Street at manhole referenced 2413. The sewer appears to connect into the 300mm combined public sewer within Charles Street (noted above) and at this location there is a Combined Sewer Overflow (CSO) which connects into the River Medlock at outfall referenced 3524.
- There is a 225mm combined public sewer within Princess Street to the east of the application site. The sewer appears to split into two 225mm diameter pipes; one of which is mentioned above and crosses through the application site and is abandoned. The other flows in a south-east to north-west direction within Princess Street.
- There are further combined public sewers within Upper Brook Street; one of which outfalls into the River Medlock where it crosses below Princess Street. This outfall is from the CSO located at the junction of Upper Brook Street and Sackville Street.
- There is a surface water public sewer within Oxford Road. The sewer is noted as a 860x770mm brick sewer and upsizes to a 900x520mm brick sewer. The sewer flows in a south-east to north-west direction and manholes adjacent to the site are referenced as 2301, 2306 and 1301.
- There is a combined public sewer within Oxford Road which is noted as a 900x600mm/ 870x640mm brick sewer and flows in a south-east to north-west direction. At manhole referenced as 1408, the sewer appears to flow back along Oxford Road in a north-west to south-east direction until it reaches Chester Street. At this point the sewer turns 90º and flows in a south-western direction.

2.2.3 No further public sewers were observed within or in the vicinity of the proposed site.

2.2.4 The public sewer records are enclosed in Appendix B.

2.2.5 There are various existing private sewers within the application site which served the existing BBC buildings. A survey was completed in July 2012 to confirm the approximate locations of existing below ground drainage on site. An additional CCTV survey was carried out in September 2015 to validate the previous survey and identify any additional drainage.

2.2.6 *The surveys confirmed the following: -*

Foul Drainage

There are various foul water drains surrounding the existing demolished buildings on site; there appears to be three private foul drainage network outfalls within the Phase 1B area.

- The demolished buildings located adjacent to Oxford Road (north of Brancaster Road) appear to have collected within the site and discharge into the Public Sewer network within Charles Street.
- The existing building which is located adjacent to Brook Street (north of Cloak Street) appears to be served by a separate foul drainage system which outfalls into Brook Street.
- The building to the south of Cloak Street connects into an existing 610 x 690 'U' shaped brick combined public sewer, which flows in a west to east direction towards Brook Street.
- The 150mm combined node connection located towards the northern area of the proposed site, into Charles Street has been confirmed by United Utilities to be an abandoned sewer.

Surface Water Drainage

There are various surface water drains surrounding the demolished buildings; there appears to be four private surface water drainage outfalls serving the Phase 1B site.

- The demolished buildings located adjacent to Oxford Road (north of Brancaster Road) appear to have collected within the site and discharge into the Public Sewer network within Oxford Road. There appears to be an existing 225 to 450mm surface water sewer in Brancaster Road and a 450mm sewer along the western boundary.
- The existing area, which is located adjacent to Princess Street (north of Cloak Street) appears to be served by two surface water drainage systems, one of which appears to discharge into the River Medlock and one which was unable to be surveyed off site but appears to be directed towards the River Medlock via Princess Street.
- The area including Cloak Street, and the building located to the south, discharge into the existing 610 x 690 'U' shaped brick combined public sewer, which flows in a west to east direction towards Brook Street.
- The circulatory junction between Cloak Street and Brook Street, inclusive of the cobbled hardstanding adjacent to the carriageway, is served by a highway drain, running from north to south. This connects into a 375mm combined sewer to the south of the site before connecting via a CSO in Brook Street.

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2.2.7 It is assumed that post-enabling works (as approved by planning reference 109647/FO/2015/C1 and currently being progressed) the majority of the existing drainage on Site and within the wider Masterplan Site will be removed and connections from the site will be retained. Where the private existing drainage is within areas with a significant reduction in levels for the enabling works, the drainage will be removed and capped off.

2.2.8 The existing site areas for Phase 1B are discharged via three outfalls (E1, E2, E3). The existing drainage has been modelled to determine the existing flow rates and volumes for each area draining.

2.2.9 For the existing impermeable areas and calculations, refer to drawing MA1420/70-00-02, enclosed in Appendix B.

Area	**Flow Rates**	**Volumes**
E1 (0.363 Ha)	1 in 1-year event = 144 l/s 1 in 30-year event = 351 l/s 1 in 100-year event = 435 l/s	100-year 6-hour event = 984m³
E2 (0.211 Ha)	1 in 1-year event = 17.5 l/s 1 in 30-year event = 30.9 l/s 1 in 100-year event = 37.7 l/s	100-year 6-hour event = 100m³
E3 (0.156 Ha)	1 in 1-year event = 39.0 l/s 1 in 30-year event = 104.4 l/s 1 in 100-year event = 133.7 l/s	100-year 6-hour event = 235m³

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3.0 Drainage Strategy

3.1 Proposed Foul Water Drainage

3.1.1 The foul drainage from the development is proposed to be collected by new private foul drains which will connect into the existing sewer network within the site, formed as part of the Phase 1A works.

3.1.2 The proposed foul water drainage will comprise of downpipes which will connect to a piped network around the proposed buildings. The drainage in the proposed buildings with basements will be suspended below the ground floor slab to avoid locating below the basement level. Basements requiring foul drainage will be locally pumped to ground floor level.

3.1.3 The proposed floor layouts for Buildings 2, 3, 4, 5, 6, 7, 8 and 14 have been assessed to determine peak foul flow rates. Commercial area flow rates have been derived based on floor area using guidance within Sewers for Adoption of 0.5 l/s for the domestic and 0.6 l/s for the commercial elements, per hectare of commercial floor space. Flow rates for the residential areas have been calculated based on the discharge unit method.

3.1.4 The M&E Engineer provided individual stack sizes based on discharge units per stack. The calculations are enclosed in ***Appendix C***. The peak flow rate from the buildings based on the total discharge units are approximately:

- 22.7 l/s from Building 2,3 &4 (includes pumped flow of 10l/s from basement areas)
- 29.3 l/s from Building 5 & 6.
- 22.1 l/s from building 7 & 8
- 14.5 l/s from Building 9.
- 31.5 l/s from building 14

3.1.5 The foul drainage for Area A (Plots 2-9) discharge via the outfall constructed in Phase 1A of the Masterplan site, into the existing combined public sewer located within Charles Street.

3.1.6 The foul drainage for Area B (Plots12-14) discharge via an outfall to the south-east corner of the Plot 14 Site, into the existing combined sewer located adjacent to Brook Street.

3.1.7 There are Section 106 Agreements in place with United Utilities under the Water Industry Act 1991. The United Utilities Approval Notices are enclosed within ***Appendix D***.

3.1.8 The Contractors As-Built information for Plot 9 is enclosed in ***Appendix E***.

3.1.9 The Proposed Drainage Masterplan Layout. And Plot Drainage Layouts are enclosed in ***Appendix F***.

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3.2 Proposed Surface Water Drainage

3.2.1 The surface water drainage is 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.

Eastern Parcel (Building 14)

3.2.2 The drainage for Building 14, in accordance with the SuDS hierarchy, is proposed to discharge to the River Medlock, adjacent to Brancaster Road.

3.2.3 The drainage model includes for future connections from Buildings 12 and 13, and currently discharges to the River Medlock, therefore, the current drainage for these areas will be required to discharge to the watercourse.

3.2.4 Due to the site layout, and the lack of available space for the siting of attenuation, the drainage for Building 14 has been combined with the anticipated drainage/attenuation for Buildings 12 and 13 into a single network. The proposed drainage layout is shown on drawing 064428-CUR-00-00-DR-C-92500, enclosed in Appendix F.

3.2.5 The existing flow rates for Building 14 have been calculated based on a model of the areas draining to the existing combined sewer in Princess Street.

3.2.6 The existing flow rates for Buildings 12 and 13 have been calculated for the based on a model of the areas draining to the existing private surface water system and ultimately to the River Medlock.

3.2.7 The existing impermeable areas and flow rates are shown in 2.3.12 and demonstrated on drawing MA1420-70-00-02, enclosed in Appendix B, noted as areas E2 and E3. The method of deriving the flows has been recommended by Manchester Lead Local Flood Authority (LLFA).

3.2.8 The flow rates will be restricted to 50% of the pre-development flow rates with an allowance of 30% climate change for the proposed 100-year event.

3.2.9 The restriction of 50% pre-development flow rates is based on the recommendations within the Manchester Strategic Flood Risk Assessment for brownfield sites within 'Critical Drainage Areas'.

3.2.10 The proposed combined maximum flow rates are therefore restricted to 25.0 l/s for the 1 in 1-year event, 58.0 l/s for the 1 in 30-year event and 73.0 l/s for the 1 in 100-year 30% change event for the connection draining Buildings 12, 13 & 14.

3.2.11 The attenuation requirements for the eastern parcel is approximately **m³**. This is provided by three cellular attenuation tanks. Within Plot 14, there is a **68m³** tank located between plots 12 & 13, to the northwest of the MSCP. The remaining attenuation volume will be provided by a tank Plot 12 works,

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and along the northern elevation of the MSCP, and in the United Utilities Sub-station area to the west of Building 14.

3.2.12 The proposed impermeable areas and flow rates are demonstrated on drawing MA1420-70-00-03 in Appendix C and this outfall connection is noted as Area B.

3.2.13 ***The drainage for Plot 14 has been constructed.***

North-Western Parcel (Buildings 2-9)

3.2.14 The existing flow rates have been calculated for the north-western parcel based on a model of the areas draining to the existing surface water sewer which currently outfalls into the surface water public sewer in Oxford Road.

3.2.15 The existing impermeable areas and flow rates are shown in 2.2.9 and demonstrated on drawing MA1420-70-00-02, in Appendix B, noted as Area E1. The method of deriving the flows has been recommended by Manchester Lead Local Flood Authority (LLFA).

3.2.16 The proposed flow rates will be restricted to 50% of the pre-development flow rates with an allowance of 30% climate change for the proposed 100-year event.

3.2.17 The restriction of 50% pre-development flow rates is based on the recommendations within the Manchester Strategic Flood Risk Assessment for brownfield sites within 'Critical Drainage Areas'.

3.2.18 The proposed flow rates are therefore proposed to be restricted to a maximum of 72 l/s for the 1 in 1-year event, 176 l/s for the 1 in 30-year event and 218 l/s for the 1 in 100-year 30% change event for the connection draining buildings 2-9.

3.2.19 The attenuation requirements for the north-western parcel serving Buildings 2-9) is approximately 100m³ and currently provided along the north-western boundary along the northern elevation of Building 4.

3.2.20 The proposed impermeable areas and flow rates are demonstrated on drawing MA1420-70-00-03 in Appendix C and this outfall connection is noted as Area A.

3.2.21 ***At the time of writing, the building drainage for Plots 2-4 & 9 and associated outfall routes have been installed and completed. Therefore, it will be necessary for this report to be updated.***

3.2.22 The proposed modelled flow rates are as follows:

Area	Flow Rates	Volumes
A (1.26 Ha)	1 in 1-year event = 62.4 l/s 1 in 30-year event = 78.8 l/s 1 in 100-year event = 166.6 l/s	100-year 6-hour event = 478m³
B (0.86 Ha)	1 in 1-year event = 25.0 l/s 1 in 30-year event = 42.0 l/s 1 in 100-year event = 57.8 l/s	100-year 6-hour event = 484m³

3.2.23 The attenuation requirements for Area A are provided by: -

- Natural stone and precast concrete paving areas are drained to filter drains with approximately 30% void ratio.
- Green roof construction (Permaquick) to the roof of building 9; specified as a Sedum blanket, which typically holds up to 5 litres per m² (5mm).
- Cellular below ground tank (ESS Pluvial Cube and Geotex Geotextile) which provides 100m³ of attenuation.

3.2.24 The attenuation requirements for Area B are provided by:-

- Natural stone and precast concrete paving areas are drained to filter drains with approximately 30% void ratio.
- Cellular below ground tanks which provide 205m³ of attenuation.

3.2.25 The proposed volumes off site in the 1 in 100-year 6-hour event equate to 962m³ (478m³ from Area A and 484m³ from Area B). These volumes are lower than the existing modelled volumes off site in the 1 in 100-year 6-hour event, which equates to 1,320m³ (984m³ from Area E1, 100m³ from Area E2 and 235m³ E3).

3.2.26 The flow rates and attenuation requirements for the future phases within the wider Masterplan will be developed upon progression of the future planning applications, however they should follow the same principles of the Phase 1B proposals.

3.2.27 The proposed drainage strategy drawings are enclosed in Appendix F.

3.2.28 The proposed surface water drainage calculations for the 1, 30 and 100 year plus 30% climate change are enclosed in Appendix C.

3.2.29 The proposed drainage networks have been modelled in the 1 in 200-year event to ensure that significant flooding does not occur in an event exceeding standard guidance.

3.2.30 Exceedance- The drainage model for Area A confirmed that flooding occurred at six separate points within the site. The largest instance is to the eastern elevation of Building 4, which has a flooding volume of 5.9 l/s. All of the volumes will be contained within the site boundary.

3.2.31 The drainage model for Area B confirmed that 38m³ of flooding occurred at the manhole to the eastern boundary of the site, north of Building 14. Based on the surrounding levels, this water will flow onto Princess Street, and away from any buildings. The volume is such that the flooding is shallow and will be contained along the highway.

3.2.32 The River Basin Management plan identifies that spatial planning and design for urban development and infrastructure should aim to reduce surface water run off; protect and restore habitats; improve the quality of rivers, coastal waters, and groundwater, and thus protect drinking water supplies and bathing areas. The release of toxic pollutants that harm the water environment also need to be reduced.

3.2.33 The measures we have proposed are as follows and are as directed by NPPF, technical guidance and covered within the WFD.

3.2.34 Reduce surface water run-off- As recommended by the Environment Agency, Manchester Lead Local Flood Authority and the Greater Manchester Strategic Flood Risk Assessment; surface water run-off should be restricted to 50% of pre-development flows. A model of the existing drainage to the Phase 1B areas has been created to assess the pre-development run-off rates. The proposed development run-off has been restricted to 50% by flow controls and we have introduced sustainable drainage systems and attenuation facilities.

3.2.35 Surface Water has been managed at its source where practical to do so and this has been demonstrated by the introduction of a green roof area, and filter drains.

3.2.36 An allowance for 30% climate change has been included within the design.

3.2.37 Water Quality- A minimum of one stage of treatment is provided for all areas within the site and a two-stage treatment has been proposed for all areas subject to vehicles.

3.2.38 The measures which have been specified to implement this are as follows:

- A filter chamber has been specified prior to outfall (Naylor Smart Filter; all surface water drainage will pass through this chamber and provides one stage of treatment.
- Green roof construction (Permaquick) to the roof of building 9; specified as a Sedum blanket, which typically holds up to 5 litres per m² (5mm).
- Natural stone and precast concrete paving areas are drained to filter drains comprising of single sized stone with approximately 30% void ratio; this system provides one stage of treatment.

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4.0 SuDS Verification

4.1.1 The Verification section has been developed with reference to the drainage design details and philosophy provided in section 3 of this report. Manchester City Council requirements are to verify the installation of the SuDS element of the design to confirm by Photographic record that this has been installed.

4.1.2 At the time of writing, only the building drainage and associated outfall routes have been installed and completed to allow discharge from plot 9 Therefore, it will be necessary for this report to be updated as future plots are completed.

4.1.3 The following elements serving Plots 2-9 have been recorded to date:

- Attenuation Tank
- Hydrobrake Flow Control Device
- Smart Filter Chamber

4.1.4 The following elements serving Plot 14 have been recorded to date:

- Attenuation Tank
- Hydrobrake Flow Control Device
- Smart Filter Chamber
- Filter Strips

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4.2 SuDs Features (Plots 2-9)

Attenuation Tank

ESS Ltd Pluvial Cube



Alderburgh Geotex Geotextile

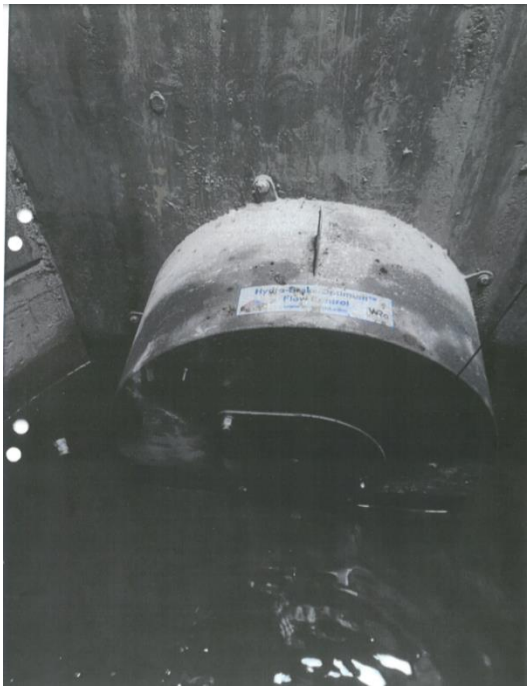


Flow Control (Manhole SA26- Outfall into Oxford Road)

Hydro-Brake Flow Control

Hydro-brake Optimum MD-SHE-0334-6250-0700-6250.





Filter Chamber (Manhole Outfall into Charles Street)

Naylor Smart Filter SF03.2B







Filter Strips





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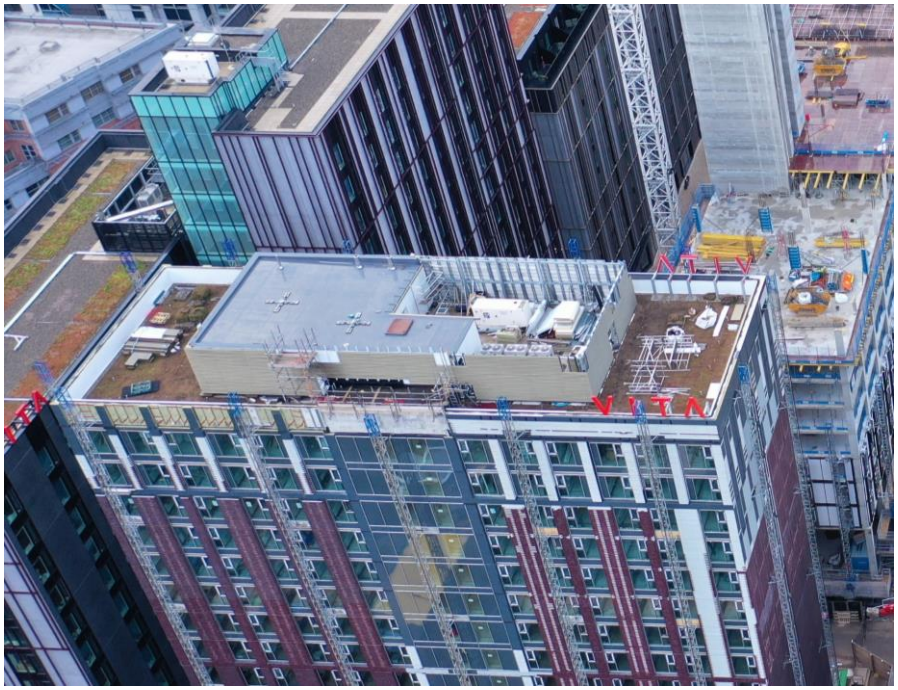
4.2.1 The Plot 9 Building is served individually by a green roof.

Green Roof (Building 9)

Radmat - Inverted Permaquik 6100 Sedum Blanket





4.3 SuDs Features (Plot 14)

Attenuation Tank

ESS Ltd Pluvial Cube





Hydrobrake Flow Control Device

Hydro-Brake Flow Control

Hydro-brake Optimum MD-SHE-0210-2200-0700-2200.



Smart Filter Chamber

Naylor Smart Filter SF03.1B



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Filter Strips





5.0 Maintenance

5.1.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

5.1.2 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

5.1.3 The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDs features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted in this section.

5.2 Components

5.2.1 The following components have been included within the drainage design for the proposed development:

- Inspection, Manhole and Catchpit Chambers
- Pipes
- Drainage Channels and Gullies
- Filter Drains
- Attenuation Tank
- Flow Control Unit
- Smart Filter
- Green Roof Area

5.2.2 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.

5.2.3 It is assumed that the maintenance of the drainage network will be the responsibility of an on-site facilities management team, however Manchester City Council may adopt the sustainable drainage features proposed.

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5.2.4 A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.

5.2.5 The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDs features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted below.

5.2.6 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.

5.2.7 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.

5.2.8 Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.

5.2.9 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter

5.2.10 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

5.3 Inspection, Manhole and Catchpit Chambers

5.3.1 The locations of the Inspection Chambers, Manholes are indicated on Curtins drainage drawings enclosed in Appendix F

5.3.2 Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.

5.3.3 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

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5.4 Pipes

5.4.1 The locations of the drainage pipes are indicated on Curtins drainage drawings enclosed in Appendix F

5.4.2 Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with the Curtins drainage specification.

5.4.3 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

5.4.4 Access for maintenance is provided through access chambers and manholes.

5.4.5 Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	Rod through poorly performing runs as initial remediation.	As required.

	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

5.5 Drainage Channels and Gullies

5.5.1 The locations of the drainage channels and gullies are indicated on Curtins drainage drawings enclosed in Appendix F

5.5.2 Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

5.5.3 Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating.

5.5.4 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.

	Check and remove large vegetation growth near channel runs.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.

5.6 Filter Drains

5.6.1 The locations of the filter drains are indicated on Curtin's drainage drawings enclosed in Appendix F.

5.6.2 The filter drains are intended for surface water conveyance, water quality and attenuation storage features.

5.6.3 Access for maintenance has been provided through access chambers and rodding points.

5.6.4 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

Maintenance Schedule	**Required Action**	**Frequency**
Monitoring (to be undertaken more regularly within the first year of	Initial Inspection including incoming channel outlet boxes.	Half yearly and after large storms.

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operation and adjusted as required).		
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required
	Remove sediment from pre-treatment structures.	Monthly or as required
Remedial Action	Replace geotextiles and clean and replace filter media, if clogging occurs. Terram 1000 typical design life is 25 years.	As required.
	Excavate trench walls to expose clean soils if infiltration performance reduces to unacceptable levels.	As required.

5.7 Attenuation Tanks

5.7.1 The locations of the attenuation tanks are indicated on Curtin's drainage drawing CS-CUR-ZZ-0G-DR-C-90002

5.7.2 The attenuation tanks are currently specified as geocellular units and are intended for storage of surface water run-off from the site up to and including the 1 in 100 year plus 30% climate change event to reduce the rate of run-off into the downstream network and to minimise flood risk.

5.7.3 The geocellular units are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.

5.7.4 Access for maintenance has been provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.

5.7.5 Geocellular units are proprietary products and therefore manufacturer's recommendations should also be taken into consideration. Additionally, different manufacturers may have different connection types and arrangements which will need to be taken into consideration.

5.7.6 Regular inspection and maintenance is important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets, outlets and overflows.	As required.

5.8 Flow Control Units

5.8.1 The locations of the smart filter are indicated on Curtin's drainage drawings CS-CUR-ZZ-0G-DR-C-90002

5.8.2 The flow control units are intended for flood control and flow restriction.

5.8.3 The flow controls are specified as Hydro-brake or similar approved and are proprietary products; therefore, manufacturer's recommendations should also be taken into consideration.

5.8.4 Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

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5.9 Smart Filter

5.9.1 The locations of the smart filter are indicated on Curtin's drainage drawings CS-CUR-ZZ-0G-DR-C-90002

5.9.2 The smart filters are intended for a second or third stage treatment for water quality.

5.9.3 The Smart Filters are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.

5.9.4 Access for maintenance has been provided by locating within manhole chambers.

5.9.5 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the chamber containing smart filters.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets and outlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and filter chambers.	Annually (or as required after heavy rainfall events)

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Remedial Actions	Repair/rehabilitation of inlets/outlets.	As required.

5.10 Green Roof

5.10.1 The green roof is located on Building 9, and is shown on the Architect's drawings

5.10.2 The green roof is intended as a first stage treatment for water quality, and also as attenuation for surface runoff.

5.10.3 The Smart Filters are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.

5.10.4 Access for maintenance has been provided by locating within manhole chambers.

5.10.5 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the chamber containing smart filters.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets and outlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and filter chambers.	Annually (or as required after heavy rainfall events)

Remedial Actions	Repair/rehabilitation of inlets/outlets.	As required.

Appendix A

Illustrative Masterplan

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Retaining Element required to Plot edge - tbc by engineer

ILLUSTRATIVE MASTERPLAN
SCALE 1:500

Appendix B

United Utilities Public Sewer Records

Existing Impermeable Areas Layout

United Utilites Water PLC
Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP
DX 715568 Warrington
Telephone 0870 751 0101
Fax Number 0870 7510102
Property.searches@uuplc.co.uk

Your Ref:
Our Ref: 11/ 849452
Date: 01/02/2012

Realty Estates

25 Rochdale Road
Manchester

M4 4HT

FAO: E KEAST

Dear Sirs

Location: BBC OXFORD STREET MANCHESTER M60 7HB

I acknowledge with thanks your request dated 31/01/12 for information on the location of our services.

Please find enclosed plans showing the approximate position of our apparatus known to be in the vicinity of this site.
I attach General Condition Information sheets, which details contact numbers for additional services (i.e. new supplies, connections, diversions) which we are unable to deal with at this office. In addition you should ensure they are made available to anyone carrying out any works which may affect our apparatus.

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

If you have any queries regarding this matter please telephone us on 0870 7510101.

Yours Faithfully,

S McManus.

Sue McManus
Operations Manager
Property Searches

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

TERMS AND CONDITIONS - WASTERWATER & 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) (UUW apparatus) of United Utilities Water PLC ("UUW").

TERMS AND CONDITIONS:

1. 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.

2. 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.

3. In particular, the position and depth of any UUW apparatus shown on the Map are approximate only. UUW strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUW apparatus. The exact location, positions and depths should be obtained by excavation trial holes.

4. 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.

5. The position and depth of UUW 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 ade subsequent to issue and prior to any works being carried out.

6. 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 UUW apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.

7. No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUW apparatus by reason of the actual position and/or depths of UUW apparatus being different from those shown on the Map and any information supplied with it.

8. 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.

9. 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 UUW from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

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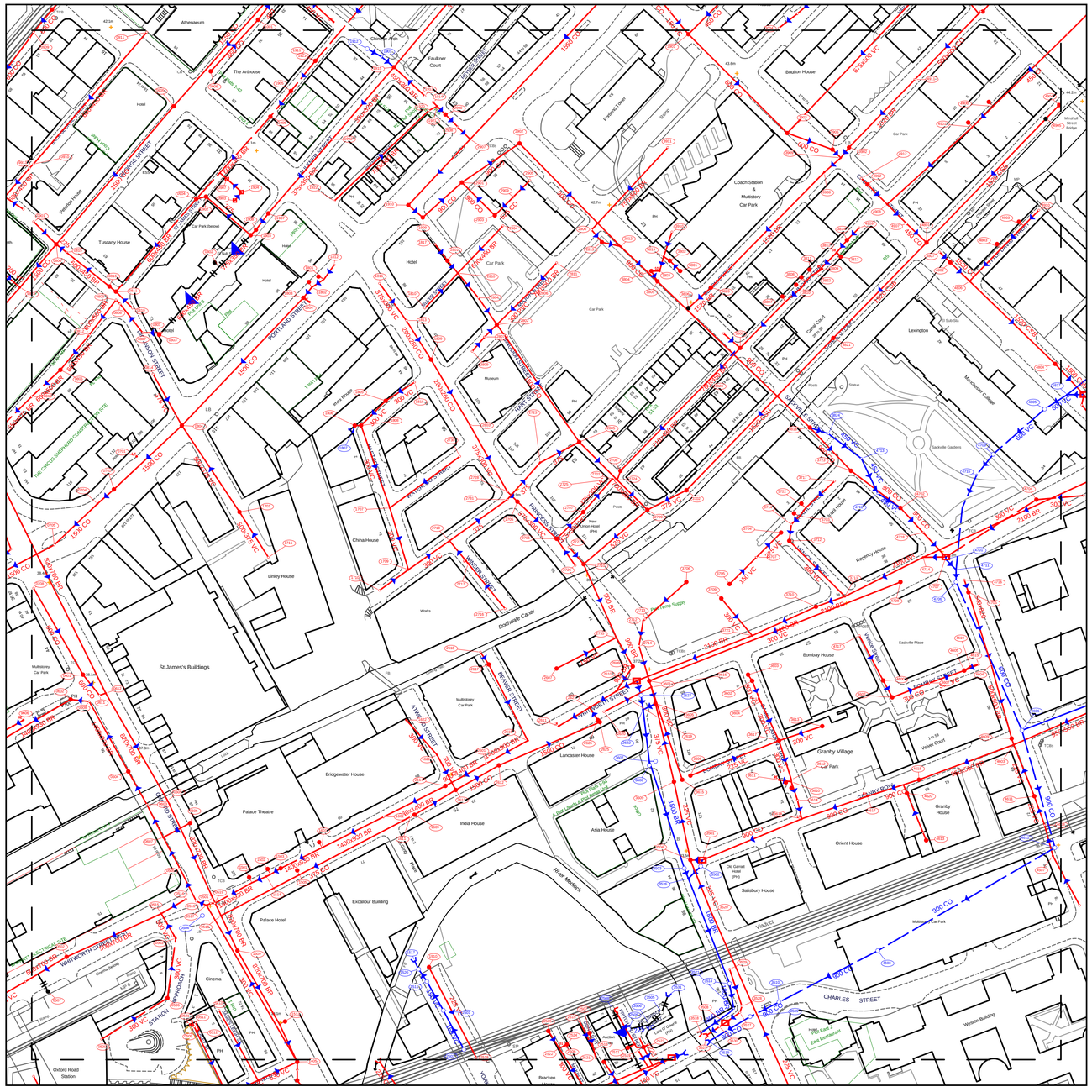

OS Sheet No: SJ8497NW

Scale 1:1250 Date: 1-Feb-2012

Printed by: Hazel Kay

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0501		C	Q		1400	1400	E	BR		2.24
0502	34.06	C	M	30.46	500	700	E	BR		23.32
0503		C	L		300		C	VC		13.89
0504	35.89	S	M							
0505		C	Q		930	1400	E	BR		17
0506	37.62	C	M	33.19	300		C	VC		29.27
0507		C	M							
0509		C	G							2.72
0510		C	G							38.95
0511		F	Q							5.45
0512		F	J							33.96
0513		F	J							2.36
0514		C	G							13.89
0515		C	J		500	700	E	BR		50.57
0516		C	G		1400	930	E	BR		17.89
0517		C	J		1400	930	E	BR		5.39
0518		C	J		820	700	E	BR		18.79
0519		C	G		1400	930	E	BR		2
0520		C	G		300		C	VC		37.74
0521		F	Q							3.11
0601	38.11	C	M	33.52	600		C	CO		12.81
0602	37.86	C	M		1400	930	E	BR		39.45
0603		C	Q		1400	930	E	BR		18.36
0604	37.88	C	M	23.99	1400	930	E	BR		38.95
0605	37.61	C	M	30.65	820	700	E	BR		61.74
0606	37.25	C	M	30.54						14.76
0607		C	J		930	1400	E	BR		17.89
0608		C	G		1400	930	E	BR		9.06
0611		C	G		600		C	CO		3.16
0612		C	J		820	700	E	BR		60.03
0701		C	L							
0702	39.24	C	M	36.45	1500		C	CO		10.63
0704		C	J		1500		C	CO		29
0705		C	G		1500		C	CO		42.94
0708		C	G		600		C	CO		48.37
0801		C	Q		600	450	E			9
0802	41.44	C	M							
0803	40.94	C	M	38.31	600	490	E	BR		1.41
0804	40.05	C	M	33.35	1500		C	CO		45.28
0805	40.39	C	M	37.28	600	500	E	BR		19.1
0806	40.83	C	M	31.31	1500		C	CO		27.4
0807		C	G		600	450	E			17.8
0808		C	G		600	450	E	BR		2.83
0809		C	G		600	500	E	BR		21.4
0810		C	G							11.31
0811		C	M		600	450	E	BR		4.04
0812		C	Q		600	450	E	BR		22.02
0813		C	Q		550	475	E	BR		19.8
0814		C	G		375		C	VC		28.65
0815		F	Q		225		C			6.18
0816		C	M		600	450	E	BR		26.79
0901		C	G							15.56
0902	41.39	C	M	37.64	375		C		54	4.86
0903		C	J				C			5.26
0904	41.33	C	M	37.89	600	450	E	BR		59.55
0905	42.03	C	M	32.95	1500		C	CO	54	87.97
0906	42.19	C	M	39.18	450		C	CO		33.97
0907		C	J				C			4.54
0909		C	G		600		C	CO		3.61
0910		C	G		600	450	E	BR		2.83
0911		C	G		600	450	E	BR		84.39
1501	36.21	C	M		1400	930	E	BR		20.59
1502	36.23	C	M	32.33	1400	930	E	BR		2.24
1503	35.98	C	M	24.42	1400	930	E	BR	-1	5.83
1505	35.86	C	M							
1509	35.27	C	M	29.02	820	700	E	BR	-9	41.26
1510	28.66	C	M	26.19	225		C	VC		49.65
1511	28.79	S	M		150			VC		7.21
1512	34.2	C	M	33.52	820	700	E	BR		20.08
1514		C	J		1400	930	E	BR		7.62
1517		S	F							
1520	28.54	S	M		150			VC		4.47
1601	36.02	C	M		1400	930	E	BR		22.36
1602		C	Q	30.43	1400	930	E	BR		33.54
1609	35.95	C	M	31.14					67	23.32
1611		C	G		375		C	CO		103.77
1621		C	J		300		C	VC		19.24
1622		C	J		300		C	VC		22.67
1701	38.93	C	M		500	375	E	VC		50.48
1707		C	J		300		C	VC		31.32
1709		C	J		300		C	VC		24.41
1710		C	G		300			VC		17.2
1711		C	G		500	375	E	VC		26.08
1801	41.44	C	M	39.39	1500		C	CO	5	7.21
1802	41.36	C	M	37.87	1500		C	CO	2	6.4
1803	41.27	C	M	35.16	1500		C	CO	47	85.59
1804		C	M	39.81					1	3.61
1805	40.73	C	M	37.13	300		C	VC	7	16.97
1806	40.64	C	M		300		C	VC		3
1807		S	R	39.52	300			VC		3.16
1808	40.44	C	M	34.5	300		C	VC		42.38
1809	40.77	C	M	37.08	280	260	R	CO		37.22
1810		C	G							23.35
1811		C	G		375	300	E	VC		22.2
1812		C	G		1500		C	CO		8.6
1813		C	Q		290	280	R	CO		22.47
1815		C	G		300		C	VC		16.64
1817		C	G							10
1901		S	Q	40.35	450	300	E	BR	49	7.81
1902		C	Q	39.65	375	350	E	BR	86	47.51
1903	41.6	C	M	38.99	375		C		21	28.66
1904		C	J				C			9.51
1905		C	M							15.93
1906	42.05	C	M	39.56	600	450	E	BR		53.81
1907	41.72	C	M	39.1	375	350	E	BR	-9	10
1908	41.69	C	M	40.16	375	350	E	BR		3.68
1909	41.97	C	M	35.92	900		C	CO		25.5
1910	42.14	C	M	35.85	900			CO	-132	9.22
1911		C	M							18.8
1912	43.11	S	M	40.52	300	450	R	BR	47	8.06
1913		C	G		450	300	E	BR		20.52
1914		C	G		600	450	E	BR		2.83
1915	43.08	C	M	40.19	350	320	E	BR	85	46.1
1920		C	G		700	500	E	BR		4.47
1921		C	J		480	460	R	BR		5.66
1922		C	G		700	500	E	BR		63.66
2501	29.33	S	M	28.23	150		C	VC		16.12
2502		F	F		225			VC		19.2
2503	29.99	S	M		150		C	VC		21.47
2504		F	Q		150		C	VC		2.83
2505	30.41	C	M	26.68	300		C	VC		9.91
2506		F	O	27.08	150		C	VC		2.66
2507	30.74	C	M	29.07	150		C	VC		8.25
2508	30.84	S	M							
2509	31	S	M							

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
2511		C	M		225			VC		3.8
2512		F	Q		225		C	VC		4.99
2514		C	J		225		C	VC		5.26
2515		C	G		150			VC		15.65
2516		C	J		150		C	VC		4.12
2518		C	G							
2519		C	G		225		C	VC		9.37
2520		S	G							
2521		C	G							
2522		C	J		300		C	VC		25.6
2523	31.08	C	M	26.7	225		C	VC		9.91
2524	30.71	C	M	27.08	150		C	VC		1.48
2601		C	Q		900	1400	E	BR		22.83
2607	38.54	C	M	33.93	150		C	VC		32.65
2609	37.26	C	M	27.36	900		C	BR		14.42
2610		C	V	34.75	2100			BR		11.04
2610		C	V	34.75	2100			BR	1	7.37
2611		C	L							
2612	36.12	C	M	30.61	1500		C	CO		53.31
2613	36.09	C	M	30.79	1500		C	CO	134	24.19
2614	36.2	C	M	24.84	930	1400	E	BR	-6	33.54
2615		C	J		1400	900	E	BR		22.83
2617		C	M		1400			BR		41.59
2618		C	G							7.21
2619		C	J		900			BR		15.26
2620		C	G		300			VC		25.94
2621		C	J		1500			CO		17.49
2622		S	J		375			VC		25.18
2625		C	M		1500			CO		1.41
2626	37.07	C	M	34.75	1500			CO		7.21
2627	36.77	S	M	29.16	2100			BR		7.07
2701		C	Q		700	800	E	BR		1.35
2705	39.78	C	M		375	300	E	VC		26.17
2706	39.88	C	M	35.55	375	300	E	VC	-35	18.38
2707	40.05	C	M	36.08	375	300	E	VC		21.21
2708	40.43	C	M	32.3	710	450	E	BR		4.71
2709	40.08	C	M	30.38	525		C	VC	17	40.66
2710	39.97	C	M	27.9	900		C	BR		39.03
2712		C	G		300			VC		12.17
2713		C	G		300			VC		1.41
2714		C	G		300			VC		17.72
2716		C	G		300			VC		28.43
2717		C	L	34.44	300			VC		14.21
2719		C	J		375		C			34.41
2723		C	J		375		C			21.47
2724		C	J		780	600	E	BR		20.62
2725		C	J		800	700	E	BR		1.18
2726		C	G		375	300	E	VC		15.81
2727		C	G							10.98
2728		C	G		375	300	E	VC		7.07
2730		C	G		300			VC		42.2
2731		C	G		375		C			24.08
2735		C	J		900		C	BR		16.12
2801	41.73	C	M	36.72	550	800	E	BR		7.81
2802	41.25	C	M	33.93	1500		C	CO		69.63
2803		C	Q		375	300	C	VC		36.72
2804		C	Q		840	540	E	CO		15.81
2805	40.54	C	M		375					26.1
2806		C	Q		300		C	PVC		21.21
2807		C	Q		300		C	PVC		8.49
2809		C	G		350	450	E	BR		9.22
2810		C	J		550	800	E	BR		15.62
2811		C	G		750	500	E	BR		20.52
2812		C	J		900		C	CO		24.76
2813	42.57	C	M		900			CO		9.22
2900	42.71	C	M	37.53	650		C	CO		8.49
2901		C	M		900		C	CO		33.84
2902	42.9	C	M	32.7	900		C	CO		70.01
2903	42.3	C	M	36	900		C	CO		22.63
2904		C	G		600	450	E	BR		31.83
2905		C	G		600	450	E	BR		11.31
2906		C	G		750			BR		7.81
2907		C	J		1550			CO		43.86
2908		C	Q		750		C	CO		8.49
2909		C	Q		525		C	CO		12.73
3501		C	V	27.44	225		C	VC	10	5.79
3501		C	V		610	1000	E	BR		3.09
3502	33.62	S	M	27.5	610	1000	E	BR		8.49
3503	33.74	S	M	28.59	1800		C	BR		5.39
3504	33.74	C	M	26.85	225		C	VC	324	38.83
3505	30.71	S	M							
3506	30.87	S	M							
3507		C	V	27.35	300		C	VC		6.38
3507		C	V		150			VC		10.14
3508		C	V							3.46
3509	32.58	S	M		900		C	CO		23.32
3510	32.5	S	M		900		C	CO		15.65
3514	32.77	S	M	28.13	1800		C	BR		12.17
3518		C	F							
3519		S	F							
3520		C	G		225		C	VC		26.93
3521		S	G		1800		C	BR		20.03
3524		S	F							
3525		O	F							
3526		S	J		1800		C	BR		54.78
3527		C	G							8.75
3528		C	G							3.16
3529		C	G							18.97
3530		O	G							7.21
3531		S	F							
3601	37.2	C	M	26.66	300			VC		3.16
3602	37.42	C	M		300		C	VC		10.77
3603	37.54	C	M	31.7	300		C	VC		3.61
3604		C	L	31.06	300		C	VC	22	21.02
3605	36.78	C	M	26.44	375		C	VC		6.71
3606	35	C	M	33.3	225		C	VC	64	46.24
3607	35.37	S	M		1800		C	BR		54.71
3608	35.33	S	M							2
3609	34.88	C	M	26.73	375		C	VC	135	39.05
3610	35.7	C	M	32.2	300		C	VC	-14	9.49
3611		C	R	32.38	300		C	VC	34	6.08
3612	35.76	C	M	32.42	300		C	VC	5	1
3613	37.24	C	M	32.42	300		C	VC	9	22.14
3614		C	Q	32.89	150		C	VC	-13	9.22
3615		C	M		300		C	VC		47.43
3616		C	J		300		C	VC		8.25
3617	36.36	C	M	30.02	300		C	VC	-8	19.92
3618		C	L	28.05	900		C	CO	88	52.2
3702	39.93	C	M	31	375		C	VC	79	21.26
3703	40.02	C	M	36.47	300			VC		5.66
3704	39.6	C	M							
3705	38.54	C	M	37.1	150		C	VC	21	18.38
3706	38.6	C	M		300			VC		26.91
3707		C	Q	36.21	225		C	VC	19	16.97
3709	38.43	C	M	33.68	300		C	VC		23.43

WASTE WATER SYMBOLOGY

MANHOLE
FOUL · SURFACE · COMBINED · DUAL
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F Foul	T Transition
S Surface	O Overflow
C Combined	U Unspecified

MANHOLE / NODE TYPE

M Manhole	Z Ghost in Rising Main
J Junction	C Cascade
L Lamphole	Y Gulley
H Hatchbox	E Ejector
R Rodding Eye	O Oil Injector
F Outfall	I Inlet
V Combined Sewer Overflow	B Hydrobrake
	T Vent Column
P Pumping Station	X Valve
S Soakaway	U Unspecified
D Dual Function Manhole	Q Expediency Node
	G Ghost (to allow pipe bends)
W Treatment Works	

SEWER SHAPE

C Circular	T Trapezoidal
E Egg	A Arch
O Oval	B Barrel
F Flat Top	H Horseshoe
R Rectangular	U Unspecified
S Square	

SEWER MATERIAL

AC Asbestos Cement	
BR Brick	
CI Cast Iron	
SI Spun (Grey) Iron	
CO Concrete	
CS Concrete Segments (Bolted)	
CS Concrete Segments (Unbolted)	
CC Concrete Box Culvert	
DI Ductile Iron	
GR Glass Reinforced Concrete	
GR Glass Reinforced Plastic	
PS Plastic / Steel Composite	
PV Polyvinyl Chloride	
PE Polyethylene	
RP Reinforced Plastic Matrix	
ST Steel	
VC Vitrified Clay (All Clayware)	
PP Polypropylene	
PF Pitch Fibre	
MA Masonry - In Regular Courses	
MA Masonry - Randomly Coursed	
U Unspecified	

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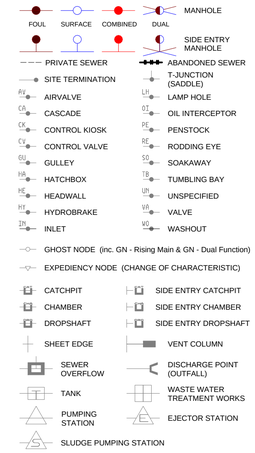
OS Sheet No: SJ8497NW
Scale 1:1250 Date: 1-Feb-2012
346 Nodes
Sheet 1 of 2

United Utilities
SEWER RECORDS

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
3710	38.61	C	M	29.6	2100		C	BR		34.01
3711		C	J		2100		C	BR		14.87
3712		C	M		300		C	VC		38.18
3714		C	G		300			VC		8.06
3717		C	G		300			VC		19.1
3721		C	J		2100		C	BR		60.31
3722	40.12	C	M		300			VC		5
3723	40.74	C	M		900		C	CO		30
3800		C	M		700	450	E	BR		26.03
3801	42.26	C	M	41.54					8	7.07
3802	42.35	C	M	40.62	700			BR		3.61
3803		C	S	34.73	960	480	R	BR	100	4
3804	42.27	C	M	34.63	300		C	CO	2	5.83
3805	42.14	C	M	32.25	900		C	CO	142	102.55
3806	41.87	C	M							
3807	41.54	C	M	37.86	700	450	E	BR		31.25
3808	41.73	C	M		700			BR		3.61
3809		C	R	36.68						3.61
3810	41.62	C	M	37.79	700			BR	-152	10.63
3811	41.71	C	M		630			BR		4.24
3812		C	L	36.82	630			BR		14.14
3813	41.88	C	M	41.08					1	2.83
3814	41.93	C	M	36.7	630	490	E	BR	-65	7.81
3816	41.58	C	M	31.53	900		C	CO		29
3816	41.58	C	M	31.53	450		C	VC		9.49
3819		C	J		700	500	E	BR		7.28
3820	20.93	C	M		1520		C	BR		14.87
3821	40.97	C	M	35.59	1520		C	CSU	55	102.67
3822		C	J		630			BR		2.24
3823		C	Q	35.09	710	480	E	BR	21	57.28
3824		S	G		450		C	VC		20
3826		F	Q							10.75
3901	43.89	C	M	38.57	600		C	CO	36	67.88
3902		C	M		1520		C	BR		6.4
3903	43.1	C	M	36.69	600		C	CO	40	23.41
3905	42.91	C	M	36.1	600		C	CO		5.66
3908		C	J		1520		C	BR		78.49
3909		C	J		1520		C	BR		10.63
3910		C	G		700	500	E	BR		12.65
3911		C	G		750	500	E	BR		54.49
4503	32.84	S	M	27.94	900		C	CO	216	54.12
4507		C	J		500	700	E	BR		15.52
4600		C	M		300		C	CO		9.29
4602	38.66	C	M	32.55	300		C	CO	80	19.31
4603		C	J		950	550	E	BR		49.04
4604		C	Q	31.17	500	900	E	BR	26	37.36
4605	38.56	C	M	32.05	300		C	VC		3.61
4606	38.12	S	M	27.75	900		C	CO	348	59.2
4607		C	Q	32.31	300		C	VC	72	18.03
4608		C	Q		225		C	VC		14.87
4609	37.91	C	M		500			BR		3.16
4611	37.31	C	M	30.38	225		C	VC		26.93
4612	36.55	S	M	27.58	900		C	CO	-276	99.48
4613		C	M				C			4.19
4615		C	G		225		C	VC		7.62
4616		F	Q				C			20.51
4617		C	L	28.48	900		C	CO	79	33.84
4618	36.52	C	M		900		C	CO		26.25
4619		C	J		300			VC		4.12
4620		C	M				C			4.37
4701		S	G		300			VC		7.07
4702	39.82	C	M	37.32	900		C	CO	4	16.28
4704	39.49	C	M	34.11	300		C	VC	11	52.02
4705	39.01	C	M	32.58	540	820	E		26	36.69
4706	39.12	S	M	27.98	600		C	CO	343	78.79
4707		C	V	29.39	2100		C	BR		11.05
4707		C	V	29.39	300			VC		1.17
4708		C	M		300		C	VC		131.1
4709		S	M		600			VC		12.81
4711		S	J		600			CO		6
4712		S	G		450		C	VC		13.04
4713		S	G		450		C	VC		18.79
4714		C	J		2100		C	BR		42.49
4715		S	G		600			VC		47.61
4716		C	G							6.32
4717		C	G		300			CO		24.71
4718		C	Q	33.36	520	910	E		4	16.19
4801	42.14	C	M	36.59	1520		C	CSB	65	64.79
4802	41.76	C	M	34.87	1520		C	CO	87	13.07
4803	41.07	C	M	38.7	1520			CO	6	22.15
4804	40.39	C	M	32.52	1500		C	CSB	34	20.41
4805	40.39	S	M	32.75	600		C	VC		33.3
4806		C	J	34.72	1520		C	CSB	42	57.79
4807		C	G		525		C	VC		7.22
4901	43.04	C	M	39.84	700			BR		55.97
4902	42.6	C	M	37.91	690	450	R	BR		13.51
4903	41.07	C	M	38.22	1520			CO	-32	15.48
4904	43.33	C	M	38.54	1520		C	CSB	49	92.76
4905	42.73	C	M							
4906	43.26	C	M	41.95	450			CI	7	14.14
4907		C	Q		450		C	CO		13.32
4908		C	J		700	450	E	BR		13.36
4909		C	G		680	460	E	BR		8.49
4910		C	G							10.52
4911		C	Q		1520		C	BR		45.97
4912		C	G		225		C	VC		4.24

WASTE WATER SYMBOLOGY



Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

- F Foul
- S Surface
- C Combined
- T Transition
- O Overflow
- U Unspecified

MANHOLE / NODE TYPE

- M Manhole
- J Junction
- L Lamphole
- H Hatchbox
- R Rodding Eye
- F Outfall
- V Combined Sewer Overflow
- P Pumping Station
- S Soakaway
- D Dual Function Manhole
- W Treatment Works
- Z Ghost in Rising Main
- C Cascade
- Y Gulley
- E Ejector
- O Oil Injector
- I Inlet
- B Hydrobrake
- T Vent Column
- X Valve
- U Unspecified
- Q Expediency Node
- G Ghost (to allow pipe bends)

SEWER SHAPE

- C Circular
- E Egg
- O Oval
- F Flat Top
- R Rectangular
- S Square
- T Trapezoidal
- A Arch
- B Barrel
- H Horseshoe
- U Unspecified

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- CI Cast Iron
- SI Spun (Grey) Iron
- CO Concrete
- CS Concrete Segments (Bolted)
- CS Concrete Segments (Unbolted)
- CC Concrete Box Culvert
- DI Ductile Iron
- GR Glass Reinforced Concrete
- GR Glass Reinforced Plastic
- PS Plastic / Steel Composite
- PV Polyvinyl Chloride
- PE Polyethylene
- RP Reinforced Plastic Matrix
- ST Steel
- VC Vitrified Clay (All Clayware)
- PP Polypropylene
- PF Pitch Fibre
- MA Masonry - In Regular Courses
- MA Masonry - Randomly Coursed
- U Unspecified

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OS Sheet No: SJ8497NW
Scale 1:1250 Date: 1-Feb-2012
346 Nodes
Sheet 2 of 2

United Utilities
SEWER RECORDS


Oxford Road Station
NEW WILDEN FERRY LOOP
NEW WILDEN FERRY
YORK STREET
Bracken House
New Broadcasting House
Interdisciplinary Biocentre
George Begg Building
Princess House
Blue Boar Medical Practice
Rowbotham Square
Rowbotham Street
Lyon Street
Lyon Street Car Park
Lyon Street Multi-Storey Car Park
Lyon Street Multi-Storey
Lyon Street Multi-Storey Car Park Ramp
Lyon Street Multi-Storey Car Park Ramp Down
Lyon Street Multi-Storey Car Park Ramp Up
HULME STREET
Upkes Yard
The Quadrangle
BRUNCASTER ROAD
Armstrong House
Oxford House
Oxford Road Station Entrance
Oxford Road Station Exit
Oxford Road Station Exit Ramp
Oxford Road Station Exit Ramp Down
Oxford Road Station Exit Ramp Up
Oxford Road Station Exit Ramp Up Car Park
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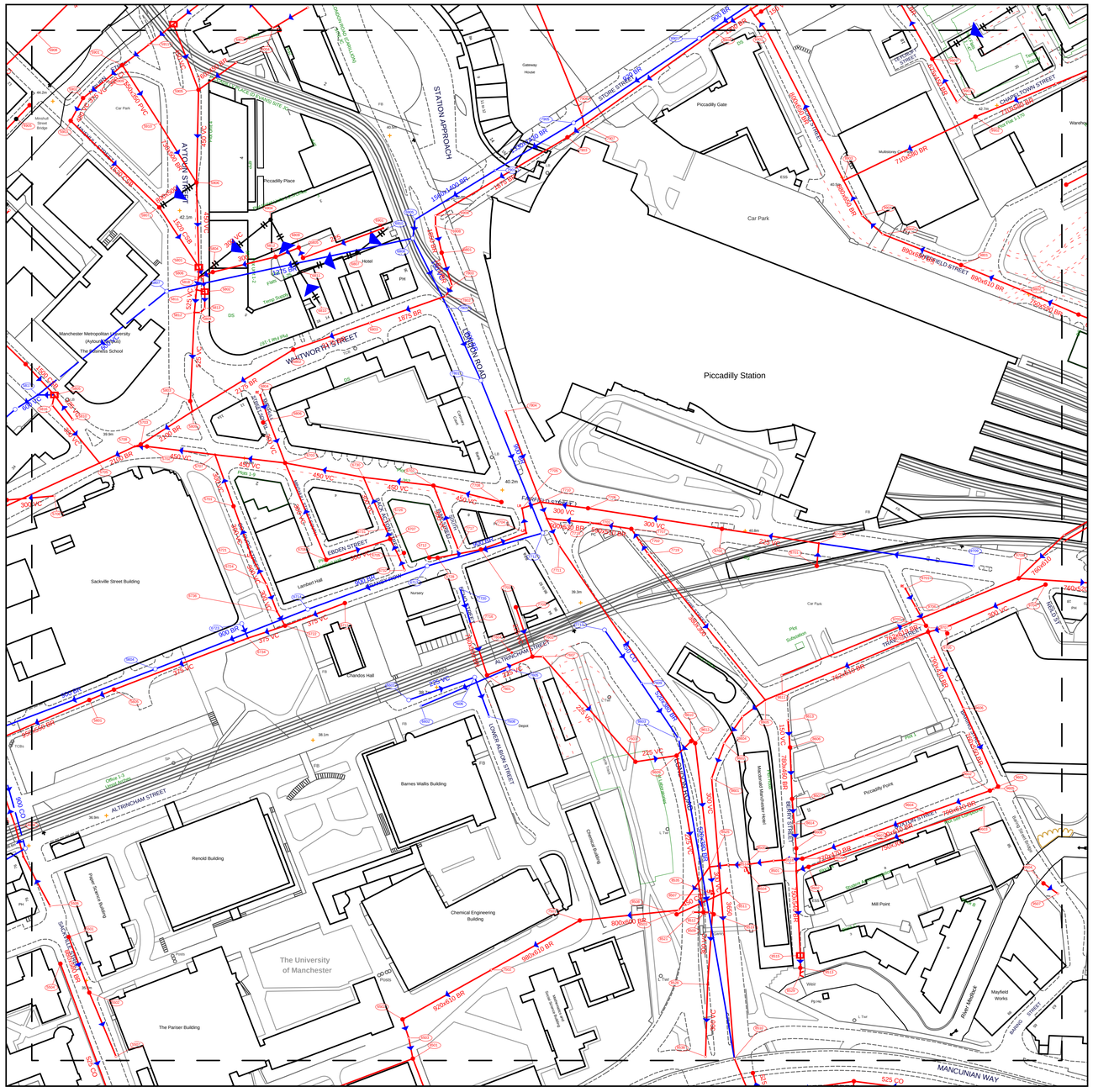

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
5501	35.75	C	M	31.79	880	580	E	BR	10	28.79
5502	35.23	C	M	29.02	880			BR		33.62
5504		C	M		525		C	CO		103.46
5506		C	G							27.29
5507		C	G							
5601	38.65	C	M		950	550	E	BR		55.54
5604	40.27	S	M	27.99	900		C	BR	352	84.5
5605	39.89	C	M	35.27	950	550	E	BR		13
5701	39.98	C	M	32.58	300		C	VC		26.57
5702	39.97	C	M	32.34	450			VC		6
5703	39.99	C	M	30.46	2100		C	BR		3.16
5705		C	J		2100		C	BR		110.07
5706		C	G		300		C	VC		23.09
5707		C	J		450		C	VC		33.24
5708		C	J		2100		C	BR		18.79
5801		C	V	32.28	525		C	VC		5
5801		C	V	32.28	1520			CSB		5.33
5802		C	V	32.32	375		C	VC		8.11
5802		C	V	41.1	300		C	CI		4.18
5803	40.47	C	M	31.63	525		C	VC		5.1
5804	33.25	C	M	32.39	300		C		124	7.42
5805		C	V	31.72	300		C	VC		5.11
5805		C	V	40.14	225		C	VC		8.05
5806		C	J		525		C	VC		6.08
5807	41.18	S	M	26.88	600		C	VC		80.24
5808		C	G		525			VC		3
5809		C	J		2100		C	BR		29.68
5810		C	G		225		C	VC		14.97
5811		C	J		525		C	VC		11.05
5812		C	J		525		C	VC		43.05
5813		O	G		375			VC		2.83
5816		C	G		300		C	VC		36.24
5817		S	J		600		C	VC		13.04
5818		O	G		340	380	E	BR		6.97
5901	43.76	C	M	39	320		C	CI	241	12.04
5901	43.76	C	M	39.31	550	350	E	PVC	30	33.29
5902	43.51	C	M	37.55	450		C	VC	45	12.53
5903	43.62	C	M	36.7	1520		C	CSB	118	60.11
5904		F	Q		760	450	E	BR		22.56
5905	43.72	C	M	38.39	450		C	VC	34	45.01
5906	42.37	C	M	37.07	450		C	VC	9	41.02
5907	42.2	C	M	35.78	1520		C	CSB	29	34.75
5908		C	G		450		C	CI		50.21
5909		C	Q	38.95	375		C	VC	320	12.81
5910		C	Q	38.19	730	500	E	BR	30	34.13
5911		C	Q	39.72	500	340	E	PVC	48	16.4
6501		C	M		525		C	CO		36.4
6502	33.79	C	M	27.8	920	630	E	BR		9.49
6503		C	Q		600	500	E	BR		10.2
6601	38.42	S	M	36.88	225		C	VC	113	33.84
6602		S	G							
6702	40.11	C	M	32.69	450		C	VC		34.23
6703	40.03	C	M	36.24	450		C	VC		34.23
6705	40.96	C	M	38.14	300		C	VC	2	8.94
6706	40.88	C	M	33.28	300		C	VC	-17	51.08
6706	40.88	C	M	33.28	300		C	VC	112	32.57
6707	40.67	C	M	32.99	300		C	VC		5.39
6711		C	M		375		C	VC		31.02
6712	41	C	M	38.02					-10	4
6713	40.85	S	M	28.46	900		C	BR	411	61.68
6714	41.23	S	M	28.31	900		C	BR	248	79.48
6721		C	L	32.31	300		C	VC	-98	26.57
6722	41.18	C	M	35.31	375		C	VC		18.97
6723	41.09	S	M	36.07	375		C	VC		7.62
6724		C	G		300		C	VC		14.76
6724		C	G		300		C	VC		13.93
6726		C	J		300		C	VC		25.08
6728	40.96	C	M	38.41					5	21.38
6730		C	J		450		C	VC		38.64
6731		C	J		300		C	VC		2.24
6732		C	G		300		C	VC		7.62
6734		C	J		375		C	VC		69.64
6736		C	J		300		C	VC		8.06
6801	39.58	C	M	31.14	1875		C	BR		16.76
6802	40	C	M	38.08	2175		C	BR		57.45
6803		C	Q		2175		C	BR		39.22
6804		C	R	32.82	300			VC	-4	12.65
6805	33.93	C	M	32.69	300		C		136	5.44
6806	40.2	C	M	36.25	300		C	VC	2247	22.47
6807	33.99	C	M							
6808	39.59	S	M	29.25	150		C	VC	422	38.01
6808	39.59	S	M	29.25	1275		C	BR	52	122.2
6809	33.25	C	M	32.65	300		C		151	12.07
6810		C	G							
6811		C	J							
6812	33.25	C	M	32.57	300		C		174	31.37
6901		F	R		225		C			41.47
6902		C	L							
6904	36.93	C	M							
6905		S	G		1560	1400	E	BR		9.06
6906		C	G		1850		C	BR		5
6908		C	G		1850		C	BR		13.34
6910		S	G							
7501	33.92	C	M	28.07	980	610	E	BR	379	49.24
7502		C	Q	27.94	920	610	E	BR	410	49.24
7601	38.99	C	M	32.68	225		C	VC	19	23.77
7602	39.03	C	M	31.45	225		C	VC		5
7603	37.18	C	M	29.21	225		C	VC	144	20.22
7604		C	R							
7605	38.94	S	M	33.91						45.69
7606	38.91	S	M	36.58	225			VC		20.25
7607		C	G		225		C	VC		68.01
7608		S	G							

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
7609		S	Q	33.38	520	380	E	BR	35	32.45
7701		C	Q		600	530	E	BR		21.1
7702		C	Q		570	500	F	BR		7.21
7703	40.45	C	M	34.33	300			VC	26	23.41
7704		C	L	33.42	300			VC	-47	12.17
7705		C	L	33.68	300			VC		9.49
7706	40.38	C	M	35.96	300		C	VC		23.19
7707	40.54	C	M	37.69	590	510	F	BR		20.22
7708	40.02	C	M	32.88	450		C	VC	179	33.96
7709	39.81	C	M	35.3	225		C	VC	7	25.3
7710		C	J		300			VC		8.54
7711		C	G		300			VC		116.5
7712	40.01	S	M		900		C	BR		58.24
7713	38.95	S	M	34.32	450		C	CO	34	31.62
7716		C	J		760	500	E	BR		26.25
7717		C	G		300		C	VC		33.24
7718		C	J		600			BR		14.32
7719		C	G		600	530	E	BR		7.21
7719		C	G		380	300	E			91.05
7720		S	G		760	500	E	BR		17.72
7801	39.93	S	M	29	900		C	BR		79.85
7802		C	G		1875		C	BR		39.22
7803		C	G		1875		C	BR		5.83
7804		C	G		300			VC		47.17
7805		S	Q	29.16	900		C	BR	240	38.48
7901		S	Q		1560	1400	E	BR		45.79
7903	38.9	C	M	31.44	1875		C	BR		74.43
7905	38.95	S	M	31.17	1330	1430	E	BR		44.42
7906		C	G		1875		C	BR		5.1
7907		C	J		1875		C	BR		10
8501		C	J		750	540	E	BR		41
8502	36.06	C	M	31.31	750	300				6.32
8503		C	G		800	600	E	BR		48.26
8504		C	L		300		C	VC		4.47
8505	36.03	C	M	28.48	780	600	E	BR		8
8506	36.07	C	M	31.29	760	470	F	BR	10	14.04
8507		C	L	35.09	300		C	VC		44.1
8508	34.72	C	M	28.31	450		C	CO		26.4
8509	35.45	C	M	28.37	930	600	E	BR		5
8510		C	G		3650		C			138
8511		C	F							
8512		C	Q	29.95	930	600	E	BR	2	3
8513	35.32	C	M	30.56	750	450	E	BR		3
8514		C	Q		870	600	E	BR		9.06
8515		C	V	30.62	600		C	CI	151	6.05
8516		C	Q	29.87	790	600	E	BR	10	14.14
8519	35.51	C	M	31.51	300		C	CO	1	2.24
8521		C	G							
8525		C	J		300		C	VC		13.15
8525		C	J		870			BR		25.81
8528		C	J		300		C	VC		35.01
8529		C	F							
8535		C	L							
8538		C	G							
8601		C	G		3650		C			136.44
8602		C	G							18.03
8603	37.44	S	M	32.42	520	380	E	BR		157.33
8604		C	G							15.81
8605		C	J							13.6
8606	38.34	C	M	37.17	780	460	E	BR	6	25.02
8607	37.43	C	M	32.74	740	400	E	BR	20	12.04
8608	36.26	C	M	31.5	740	450	F	BR		11
8609	37.27	C	M	29.05	225		C	VC	203	77.1
8610	37.29	C	M		300		C	VC		9.9
8611		C	G		762	619		BR		124.23
8612	37.1	C	M		300		C	VC		60.41
8613		C	G		150		C	VC		13.04
8614		C	Q	32.15	790	440	F	BR	20	12.04
8701	40.81	C	M	36.62	225			VC		11.05
8702	40.77	C	M	36.51	300		C	VC	120	65.76
8703		C	J		225		C	VC		47.52
8901	38.41	S	M	32.05	920		C	BR	119	73.5
8902		C	G		800	650	E	BR		10
8903		C	J		800	650	E	BR		80.95
8904		C	J		1900			BR		77.42
9504	35.39	C	M	32.18	225		C	VC		8.6
9507		C	G							
9601	37.07	C	M	32.81	225		C	VC	1	2.24
9602	37.01	C	M	28.78	790	610	E	BR		32.89
9603		C	G		750	300				89.81
9604		C	J		800	610	E	BR		31.95
9605		C	Q	30.91	300		C	VC	1	2.24
9606		C	Q	33.52	760	550	F	BR	60	41.63
9607		C	Q		770	470	F	BR		31.95
9701		C	R	34.34	680	650	E	BR	206	10.3
9702	39.84	C	M	34.18	780	510	F	BR	-35	1.41
9703	39.84	C	M	34.21	790	430	F	BR	59	40.72
9703	39.84	C	M		762	610		BR		85.62
9704	40.88	C	M	35.04	300		C	VC	-24	53.31
9705		C	M	33.87	300		C	VC	-14	8.25
9706		C	Q	34.29	700	630	F	BR	172	10.3
9707		C	Q	34.22	740	460	F	BR	-67	2
9708	40.85	C	M	37.49	760	520	E	BR		62.13
9709		S	G		225			VC		75.8
9801	40.8	C	M	36.49	890	650	E	BR		40.85
9802		C	Q	36.97	890	610	E	BR	65	31.38
9901	42.06	C	M	37.53	225		C	BR	16	40.31
9902	42.3	C	M	36.35	710	580	E	BR		71.11
9903		C	G		675	450	C	BR		24.19
9904		C	G		880	650	E	BR		19.24
9905		C	G		880	650	E	BR		13.45
9906		C	Q		710	580	E	BR		42.15

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WASTE WATER SYMBOLOGY

MANHOLE (FOUL, SURFACE, COMBINED, DUAL)

SIDE ENTRY MANHOLE

PRIVATE SEWER

ABANDONED SEWER

SITE TERMINATION

T-JUNCTION (SADDLE)

AIRVALVE

LAMP HOLE

CASCADE

OIL INTERCEPTOR

CONTROL KIOSK

PENSTOCK

CONTROL VALVE

RODDING EYE

GULLEY

SOAKAWAY

HATCHBOX

TUMBLING BAY

HEADWALL

UNSPECIFIED

HYDROBRAKE

VALVE

INLET

WASHOUT

GHOST NODE (inc. GN - Rising Main & GN - Dual Function)

EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)

CATCHPIT

SIDE ENTRY CATCHPIT

CHAMBER

SIDE ENTRY CHAMBER

DROPSHAFT

SIDE ENTRY DROPSHAFT

SHEET EDGE

VENT COLUMN

SEWER OVERFLOW

DISCHARGE POINT (OUTFALL)

TANK

WASTE WATER TREATMENT WORKS

PUMPING STATION

EJECTOR STATION

SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F	Foul	T	Transition
S	Surface	O	Overflow
C	Combined	U	Unspecified

MANHOLE / NODE TYPE

M	Manhole	Z	Ghost in Rising Main
J	Junction	C	Cascade
L	Lamphole	Y	Gulley
H	Hatchbox	E	Ejector
R	Rodding Eye	O	Oil Injector
F	Outfall	I	Inlet
V	Combined Sewer Overflow	B	Hydrobrake
		T	Vent Column
P	Pumping Station	X	Valve
S	Soakaway	U	Unspecified
D	Dual Function Manhole	Q	Expediency Node
		G	Ghost (to allow pipe bends)
W	Treatment Works		

SEWER SHAPE

C	Circular	T	Trapezoidal
E	Egg	A	Arch
O	Oval	B	Barrel
F	Flat Top	H	Horseshoe
R	Rectangular	U	Unspecified
S	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
CI	Cast Iron
SI	Spun (Grey) Iron
CO	Concrete
CS	Concrete Segments (Bolted)
CS	Concrete Segments (Unbolted)
CC	Concrete Box Culvert
DI	Ductile Iron
GR	Glass Reinforced Concrete
GR	Glass Reinforced Plastic
PS	Plastic / Steel Composite
PV	Polyvinyl Chloride
PE	Polyethylene
RP	Reinforced Plastic Matrix
ST	Steel
VC	Vitrified Clay (All Clayware)
PP	Polypropylene
PF	Pitch Fibre
MA	Masonry - In Regular Courses
MA	Masonry - Randomly Coursed
U	Unspecified

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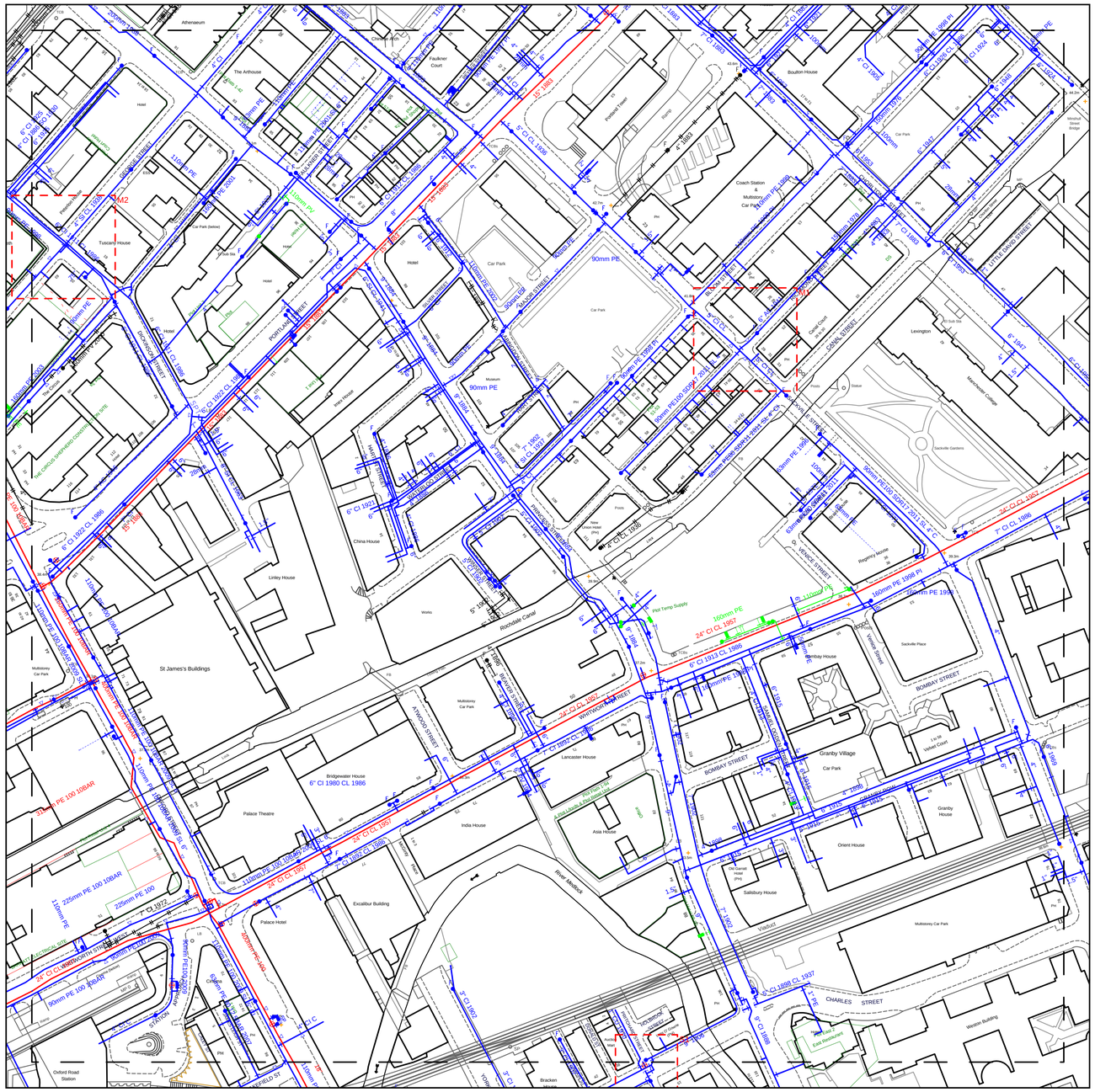
205 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS


MANCUNIAN WAY
SACKVILLE STREET
Chemistry Building
Ferranti Building
Elevated Road
DOWNING STREET
Downing Street Industrial Estate
CORAM STREET
CLOSE STREET
Factory
Works
CORAM PLACE
Lamport Court
LAMPORT CLOSE
Museum of Science and Industry
Grosvenor Building
GROSVENOR STREET
SILKIN CLOSE
Silkin Court
HANKEY PLACE
HANKEY CLOSE
WADDON WAY
Schaalben House
KALE STREET
JUSTIN CLOSE
Hall
The Grosvenor Centre
BIRLEY STREET
Manchester Metropolitan University
Manchester Science Partks
KINCARDINE ROAD
JOHN DALTON STREET
JOHNSON STREET
PRITCHARD STREET
PRINCESS STREET
OXFORD ROAD
Garage
Gartside Gardens
INCHLEY ROAD
Kings Arms (Pub)
Manchester Metropolitan University
Mayfield
Mayfield Walk
Mayfield Square
Mayfield Park
Mayfield Depot
Mayfield Tram Stop
Mayfield Tram Stop Platform
Mayfield Tram Stop Platform
Mayfield Tram Stop Platform



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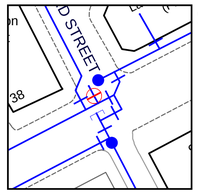
S1



S2

S3

S4

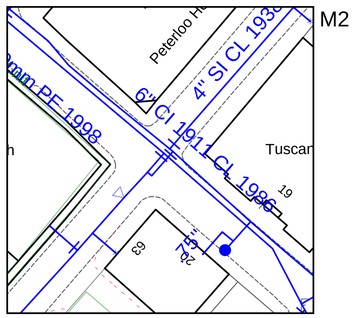
L1

L2

M1



M2



M3

M4

PIPEWORK

- TRUNK MAIN
- DISTRICT MAIN
- NON-POTABLE MAIN
- PROPOSED
- AQUEDUCT
- COMMON PIPE
- PRIVATE PIPE
- ABANDONED

NODES / FURNITURE

END CAP, CLOCKWISE VALVE, ANTI-CLOCKWISE VALVE, SHEET EDGE

AIR VALVE, TREATED WATER SLUICE VALVE, PRESSURE SUSTAINING VALVE, PRESSURE REDUCING VALVE, REFLUX VALVE

CHANGE OF CHARACTERISTIC, ANODE, CHLORINATION POINT, DE-CHLORINATION POINT

BORE HOLE, ABSTRACTION POINT, INLET POINT, BULK SUPPLY POINT

NWW WASHOUT, F FIRE HYDRANT, F/W SHARED HYDRANT, PUMP

SITE TERMINATION, INTERMEDIATE NODE, CONCESSION START, CONCESSION END

METER, METER AND STOPTAP, STOPTAP, MONITOR LOCATION

SP STRAIN POINT, AP ACCESS POINT, HB HATCHBOX, IP INSERT PROBE POINT

RM ROUTE MARKER, SPT SAMPLING POINT, LB LOGGER BOX

PROPERTY TYPES

CONDITION REPORT, PB PIPE BRIDGE, PT PIPE TUNNEL

TS TELEMETRY STATION, PUMPING STATION, PUMP HOUSE

WATER TREATMENT WORKS, PRIVATE TREATMENT WORKS, VH VALVE HOUSE, WATER TOWER

CS CONFINED SPACE, DU DIALYSIS UNIT, SR SERVICE RESERVOIR, SUP RES SUPPLY RESERVOIR

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT
TB	TAR OR BITUMEN
ER	EPOXY RESIN

INSERTION TYPES

DD	DIE DRAWN
DR	DIRECTIONAL DRILLING
MO	MOLING
PI	PIPELINE
SL	SLIP LINED

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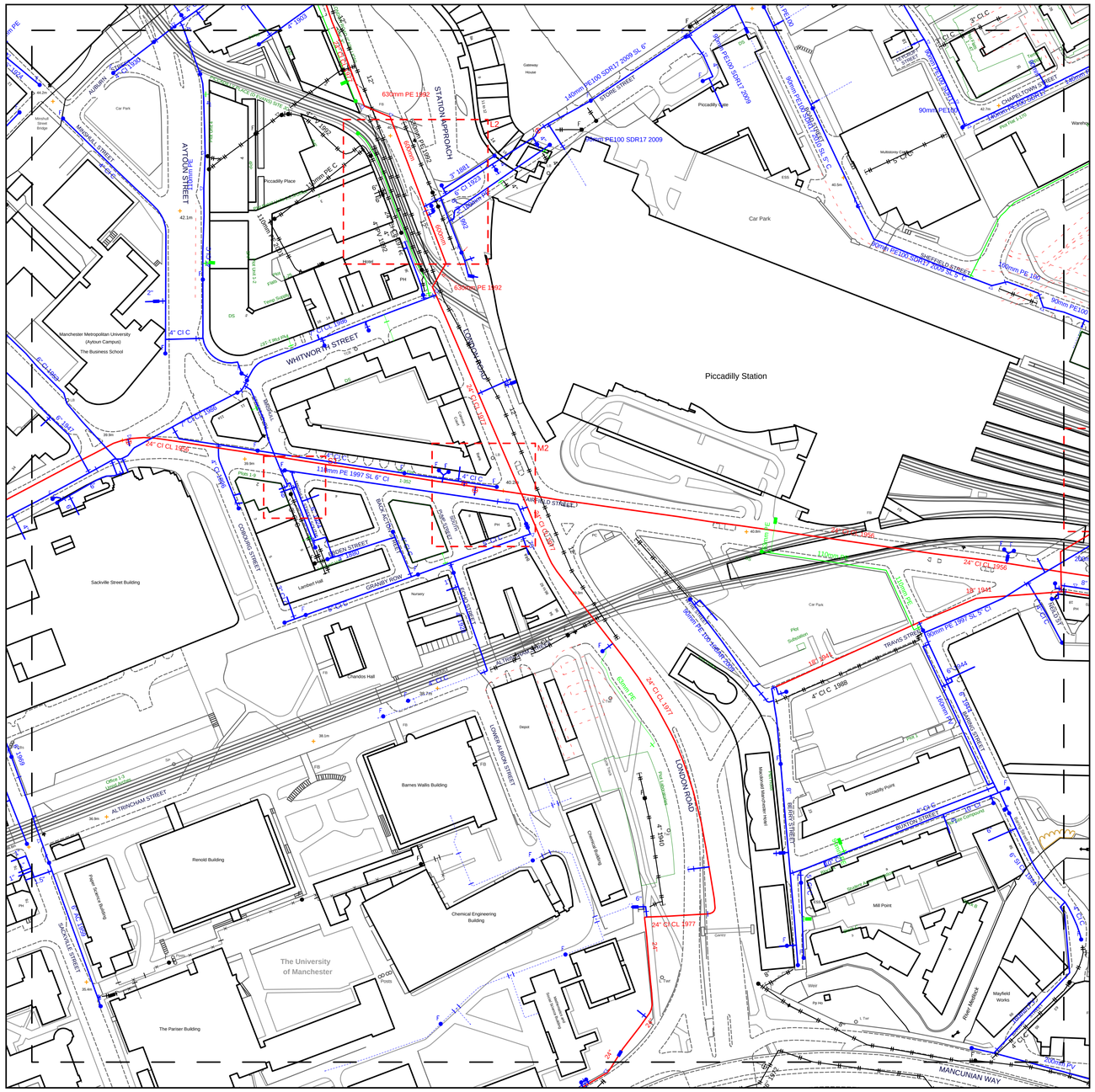
United Utilities

WATER MAINS RECORDS


Oxford Road Station
PRIMROSE ST
NEW WAKEFIELD STREET
MARK BROWN'S WHARF
HULME STREET
Dickies Yard
The Quadrangle
BRUNSWICK STREET
OXFORD ROAD
BRAZENNOSE STREET
CHARLES STREET
YORK STREET
PRINCESS STREET
BRIDGE STREET
LOWER ORMOND STREET
BRANCASTER ROAD
CLAY STREET
SACKVILLE STREET
New Broadcasting House
Interdisciplinary Biocentre
George Begg Building
Armstrong House
Oxford House
John Dalton Building
University Union Building
Sugden Sports Centre
MANCUNIAN WAY (Elevated Road)
The Manchester Metropolitan University
All Saints Building
Hub and Business Centre
Grosvenor Square
Bellhouse Building
St Augustine's
St Augustine's Church
Ormond Building
Cavendish Building
Cambridge Hall (North)
Mabel Tylecote Building
Grosvenor Building
The Aquatic Centre
GROSVENOR STREET
CAVENDISH STREET
LOWER CHATHAM STREET
LOWER ORMOND STREET
COBURN PLACE
Hilton Hotel
Premier Inn
Club
PH
Bracken House
Abtex House
Works
Garage
Subway
Tennis Court
Gantry
Sub Sta
Posts
TCBs
Pol
Pol Temp Supply
Pol Twin Supply
Pol School of Law
Pol Hub and Business Centre
Pol Quadrangle
Pol Oxford Rd
Pol Brunswick St
Pol Clay St
Pol Princess St
Pol Charles St
Pol Bridge St
Pol Grosvenor St
Pol Cavendish St
Pol Lower Ormond St
Pol Lower Chatham St
Pol Coburn Place
Pol Sackville St
Pol Mancunian Way
Pol Temp Supply
Pol Twin Supply
Pol Primrose



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S1

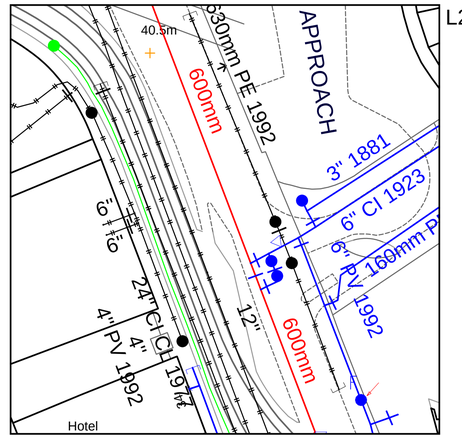
S2

S3

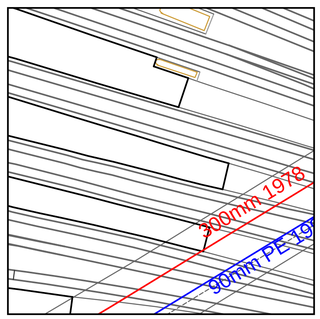
S4

L1

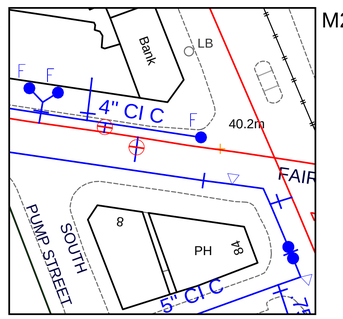
L2



M1



M2



M3

M4

PIPEWORK

- TRUNK MAIN
- DISTRICT MAIN
- NON-POTABLE MAIN
- PROPOSED
- AQUEDUCT
- COMMON PIPE
- PRIVATE PIPE
- ABANDONED

NODES / FURNITURE

END CAP, CLOCKWISE VALVE, ANTI-CLOCKWISE VALVE, SHEET EDGE

AIR VALVE, TREATED WATER SLUICE VALVE, PRESSURE SUSTAINING VALVE, PRESSURE REDUCING VALVE, REFLUX VALVE

CHANGE OF CHARACTERISTIC, ANODE, CHLORINATION POINT, DE-CHLORINATION POINT

BORE HOLE, ABSTRACTION POINT, INLET POINT, BULK SUPPLY POINT

NWW WASHOUT, F FIRE HYDRANT, F/W SHARED HYDRANT, PUMP

SITE TERMINATION, INTERMEDIATE NODE, CONCESSION START, CONCESSION END

METER, METER AND STOPTAP, STOPTAP, MONITOR LOCATION

SP STRAIN POINT, AP ACCESS POINT, HB HATCHBOX, IP INSERT PROBE POINT

RM ROUTE MARKER, SPT SAMPLING POINT, LB LOGGER BOX

PROPERTY TYPES

CONDITION REPORT, PB PIPE BRIDGE, PT PIPE TUNNEL

TS TELEMETRY STATION, PUMPING STATION, PUMP HOUSE

WATER TREATMENT WORKS, PRIVATE TREATMENT WORKS, VH VALVE HOUSE, WATER TOWER

CS CONFINED SPACE, DU DIALYSIS UNIT, SR SERVICE RESERVOIR, SUP RES SUPPLY RESERVOIR

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT
TB	TAR OR BITUMEN
ER	EPOXY RESIN

INSERTION TYPES

DD	DIE DRAWN
DR	DIRECTIONAL DRILLING
MO	MOLING
PI	PIPELINE
SL	SLIP LINED

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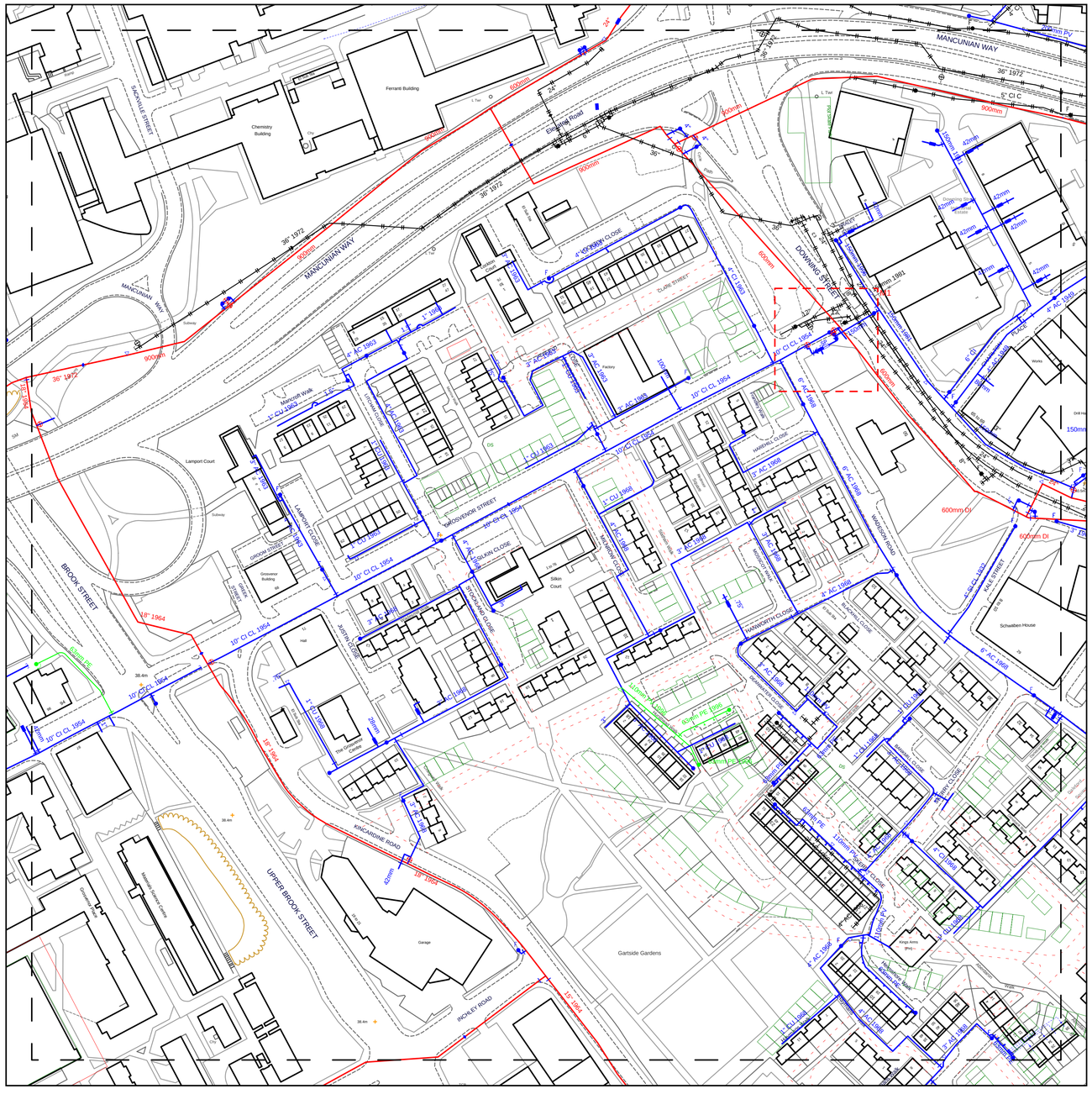
OS Sheet No: SJ8497NE
Scale 1:1250
Date: 1-Feb-2012

United Utilities
WATER MAINS RECORDS


MANCUNIAN WAY
SACKVILLE STREET
Chemistry Building
Ferranti Building
Lamport Court
Subway
Sub Sta
Sub Sta
Sub Sta

Conditions and information regarding wastewater network

These general conditions and precautions apply to the wastewater network of United Utilities.

Please ensure that a copy of these conditions is passed to your representative and contractor on site.

1. United Utilities provides the approximate locations of its sewers according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of every sewer culvert or drain, private connections from properties to the public sewers or the particulars of any private system. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated. The records do indicate the position of the nearest known public sewer from which the likely length of private connections can be estimated together with the need for any off site drainage rights or easements.

2. Special requirements relative to our sewers may be indicated. United Utilities employees or its contractors will visit any site at reasonable notice to assist in the location of its underground sewers and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, or any notification required under these General Conditions, please call us on **0845 746 2200**.

3. Where public sewers are within a site which is to be developed and do not take any drainage from outside the area, they are from an operational viewpoint redundant. The developer must identify all redundant sewers affected by the development and apply to United Utilities in writing for these sewers to be formally closed. The developer shall bear all related costs of the physical abandonment work.

4. Public sewers within the site that are still live outside the area, will be subject to a "Restricted Building zone". This would normally be a surface area equivalent to the depth of the sewer measured from the centre line of the sewer on either side. No construction will be permitted within that zone. The developer should also note that deep and wide rooted trees must not be planted in close proximity to live sewers. Access to public sewers must be maintained at all times and no interference to manholes will be permitted during construction work.

5. Where there is a public sewer along the line of a proposed development/building, arrangements shall be made by the developer at his cost to divert the sewer around the development. Where this is not possible and as a last resort, a "Building Over Agreement" will need to be completed under section 18 of the Building Act 1984. The developer shall design building foundations to ensure that no additional loading is transferred to the sewer and submit such details both to the Local Authority's Building Control Officer and to United Utilities for approval/acceptance. United Utilities on a rechargeable basis would normally undertake all aspects of design work associated with the diversion of any part of the operational wastewater network.

6. Where there is a non-main river watercourse/culvert passing through the site, the landowner has the responsibility of a riparian owner for the watercourse/culvert and is responsible for the maintenance of the fabric of the culvert and for all works involved in maintaining the unrestricted flow through it. Building over the watercourse/culvert is not recommended. The developer must contact the local authority before any works are carried out on the watercourse/culvert. Where it is necessary to discharge surface water from the site into the watercourse/culvert the developer shall make an assessment of the available capacity of the watercourse/culvert (based on a 1 in 50 year event) and ensure that the additional flow to be discharged into the watercourse/culvert will not cause any flooding. In appropriate cases, flooding may be prevented by on-site storage. The developer shall submit the relevant details required to substantiate his development proposals. Details of any outfall proposed shall also be submitted to the Environment Agency, PO Box 12, Richard Fairclough House, Knutsford Road, Warrington, Cheshire, WA4 1HT for their approval.

7. Where there is a main river watercourse/culvert passing through the site, the developer shall submit all proposals affecting the river to the Environment Agency at the address stated in paragraph 6 for approval/acceptance.

8. Your attention is drawn also to the following:

- **Private drains or sewers which may be within the site.** United Utilities has no duty to keep records of private drains and sewers, and there are no comprehensive records kept elsewhere. Local Authority Building Control Officers may have records of recent developments and they or the developer may be able to provide information in this respect.

- **Applications to make connections to the public sewer.** The developer must write to United Utilities requesting an application form that must be duly completed and returned. No works on the public sewer shall be carried out until a letter of consent is received from United Utilities.

- **Sewers for adoption.** If an agreement for the adoption of sewers under Section 104 of the Water Industry Act 1991 is being contemplated, a submission in accordance with "Sewers for Adoption", Fifth Edition, published by the Water Research Centre (2001) Plc, Henley Road, Medmenham, PO Box 16, Marlow, Buckinghamshire, SL7 2HD will be required, taking into consideration any departures from the general guide stipulated by United Utilities.

- **Further consultation with United Utilities.** Developers wishing to seek advice or clarification regarding sewer record information provided should contact United Utilities to arrange an appointment. A consultation fee may be charged, details of which will be made available at the time of making an appointment.

9. Combined sewers, foul sewers, surface water sewers, and pumped mains. These are shown separately in a range of colours or markings to distinguish them on our drawings, which are extracts from the statutory regional sewer map. A legend and key is provided on each extract for general use, although not all types of sewer will be shown on every extract.

   Combined sewers shown coloured red carry both surface water and foul sewage, especially in areas where there is no separate surface water sewerage system.

   Foul sewers coloured brown may also carry surface water and there may be no separate surface water system indicated in the immediate area. Both combined and foul sewers carry wastewater to our treatment works before it can safely be returned to the environment.

   Surface water sewers coloured blue on our drawings are intended only to carry uncontaminated surface water (e.g. rainfall from roofs, etc) and they usually discharge into local watercourses. It is important for the protection of the environment and water quality that only uncontaminated surface water is connected to the surface water sewers. Improper connections to surface water sewers from sink wastes, washing machines and other domestic use of water can cause significant pollution of watercourses.

   Pumped mains, rising mains and sludge mains will all be subject to pumping pressures and are neither suitable nor available for making new connections.

   Highway drains, when included, show as blue and black dashed lines. Highway drains are not assets belonging to United Utilities and are the responsibility of local authorities.

10. For information regarding future proposals for construction of company apparatus please write to United Utilities, PO Box 453, Warrington, WA5 3QN.

11. For information regarding easements, deeds, grants or wayleaves please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel: 01925 463 654**).

United Utilities Water PLC
Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington WA5 3LP
www.unitedutilities.com

Registered in England and Wales Registered Number 2366678

Conditions and information regarding water distribution apparatus

These general conditions and precautions apply to the water distribution system of United Utilities.

Please ensure that a copy of these conditions is passed to your representative and contractor on site.

1. United Utilities provides approximate locations of its water mains or apparatus according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of private service pipes from the mains to properties. Where service pipes are shown, a blue broken line indicates their approximate position. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated.

2. Special requirements relative to our apparatus may be indicated. United Utilities employees will visit any site at reasonable notice to assist in the location of its underground water apparatus and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, future proposals for construction of company apparatus or any notification required under these General Conditions, please telephone us on **0845 746 2200** or write to United Utilities, PO Box 453, Warrington, WA5 3QN.

3. In order to achieve safe working conditions adjacent to any water apparatus the following should be observed;

   (a) All water apparatus should be located by hand digging prior to the use of mechanical excavation.

   (b) During construction work where heavy plant may have to cross the line of a water main, and the main is not under a carriageway of adequate standard of construction, crossing points should be suitably reinforced with sleepers, steel plates or a specially constructed reinforced concrete raft as necessary. These crossing points should be clearly indicated and crossing the line of the water main at other places should be prevented. United Utilities employees will advise on the type of reinforcement necessary. This is particularly important on agricultural or open land, where tilling or erosion may have significantly reduced the original cover.

   (c) No explosive should be used within 32 metres of any United Utilities apparatus without prior consultation with United Utilities.

   (d) Where it is proposed to carry out piling within 15 metres of any water main United Utilities should be consulted so that the affected main may be surveyed.

4. During any excavation, it is important that measures should be taken to ensure continued support for any water main:

   (a) Where excavation of trenches adjacent to any water main is likely to affect its support, the main must be supported to the satisfaction of United Utilities.

   (b) Where a trench is excavated crossing or parallel to the line of a water main, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the main. In special cases it may be necessary to provide permanent support to a main which has been exposed over the length of the excavation before back-filling and reinstatement is carried out. No back-filled concrete should contact the main.

5. No other apparatus should be laid over and along the line of a water main irrespective of clearance. A minimum clearance of 450 millimetres should be allowed between any plant being installed and an existing main, to facilitate maintenance and repair, whether the adjacent plant is parallel to or crossing the main. No manhole, chamber, or other obstruction should be built over or around a water main.

6. Where a water main is coated with special wrapping and the wrapping is damaged, even to a minor extent, United Utilities must be notified, and the excavation must be left open for ready access so that repairs can be made. In case of any material damage to the main itself causing leakage, or weakening of the mechanical strength of the pipe, the person or body responsible should immediately notify United Utilities in order that the necessary remedial work can be carried out. The full cost of the necessary remedial work will be charged to the person or body responsible for the damage.

7. If you propose to change existing levels over water mains you will need to inform us. We will need specific locations to be identified together with precise details as to the scale of the proposed changes to existing ground levels. Changes to existing levels may require the diversion of our apparatus at your cost. However, in certain circumstances we may wish to leave our apparatus where it is. On these occasions you will usually be required to protect our apparatus by means of a concrete raft and either raise or lower any surface boxes affected.

8. Under no circumstances should our surface boxes be either buried or left in a situation where they are raised above finished ground levels. You should re-use and re-set any surface boxes affected by your works into the new surface so that they align over the water apparatus below. You will be responsible for the cost of repairing any damage to our apparatus as a result of your works.

9. Where proposals involve resurfacing, you must notify United Utilities if your excavation will be greater than 750mm in the highway and 300mm in a footpath, verge or other location.

10. For information regarding easements, deeds, grants, licences or wayleaves, please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel: 01925 463 654**).

Tree planting restrictions over water mains

a) Poplar and willow trees have extensive root systems and should not be planted within 10 metres of any water main.

b) The following trees and those of a similar size, whether they are deciduous or evergreen, should not be be planted within six metres of any water main:

- Ash, beech, birch, elm, horse chestnut, lime, oak, sycamore;
- Apple trees and pear trees;
- Most conifers.

c) United Utilities requires access to the route of its mains at all times to inspect for leaks and carry out surveys. We recommend that no shrubs or bushes which might obstruct or interfere with our access should be planted within one metre of the centre line of any water main.

d) There may be instances when both United Utilities and the landowner will wish to plant shrubs or bushes close to the water main for screening or other purposes. The following shallow rooting shrubs would be suitable for this purpose:

- Blackthorn, broom, cotoneaster, elder;
- Hazel, laurel, privet, quickthorn, snowberry;
- Most ornamental flowering shrubs.

e) In areas where soft fruit is grown, blackcurrant, raspberries and gooseberries may be planted close to the main, provided that a path is left clear for inspection access and surveys. United Utilities can give additional advice where required in particular circumstances.

United Utilities Water PLC
Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington WA5 3LP
www.unitedutilities.com

Registered in England and Wales Registered Number 2366678

DRAINAGE FOR HIGHWAYS WORKS WILL BE DEALT WITH AS PART OF THE S278 WORKS

DRAINAGE CONNECTS TO SURFACE WATER SEWER UNDER OXFORD ROAD

SMALL LANDSCAPED AREA ASSUMED TO BE PERMEABLE

AREA E2 DRAINAGE DISCHARGES TO RIVER MEDLOCK

DRAINAGE FOR HIGHWAYS WORKS WILL BE DEALT WITH AS PART OF THE S278 WORKS

AREA E3 DRAINAGE CONNECTS TO COMBINED SEWER UNDER BROOK STREET

KEY

- PHASE 1B APPLICATION BOUNDARY
- EXISTING SURFACE WATER DRAINAGE
- EXISTING COMBINED DRAINAGE
- EXISTING IMPERMEABLE AREA FOR PHASE 1B WORKS
- AREA FALLS UNDER PREVIOUS APPLICATION FOR PHASE 1 A WORKS
- AREA OF FUTURE DEVELOPMENT PHASES

OUTFALL NOTES

AREA E1

THE EXISTING AREA E1 IS APPROXIMATELY 1.463 HA AND IS 100% IMPERMEABLE. THE EXISTING FLOW RATES FOR THE TOTAL SITE HAVE BEEN CALCULATED BASED ON A MODEL OF THE EXISTING NETWORK.

THE FLOW RATES FOR THE TOTAL SITE ARE APPROXIMATELY:
- 144 l/s FOR THE 1 IN 1 YEAR EVENT
- 351 l/s FOR THE 1 IN 30 YEAR EVENT
- 435 l/s FOR THE 1 IN 100 YEAR EVENT

THE TOTAL RUNOFF VOLUME FOR THE 100 YEAR, 6 HOUR EVENT IS 984m³

AREA E2

THE EXISTING AREA E2 IS APPROXIMATELY 0.154HA AND IS 100% IMPERMEABLE. THE EXISTING FLOW RATES FOR THE TOTAL SITE HAVE BEEN CALCULATED BASED ON A MODEL OF THE EXISTING NETWORK.

THE FLOW RATES FOR THE TOTAL SITE ARE APPROXIMATELY:
- 17.5 L/S FOR THE 1 IN 1 YEAR EVENT
- 30.9 L/S FOR THE 1 IN 30 YEAR EVENT
- 37.7 L/S FOR THE 1 IN 100 YEAR EVENT

THE TOTAL RUNOFF VOLUME FOR THE 100 YEAR, 6 HOUR EVENT IS 101m³

AREA E3

THE EXISTING AREA E3 APPROXIMATELY 0.369 HA AND IS 100% IMPERMEABLE. THE EXISTING FLOW RATES FOR THE TOTAL SITE HAVE BEEN CALCULATED BASED ON A MODEL OF THE EXISTING NETWORK.

THE FLOW RATES FOR THE TOTAL SITE ARE APPROXIMATELY:
- 39.0 L/S FOR THE 1 IN 1 YEAR EVENT
- 104.4 L/S FOR THE 1 IN 30 YEAR EVENT
- 133.7 L/S FOR THE 1 IN 100 YEAR EVENT

THE TOTAL RUNOFF VOLUME FOR THE 100 YEAR, 6 HOUR EVENT IS 235m³

REFERENCE SHOULD BE MADE TO THE EXISTING DRAINAGE MODEL CALCULATIONS

TOTAL AREA OF APPLICATION BOUNDARY IS 3.2 Ha. THIS INCLUDES AREAS OF HIGHWAYS WORKS. THE DRAINAGE FOR THESE WORKS WILL BE DEALT WITH AS PART OF THE S278 WORKS AND ARE NOT CONSIDERED IN THE FRA FOR PHASE 1B

Rev:	Description:	Date:	By:	Chkd:
D	MASTERPLAN UPDATED	19.08.16	ATL	CG
C	MASTERPLAN UPDATED	12.04.16	ATL	CG
B	AREA E3 AMENDED	15.01.16	ATL	CG
A	MASTERPLAN UPDATED	11.01.16	ATL	CG

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Structures - Civils - Environmental - Infrastructure - Transport Planning - Sustainability - Expert Advisory Services
Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:

PRELIMINARY

Project:

THE FORMER BBC SITE
OXFORD ROAD, MANCHESTER

Drg Title:

PHASE 1B
EXISTING IMPERMEABLE AREAS

Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A1	07.12.15	ATL	CG

Drg No: MA1420-70-00-02

Rev: D

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Appendix C

M&E Engineer Discharge Unit Calculations

1609 - B2 AGD Calculation

Revision 0

Max Simultaneous Demand

Stack Reference	Number of floors	Sanitary Appliances / Discharge Units draining into each stack														Total DU Sub Total (DU)	Riser Stack Flow Rate (l/s)	Size of stack required			
		Basins		Sinks		WCs		Showers		Urinal		W/machine		Dishwasher				82mm	110mm	160mm	200mm
		No.	DU	No.	DU	No.	DU	No.	DU	No.	DU	No.	DU								
SVP 01	**N/A**	14	0.3	0	1.3	14	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**23.8**	**2.44**	-	1	-	-
SVP 01 (s)	**N/A**	1	0.3	0	1.3	1	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**1.7**	**0.65**	-	1	-	-
SVP 02	**N/A**	28	0.3	0	1.3	28	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**47.6**	**3.45**	-	1	-	-
SVP 02 (s)	**N/A**	2	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**3.4**	**0.92**	-	1	-	-
SVP 03	**N/A**	28	0.3	0	1.3	28	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**47.6**	**3.45**	-	1	-	-
SVP 03 (s)	**N/A**	2	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**3.4**	**0.92**	-	1	-	-
SVP 04	**N/A**	28	0.3	0	1.3	28	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**47.6**	**3.45**	-	1	-	-
SVP 04 (s)	**N/A**	2	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**3.4**	**1.29**	-	1	-	-
SVP 05	**N/A**	15	0.3	15	1.3	0	1.4	0	0.4	0	0.8	0	1.2	15	0.2	**27**	**2.60**	-	1	-	-
SVP 06	**N/A**	15	0.3	15	1.3	0	1.4	0	0.4	0	0.8	0	1.2	15	0.2	**27**	**2.60**	-	1	-	-
SVP 07	**N/A**	15	0.3	15	1.3	0	1.4	0	0.4	0	0.8	0	1.2	15	0.2	**27**	**2.60**	-	1	-	-
SVP 08	**N/A**	0	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**0**	**0.00**	-	1	-	-
SVP 09	**N/A**	2	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**3.4**	**0.92**	-	1	-	-
SVP 10	**N/A**	0	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**2.8**	**0.84**	-	1	-	-
SVP 11	**N/A**	2	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**0.6**	**0.39**	-	1	-	-
SVP 12	**N/A**	0	0.3	0	1.3	0	1.4	2	0.4	0	0.8	0	1.2	0	0.2	**0.8**	**0.45**	-	1	-	-
SVP 13	**N/A**	0	0.3	0	1.3	0	1.4	5	0.4	0	0.8	0	1.2	0	0.2	**2**	**0.71**	-	1	-	-
SVP 14	**N/A**	1	0.3	0	1.3	1	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**1.7**	**0.65**	-	1	-	-
SVP 15	**N/A**	0	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**2.8**	**0.84**	-	1	-	-
SVP 16	**N/A**	2	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	**0.6**	**0.39**	-	1	-	-
SVP 17	**N/A**	0	0.3	0	1.3	0	1.4	10	0.4	0	0.8	0	1.2	0	0.2	**4**	**1.00**	-	1	-	-
RSVP01-09	**N/A**	2	0.3	1	1.3	2	1.4	0	0.4	0	0.8	0	1.2	1	0.2	**4.7**	**1.52**	-	1	-	-
D01	**N/A**	**N/A**	0.3	**N/A**	1.3	**N/A**	1.4	**N/A**	0.4	**N/A**	0.8	**N/A**	1.2	**N/A**	0.2	**125.6**	**5.60**	**-**	-	1	-
D02	**N/A**	**N/A**	0.3	**N/A**	1.3	**N/A**	1.4	**N/A**	0.4	**N/A**	0.8	**N/A**	1.2	**N/A**	0.2	**79.9**	**4.47**	**-**	1	-	-
D01/2	**N/A**	**N/A**	0.3	**N/A**	1.3	**N/A**	1.4	**N/A**	0.4	**N/A**	0.8	**N/A**	1.2	**N/A**	0.2	**205.5**	**7.17**	**-**	-	1	-
Total Discharge Units for Building (DU)																**320.5**					
Frequency Factor (K)	**Offices**															**0.5**					
Frequency Factor (K)	**Retail**															**0.7**					

Notes:

1. Calculations are based on BS EN 12056-2.
2. Discharge units based on a system III - single discharge stack with a filling degree of 100%
3. Condensate discharge from FCU's not included
4. All floor gullies are excluded from the foul drainage calculation due to having an infrequent use rate.
5. WC cistern with 7.5 litres used to determine discharge units.
6. Each Retail SVP assumed to have 2No WHB's, 1No Sink, 2No WC's and 1No D/W per stack - Individual flow rate of 1.52 l/s / 4.7 DU's
7. Each tenant SVP assumed to have 1No WHB's, 1No sinks, 1No dishwashers

1609 - B4 AGD Calculation

Revision 0

Max Simultaneous Demand

Stack Reference	Number of floors	Sanitary Appliances / Discharge Units draining into each stack														Total DU Sub Total (DU)	Riser Stack Flow Rate (l/s)	Size of stack required			
		Basins		Sinks		WCs		Showers		Urinal		W/machine		Dishwasher				82mm	110mm	160mm	200mm
		No.	DU	No.	DU	No.	DU	No.	DU	No.	DU	No.	DU								
SVP 01	N/A	24	0.3	24	1.3	0	1.4	0	0.4	0	0.8	0	1.2	24	0.2	43.2	3.29	-	1	-	-
SVP 02	N/A	11	0.3	0	1.3	11	1.4	0	0.4	0	0.8	0	1.2	0	0.2	18.7	2.16	-	1	-	-
SVP 03	N/A	0	0.3	0	1.3	48	1.4	0	0.4	0	0.8	0	1.2	0	0.2	67.2	4.10	-	1	-	-
SVP 04	N/A	48	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	14.4	1.90	1	-	-	-
SVP 05	N/A	1	0.3	0	1.3	58	1.4	0	0.4	0	0.8	0	1.2	0	0.2	81.5	4.51	-	1	-	-
SVP 06	N/A	58	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	17.4	2.09	-	1	-	-
SVP 07	N/A	24	0.3	24	1.3	0	1.4	0	0.4	0	0.8	0	1.2	24	0.2	43.2	3.29	-	1	-	-
SVP 08	N/A	24	0.3	24	1.3	0	1.4	0	0.4	0	0.8	0	1.2	24	0.2	43.2	3.29	-	1	-	-
SVP 09	N/A	0	0.3	0	1.3	0	1.4	0	0.4	55	0.8	0	1.2	0	0.2	44	3.32	-	1	-	-
SVP 10	N/A	48	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	14.4	1.90	1	-	-	-
SVP 11	N/A	0	0.3	13	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	16.9	2.06	-	1	-	-
SVP 12	N/A	24	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	7.2	1.34	1	-	-	-
SVP 13	N/A	0	0.3	0	1.3	61	1.4	0	0.4	0	0.8	0	1.2	0	0.2	85.4	4.62	-	1	-	-
SVP 14	N/A	24	0.3	24	1.3	0	1.4	0	0.4	0	0.8	0	1.2	23	0.2	43	3.28	-	1	-	-
SVP 15	N/A	1	0.3	0	1.3	1	1.4	0	0.4	0	0.8	0	1.2	0	0.2	1.7	0.65	-	1	-	-
SVP 16	N/A	1	0.3	0	1.3	1	1.4	0	0.4	0	0.8	0	1.2	0	0.2	1.7	0.65	-	1	-	-
SVP 17	N/A	1	0.3	1	1.3	1	1.4	0	0.4	0	0.8	0	1.2	0	0.2	3	0.87	-	1	-	-
SVP 18	N/A	0	0.3	0	1.3	2	1.4	0	0.4	0	0.8	0	1.2	0	0.2	2.8	0.84	-	1	-	-
SVP 19	N/A	2	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	0.6	0.39	1	-	-	-
SVP 20	N/A	0	0.3	0	1.3	0	1.4	5	0.4	0	0.8	0	1.2	0	0.2	2	0.71	-	1	-	-
SVP 21	N/A	0	0.3	0	1.3	0	1.4	5	0.4	0	0.8	0	1.2	0	0.2	2	0.71	-	1	-	-
SVP 22	N/A	0	0.3	0	1.3	0	1.4	7	0.4	0	0.8	0	1.2	0	0.2	2.8	0.84	-	1	-	-
SVP 23	N/A	0	0.3	0	1.3	0	1.4	7	0.4	0	0.8	0	1.2	0	0.2	2.8	0.84	-	1	-	-
SVP 24	N/A	0	0.3	0	1.3	3	1.4	0	0.4	0	0.8	0	1.2	0	0.2	4.2	1.02	-	1	-	-
SVP 25	N/A	3	0.3	0	1.3	0	1.4	0	0.4	0	0.8	0	1.2	0	0.2	0.9	0.47	1	-	-	-
RSVP01-26	N/A	2	0.3	1	1.3	2	1.4	0	0.4	0	0.8	0	1.2	1	0.2	4.7	1.52	-	1	-	-
D01	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	0.8	N/A	1.2	N/A	0.2	242.4	7.78	-	-	-	-
D02	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	0.8	N/A	1.2	N/A	0.2	257.5	8.02	-	-	-	-
Total Discharge Units for Building (DU)																568.9	11.93				
Frequency Factor (K)	Offices															0.5					
Frequency Factor (K)	Retail															0.7					

Notes:

1. Calculations are based on BS EN 12056-2.
2. Discharge units based on a system III - single discharge stack with a filling degree of 100%
3. Condensate discharge from FCU's not included
4. All floor gullies are excluded from the foul drainage calculation due to having an infrequent use rate.
5. WC cistern with 7.5 litres used to determine discharge units.
6. Each Retail SVP assumed to have 2No WHB's, 1No Sink, 2No WC's and 1No D/W per stack - Individual flow rate of 1.52 l/s / 4.7 DU's
7. Each tenant SVP assumed to have 2No WHB's, 2No sinks, 2No dishwashers

1610 - B5 & B6 AGD Calculation

Revision 0

Max Simultaneous Demand

Stack Reference	Number of floors	Sanitary Appliances / Discharge Units draining into each stack														Total DU Sub Total (DU)	Riser Stack Flow Rate (l/s)	Size of stack required			
		Basins		Sinks		WCs		Showers		Bath		W/machine		Dishwasher				50mm	100mm	150mm	200mm
		No.	DU	No.	DU	No.	DU	No.	DU	No.	DU	No.	DU								
SVP 01	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 02	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	1	1.2	0	0.2	46.2	3.40	-	1	-	-
SVP 03	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 04	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-	-
SVP 05	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 06	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 07	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 08	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 09	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 10	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 11	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	0	0.2	64.4	4.01	-	1	-	-
SVP 12	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 13	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-	-
SVP 14	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-	-
SVP 15	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 16	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 17	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-	-
SVP 18	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-	-
SVP 19	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-	-
SVP 20	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 21	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 22	14	2	0.3	0	1.3	2	1.4	0	0.4	2	1.3	0	1.2	0	0.2	84	4.58	-	1	-	-
SVP 23	14	2	0.3	0	1.3	2	1.4	2	0.4	0	1.3	0	1.2	0	0.2	58.8	3.83	-	1	-	-
SVP 24	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-	-
SVP 25	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 26	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 27	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-	-
SVP 28	14	2	0.3	0	1.3	2	1.4	2	0.4	0	1.3	0	1.2	0	0.2	58.8	3.83	-	1	-	-
SVP 29	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-	-
SVP 30	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-	-
SVP 31	35	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	168	6.48	-	-	1	-
SVP 32	35	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	105	5.12	-	1	-	-
SVP 33	35	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	1	1.2	0	0.2	115.5	5.37	-	-	1	-
SVP 34	35	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	94.5	4.86	-	1	-	-
SVP 35	35	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	105	5.12	-	1	-	-
SVP 36	35	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	73.5	4.29	-	1	-	-
SVP 37	35	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	73.5	4.29	-	1	-	-
SVP 38	35	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	45.5	3.37	-	1	-	-
SVP 39	34	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	91.8	4.79	-	1	-	-
SVP 40	34	1	0.3	1	1.3	1	1.4	0	0.4	1	1.3	1	1.2	1	0.2	193.8	6.96	-	-	1	-
SVP 41	34	2	0.3	0	1.3	2	1.4	1	0.4	1	1.3	0	1.2	0	0.2	173.4	6.58	-	-	1	-
SVP 42	34	0	0.3	0	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	0	0.00	-	1	-	-
SVP 43	34	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	71.4	4.22	-	1	-	-
SVP 44	34	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	71.4	4.22	-	1	-	-
SVP 45	34	1	0.3	1	1.3	1	1.4	0	0.4	1	1.3	1	1.2	1	0.2	193.8	6.96	-	-	1	-
SVP 46	34	0	0.3	0	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	0	0.00	-	1	-	-
MSVP 01	1	2	0.3	0	1.3	2	1.4	0	0.4	0	1.3	0	1.2	0	0.2	3.4	0.92	-	1	-	-
GSVP 01	1	1	0.3	0	1.3	1	1.4	0	0.4	0	1.3	0	1.2	0	0.2	1.7	0.65	-	1	-	-
GSVP 02	1	1	0.3	0	1.3	1	1.4	0	0.4	0	1.3	0	1.2	0	0.2	1.7	0.65	-	1	-	-
GSVP 03	1	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	1	0.2	1.3	0.80	-	1	-	-
GSVP 04	1	0	0.3	0	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	0	0.00	-	1	-	-
RSVP01-17	17	2	0.3	1	1.3	2	1.4	0	0.4	0	1.3	0	1.2	1	0.2	117.5	7.59	-			-
D01	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	277.2	8.32	-	-	-	-
D02	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	327.6	9.05	-	-	1	-
D03	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	214.2	7.32	-	-	1	-
D04	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	291.2	8.53	-	-	1	-
D05	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	134.4	5.80	-	-	1	-
D06	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	176.4	6.64	-	-	1	-
D07	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	96.6	4.91	-	1	-	-
D08	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	661.5	12.86	-	-	-	1
D09	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	359.1	9.47	-	-	1	-
D10	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	142.8	5.97	-	-	1	-
D11	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	387.6	9.84	-	-	1	-
B01	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	640.2	12.65	-	-	-	-
B02	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	9.4	2.15	-	-	-	-
Total Discharge Units for Building (DU)																3429.3	29.28				
Frequency Factor (K)	Residential															0.5					
Frequency Factor (K)	Retail															0.7					

Notes:

1. Calculations are based on BS EN 12056-2.
2. Discharge units based on a system III - single discharge stack with a filling degree of 100%
3. Condensate discharge from FCU's not included
4. All floor gullies are excluded from the foul drainage calculation due to having an infrequent use rate.
5. WC cistern with 7.5 litres used to determine discharge units.
6. Discharge from HIU overflow not included.
7. Each Retail SVP assumed to have 2No WHB's, 1No Sink, 2No WC's and 1No D/W per stack - Individual flow rate of 1.52 l/s / 4.7 DU's

1610 - Building 7 & 8 AGD Calculation

Revision 0

Max Simultaneous Demand

Stack Reference	Number of floors	Sanitary Appliances / Discharge Units draining into each stack														Total DU Sub Total (DU)	Riser Stack Flow Rate (l/s)	Size of stack required		
		Basins		Sinks		WCs		Showers		Bath		W/machine		Dishwasher				50mm	100mm	150mm
		No.	DU	No.	DU	No.	DU	No.	DU	No.	DU	No.	DU							
SVP 01	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 02	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 03	14	0	0.3	0	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	0	0.00	1	1	-
SVP 04	14	0	0.3	0	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	0	0.00	1	1	-
SVP 05	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 06	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 07	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-
SVP 08	14	1	0.3	1	1.3	1	1.4	0	0.4	1	1.3	1	1.2	1	0.2	79.8	4.47	-	1	-
SVP 09	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 10	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-
SVP 11	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-
SVP 12	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-
SVP 13	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-
SVP 14	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-
SVP 15	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 16	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 17	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 18	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-
SVP 19	14	2	0.3	0	1.3	2	1.4	0	0.4	2	1.3	0	1.2	0	0.2	84	4.58	-	1	-
SVP 20	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 21	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 22	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 23	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 24	14	2	0.3	0	1.3	2	1.4	0	0.4	2	1.3	0	1.2	0	0.2	84	4.58	-	1	-
SVP 25	14	2	0.3	0	1.3	2	1.4	0	0.4	2	1.3	0	1.2	0	0.2	84	4.58	-	1	-
SVP 26	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 27	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 28	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 29	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 30	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-
SVP 31	14	2	0.3	0	1.3	2	1.4	0	0.4	2	1.3	0	1.2	0	0.2	84	4.58	-	1	-
SVP 32	7	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	9.1	1.51	-	1	-
SVP 33	14	1	0.3	0	1.3	1	1.4	1	0.4	0	1.3	0	1.2	0	0.2	29.4	2.71	-	1	-
SVP 34	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 35	14	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	1	1.2	1	0.2	37.8	3.07	-	1	-
SVP 36	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 37	14	1	0.3	1	1.3	1	1.4	1	0.4	0	1.3	1	1.2	1	0.2	67.2	4.10	-	1	-
SVP 38	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-
SVP 39	14	1	0.3	0	1.3	1	1.4	0	0.4	1	1.3	0	1.2	0	0.2	42	3.24	-	1	-
MSVP 01	1	1	0.3	0	1.3	1	1.4	0	0.4	0	1.3	0	1.2	0	0.2	1.7	0.65	-	1	-
MSVP 02	1	1	0.3	0	1.3	1	1.4	0	0.4	0	1.3	0	1.2	0	0.2	1.7	0.65	-	1	-
MSVP 03	1	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	1	0.2	1.3	0.57	-	1	-
MSVP 04	1	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	1	0.2	1.3	0.57	-	1	-
MSVP 05	1	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	1	0.2	1.3	0.57	-	1	-
GSVP 01	1	0	0.3	1	1.3	0	1.4	0	0.4	0	1.3	0	1.2	0	0.2	1.3	0.57	-	1	-
GSVP 02	1	2	0.3	0	1.3	2	1.4	1	0.4	0	1.3	0	1.2	0	0.2	3.8	0.97	-	1	-
RSVP01-25	25	2	0.3	1	1.3	2	1.4	0	0.4	0	1.3	0	1.2	1	0.2	117.5	7.59	-		
D01	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	126	5.61	-	-	1
D02	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	176.4	6.64	-	-	1
D03	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	79.8	4.47	-	1	-
D04	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	75.6	4.35	-	1	-
D05	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	29.4	2.71	-	1	-
D06	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	180.6	6.72	-	-	1
D07	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	310.8	8.81	-	-	1
D08	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	226.8	7.53	-	N/A	1
D09	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	352.8	9.39	-	N/A	1
D10	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	260.4	8.07	-	N/A	1
D11	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	4.7	1.08	-	1	-
B01	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	477.9	10.93	-	-	-
B02	N/A	N/A	0.3	N/A	1.3	N/A	1.4	N/A	0.4	N/A	1.3	N/A	1.2	N/A	0.2	214.7	7.33	-	-	-
Total Discharge Units for Building (DU)																1957.6	22.12			
Frequency Factor (K)	Residential															0.5				
Frequency Factor (K)	Retail															0.7				

Notes:

1. Calculations are based on BS EN 12056-2.
2. Discharge units based on a system III - single discharge stack with a filling degree of 100%
3. Condensate discharge from FCU's not included
4. All floor gullies are excluded from the foul drainage calculation due to having an infrequent use rate.
5. WC cistern with 7.5 litres used to determine discharge units.
6. Discharge from HIU overflow not included.
7. Each Retail SVP assumed to have 2No WHB's, 1No Sink, 2No WC's and 1No D/W per stack - Individual flow rate of 1.52 l/s / 4.7 DU's

Circle Square Plot 9	
Lower Ground Floor Discharge Unit Summary	
M&E Ref	**Discharge Units**
Floor Gully	1.5
Floor Gully	1.5
Laundry Connection (Allowance)	10
RSVP	5
RSVP	5
RSVP	5
RSVP	5
RSVP	5
ST08	10
ST16	380
ST18	380
ST21	10
ST23	10
ST24	10
Total	**838**
Reduction Factor	0.5
Total Flow (l/s)	14.5

Notes
RSVP = Retail Pop-up. Allowance of 10 Dus/ pop-up
ST Numbers refer to Drawing CS-SES-ZZ-LG-DR-M-5201 Rev C01

Appendix D

Environment Agency Flood Defense Consent

United Utilities S106 Approval Area A (Foul Water)

United Utilities S106 Approval Area A (Surface Water)

United Utilities S106 Approval Area A (Foul Water)

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Curtins Consulting Ltd
Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG

Our ref: NW_South_2016_528

Date: 17 February 2016

FAO Chloe Grimsley

Dear Sirs,

ENVIRONMENT AGENCY FLOOD DEFENCE CONSENT APPLICATION
REF NO: NW_South_2016_528

New surface water outfall into the river and other works within 8 metres easement at Oxford Road/Charles Street Manchester

Thank you for your application for Flood Defence Consent we received on 23 December 2015.

I am pleased to confirm that your proposals are acceptable to us. I enclose Consent Number NW_South_2016_528 issued under Water Resources Act 1991 and associated byelaws.

Please notify us of the proposed starting date of the works no less than seven days before commencement by emailing PSOWarrington@environment-agency.gov.uk quoting reference number NW_South_2016_528.

Written permissions must be obtained from all third parties affected by the proposed works.

Please note the conditions of our approval. If you believe that any conditions imposed are unreasonable then you have a right of appeal to an independent arbitrator or Government Minister as appropriate.

Finally, please note that this consent does not absolve you from the need to obtain any other consents, licences or permissions which may be required in law prior to you commencing the work. You are solely responsible for ensuring that your designs meet all applicable standards and are fully compliant with current legislative requirements.

Yours faithfully

P. Costello

Peter Costello
Team Leader Partnership and Strategic Overview

Please ask for Sandrine Thomas
Direct dial 02030 250 985

Email: PSOWarrington@environment-agency.gov.uk
www.gov.uk/environment-agency

RIGHTS OF APPEAL

WATER RESOURCES ACT 1991 -SECTION 110 (4)

If any question arises under this section whether any consent or approval is unreasonably withheld or whether any condition imposed is reasonable, the question shall-

(a) if the parties agree to arbitration, be referred to a single arbitrator appointed by agreement between the parties or, in default of agreement, by the President of the Institution of Civil Engineers; and

(b) if the parties do not agree to arbitration, be referred to and determined by the Ministers or the Secretary of State, according to whether the determination falls to be made in relation to England or Wales.

The most likely source of arbitrators can be found on the following links

- the ICE http://www.ice.org.uk/ and http://www.ice.org.uk/About-ICE/What-we-do/Dispute-resolution
- the Chartered Institute of Arbitrators (CIArb) http://www.ciarb.org/about/ or
- the Chartered Institution of Water and Environmental Management (CIWEM) http://www.ciwem.org/ .

Customer services line: 03708 506506
Email: PSOWarrington@environment-agency.gov.uk
www.gov.uk/environment-agency

United Utilities Water Ltd
Developer Services & Planning

Your Reference	EC3477
Our Reference	4200012173
Date	07/02/2017

Dear Sir/Madam

Location:	Phase 1A Former BBC Site Oxford Road Manchester

I am writing to you in reference to your recent sewer connection application. I can confirm that the connection has been inspected on the xxx and is deemed as satisfactory.

Please accept this letter as our final approval for this sewer connection.

Should you need to enquire about this application please telephone our Customer Service Centre on 0345 672 3723 and quote the above reference number.

Yours faithfully

Mike Porter
Developer Services and Planning

United Utilities Water Ltd
Developer Services & Planning
Warrington North WWTW
Gatewarth Street
Warrington
WA5 1DS

Telephone : 01925 679413
Wastewaterdeveloperservices@uuplc.co.uk

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unitedutilities.com

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helping life flow smoothly