Intended for
First Street Developments Ltd

Project no.
1620002943

Date
20 December 2021

PLOT 9A FIRST STREET, MANCHESTER

DRAINAGE STRATEGY

Revision History

Revision	Date	Purpose / Status	Document Ref.	Comments
P02	20.12.21	Planning/S0	1620002943-RAM-05-XX-RP-D-00010	Planning Issue
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1 INTRODUCTION

Ramboll UK Ltd has been appointed to undertake a Drainage Strategy in support of a planning application for the erection of a 9-storey building with basement comprising office accommodation (Use Class E(c)), 26 car parking spaces, 130 cycle spaces and associated facilities, landscaping, and associated works. The development consists of 18,977sqm of commercial office space at Plot 9a, First Street, Manchester.

The proposed development will hereafter be referred to as the "Application Site".

Location plans can be found below.

Figure 1.1: Wider Context Site Location [Google Earth Extract ©2021 Google]

National Grid Ref

SJ837972

X Co-ordinates

383711

Y Co-ordinates

397279

WhatThreeWords

frosted.ocean.magma

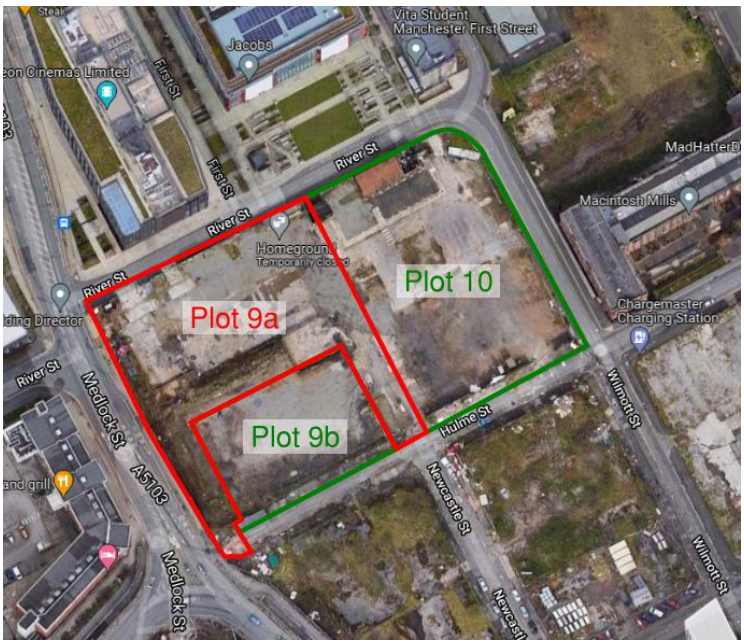


Figure 1.2: Plot Site Location [Google Earth Extract ©2021 Google]

2 SCOPE AND OBJECTIVES

This Drainage Strategy report should be read in conjunction with all other planning documents specifically the Flood Risk Assessment reference 1620002943-RAM-05-XX-RP-Y-0001.

The specific objectives of this assessment are to establish the following:

- Existing drainage systems on and adjacent to the application site.
- Proposals for collection and discharge of surface water from the application site.
- Proposals for collection and discharge of foul water from the application site.

3 LIMITATIONS

This report has been prepared for the planning application of Plot 9a and shall not be relied upon by any third party unless that party has been granted a contractual right to rely on this report for the purpose for which it was prepared.

The findings and opinions in the report are based upon information derived from a variety of information sources. Ramboll believe these information sources to be reliable and where possible have tried to verify the information.

This report has been prepared based on the proposed end land use defined by the Client at the time of writing. If this proposed end land use is altered or changed then it will be necessary to review the findings of this report.

It should be noted that some of the aspects considered in this study are subject to change with time. Therefore, if the development is delayed or postponed for a significant period then it should be reviewed to confirm that no changes have taken place, either at the application site or within relevant legislation.

4 LEGISLATION

The following legislation has been reviewed and considered in preparation of the proposed drainage strategy.

4.1 Planning Policy

Government has strengthened planning policy on the provision of sustainable drainage systems (SuDS) for 'major' planning applications and this is covered in Section 14 of National Planning Policy Framework February 2019. As per the guidance issued by the Department of Communities and Local Government (DCLG), all 'major' planning applications being determined from 6 April 2015 and the NPPF 2021, must consider sustainable drainage systems.

Assessment of the suitability of sustainable drainage systems must be undertaken in accordance with Section 14 Meeting the challenge of climate change, flooding and coastal change.

The department for Environment, Food and Rural Affairs has produced a non-statutory technical standard for sustainable drainage systems which states that:

For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

4.2 Strategic Flood Risk Assessment

The Level 2 Manchester City Council Strategic Flood Risk Assessment (SFRA) has been reviewed along with the flood maps which indicate that the Application site is within the Conurbation Core Critical Drainage Area.

The SFRA states that for sites less than 1 ha in size but situated within a critical drainage area mitigation of potential surface water runoff from within the site will need to be included as part of the planning application assessments.

For critical drainage areas the SFRA states:

- Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100-year storm event, considering climate change; and
- Development should be designed so that there is no flooding to the development in a 1 in 30-year event and so that there is no property flooding in a 1 in 100 year plus climate change event.

5 CONSULTATIONS

5.1 United Utilities (UU)

Initial communication was made with UU in May/June 2018 on the larger Plot 9 development which included Plot 9a and 9b. United Utilities responded stating:

- Foul drainage could drain to the public combined sewer network at an unrestricted rate.
- Surface water would need to drain to either soakaway or directly to watercourse unless evidence could be if this was not possible before connection to the public sewer.
- Formal sewer connection agreement would have to entered to confirm connections.
- Any adoptions would need to be in accordance with Sewers for Adoption 6th Edition and any pumping stations in accordance with United Utilities addendum to this.
- Site drainage must be designed in accordance with Building Regulations, National Planning Policy and local flood authority guidelines.
- If any wastewater assets are offered for adoption by UU, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer to ensure that the proposals meet the requirements of Sewers for adoption and UU Asset Standards. The proposed design should consider long term operability and give United Utilities a cost-effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by UU. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

Further consultations were made with UU in June/July 2018 regarding discharge of surface water to the combined public sewer following provision of evidence that infiltration was not fully possible due to space restrictions and that discharge to watercourse would not be possible following a high-level capacity check on the existing surface water system outside of the site boundary in First Street which discharges to the River Medlock. Refer to section 7.1 for more details on this.

Further communication was undertaken with UU in September 2021 following a delay to the project which confirmed that if discharge to the watercourse was not achievable as evidence suggested then connection to the combined network is acceptable at a maximum pass forward flow rate of 7.5 l/s for the Plot 9a site.

Refer to Appendix 2 for a copy of these consultations.

5.2 Lead Local Flood Authority Manchester City Council (LLFA)

Initial communication was made with the LLFA in April 2017 and May 2018 which stated if soakaway or discharge to the River Medlock is not feasible then at least a 50% reduction in existing runoff rates is appropriate to the combined sewer, assuming acceptance from UU.

Following a delay to the project further consultation with the LLFA was undertaken in August 2021. The LLFA responded stating that evidence of the existing and proposed discharge rate calculations from the site would be required to ensure this was in line with Manchester City Council policy. They also confirmed that discharge to sewer would be acceptable if evidence of up-to-date correspondence, which confirms that in principle the proposed point of connection and discharge rates are acceptable to UU, was provided.

Regarding SuDS, the LLFA request that a SuDS assessment is carried out as part of the drainage strategy, which identifies the feasibility of a range of SuDS both infiltration and non-infiltrating.

Refer to Appendix 2 for a copy of the consultations, Sections 6.4 and 7.2 for existing and proposed calculations and Section 7.4 for the SuDS assessment.

6 SITE DESCRIPTION

6.1 General Existing and Proposed Description

The site is located 1.3km southeast of Manchester City Centre and is located within the First Street Strategic Development Framework (SDF) 2018 area. It is part of a wider vision to create a mixed-use neighbourhood in the area, supported by a mixture of leisure, office, and residential blocks.

The application site is known as Plot 9a and is bound by River Street to the north, a future development site known as Plot 10 to the east, future development Plot 9b to the south, and Medlock Street to the west. The site area is 0.480 ha.

The application site is currently mostly hardstanding, reflecting its recent use as a temporary car parking area ahead of the plot's permanent redevelopment, although limited positive drainage has been found on the site it is believed that this area was drained into the public sewer network. There is limited vegetation on site, limited to small shrubbery to the edge of Medlock Street.

6.2 Topography

A topographical survey was undertaken in in February 2020 by Survey Operations for the Plot 9a, 9b and 10 sites.

The levels within Plot 9a indicate a level of 31.6 falling to 30.8 from the corner of River Street/Medlock Street to the Plot 9a boundary with Plot 10. Levels then rise towards Hulme Street. A level of 34.0 is indicated where Hulme Street meets Medlock Street to 33.1 where Hulme Street meets the proposed Plot 10 boundary.

6.3 Existing Drainage

A review of the United Utilities public sewer records has been undertaken which indicates an existing 600x500 vitrified clay sewer within Hulme Street. CCTV surveys have found that public sewer manhole 7201 is 5.65m deep with an invert level of 27.57m. The surveys found that this sewer appears to start within Hulme Street adjacent to the Plot 10 site and is therefore different from what is indicated on the sewer records. This sewer is believed to only collect water from the former Hulme Street.

A 590x680 brick combined public sewer is located within Plot 10 flowing from manhole 7201 to 7203. Sewer record information indicates the invert level of 7203 as 26.75.

The sewer then changes from a brick sewer to a 610mm diameter concrete sewer from manholes 7203 to 7301 with the invert level of 7301 at 26.68m.

An S104 application is due to be undertaken for the section of pipework between 7201 and 7301 as part of a separate package of works.

The sewer then heads North East along River Street within the Plot 10 boundary in a 610mm concrete sewer and connects into a large storage chamber outside of the site at the corner of River Street and Wilmott Street.

An S185 application is due to be undertaken to divert this pipework into River Street as part of a separate package of works.

There is a 300mm diameter outfall from the storage tank which heads South along Wilmott Street. The sewer records indicate a high level 300mm diameter overflow from the storage tank into the River Medlock although the physical surveys undertaken found that this was no longer in use. A copy of the sewer records and existing drainage drawing can be found in Appendix 2.

There is minimal private drainage within the application site currently, apart from a small system for collection of foul drainage from recent toilet facilities for the construction of No 8 First Street. Several connections from the site into the public sewer systems were found during the survey but due to the demolition of the existing buildings these have been severed within the boundary and are therefore unable to survey.

A private surface water drain is located within the existing First Street which collects surface water from No 8 First Street and associated public realm, River Street, and the existing section of First Street. This was installed as part of the First Street North development. The head of this system is at the boundary of Plot 9a.

The existing drainage can be found on drawing RAM-XX-XX-DR-D-10010 in Appendix 2.

6.4 Existing Surface Water Flows

The existing site, whilst it has been developed in the past currently does not have a full positive drainage system discharging from the site although connections into the sewer are visible along its length. It is not possible to model any of the existing private sections of drainage therefore both greenfield and brownfield rates have been calculated for the application site. The site is not deemed to be greenfield as it would have drained to the sewer previously.

To establish the existing peak storm run-off rates, two methods have been reviewed.

- Wallingford Procedure for brownfield developments; and
- Greenfield rates assuming a soil value of 0.50 for brownfield developments.

Table 6.1: Existing Run-off - Wallingford Procedure - Site Area = 0.480 ha

Return Period	Peak Run-off Rate (l/s)
M1-5	70.3 l/s
M2-5	89.5 l/s
M30-5	161.7 l/s
M100-5	202.8 l/s

Table 6.2: Existing Run-off - Greenfield - Site Area = 0.480 ha

Return Period	Peak Run-off Rate (l/s)
M1-5	2.4 l/s
M2-5	2.5 l/s

M30-5	4.6 l/s
M100-5	5.7 l/s

7 SURFACE WATER DRAINAGE PROPOSALS

7.1 Strategy

The following hierarchy has been reviewed regarding discharge of surface water from the Plot 9a site:

- To Ground/Infiltration
- To Watercourse
- To Sewer

Infiltration

Existing ground conditions comprise of hard standing/gravel surfacing overlying granular and cohesive made ground which overlays alluvium. It may be possible to infiltrate some of the water, however the development proposals for the application site indicate minimal external space between the 5m easement from proposed substructure, future buildings, and restrictions due to the easements of existing Cadent gas services and public sewer.

Watercourse

The River Medlock is located approximately 80m northeast of the application site and is culverted in this location. Surface water drainage was installed as part of the First Street North Development which starts at the north of Plot 9a within River Street.

The sewer records indicate there is also an overflow from the combined public sewer in the north-east corner of the site into the River Medlock, but survey work indicated this as being no longer utilised.

A review has been undertaken to determine whether a gravity connection could be installed to discharge to the watercourse. To enable a connection to be constructed a minimum of approximately 130m of 300mm pipework would be required which will need to cross existing infrastructure. Based on the information known on the existing services routing through would be complex and may require significant service diversions outside of the redline boundary in third party land or a pumped system to be installed from our site.

The private surface water drainage within First Street which discharges to the watercourse appears to drain River Street, First Street, and the existing Plot 5 and 6 buildings. A high-level capacity check of this has been undertaken to identify if there is any residual capacity for collection of Plot 9 and 10 surface water drainage. The review of the brownfield rates from the external works alone indicates that there would be limited capacity within the network for an additional connection and therefore this has been discounted.

Sewer

There are no known surface water public sewers in the vicinity of the application site.

There are however, combined public sewers located adjacent to the site within Plot 10. An S185 package is due to be undertaken to divert the public sewer within Plot 10 into the nearby River Street. It is therefore proposed that discharge of foul and surface water from Plot 9a will be into this diverted combined public sewer. Agreement with United Utilities on a connection into the existing public sewer location has been gained in principle subject to the formal S106 agreement, however an updated agreement will be required to connect into the diverted manhole.

The proposed surface water drainage system for the application site shall be designed to adhere to the following criteria:

- No surcharging of pipework during storms up to a 1:2-year annual probability
- No flooding to occur on site during storms up to a 1:30-year annual probability
- No flooding of third-party land or buildings during storms up to a 1:100-year annual probability + 40% allowance for climate change.

7.2 Proposed Surface Water Flows

There are several driving factors behind the selected discharge rate for the proposed development.

- Restrictions imposed by the LLFA to suit local and site development plans – 50% betterment on existing flows
- Restrictions imposed by the EA to suit local flood risk requirements – as per LLFA requirements
- Capacity of the existing downstream system
- Proposed site layout and adjacencies dictating viable space for attenuation or SuDS features.

As such, an assessment of these flows has been undertaken and can be found in the table below.

Table 7.1: Proposed Discharge Rates – Plot 9a

Return Period	**Predevelopment run-off rate assuming brownfield** (l/s)	**Predevelopment run-off rate assuming greenfield** (l/s)	**50% Betterment on Brownfield** (l/s)	**Proposed Development Maximum Discharge Rates**
M1-5	70.3	2.4	35.2	**7.5 l/s**
M2-5	89.5	2.5	44.8	**7.5 l/s**
M30-5	161.7	4.6	80.9	**7.5 l/s**
M100-5	202.8	5.7	101.4	**7.5 l/s**
* M100-5 + 40% CC	283.9	8.0	142.0	**7.5 l/s**

** The M100 + Climate Change figure does not apply to the existing system but has been included for reference.*

Whilst we believe the site isn't greenfield, we have tried to reduce the discharge to as close to greenfield rates as possible in line with the LLFA polices and guidance.

A review of the sustainable drainage options can be found in Section 7.4 of this report and include the option of a blue roof for this scheme.

To enable a blue roof to be included within the scheme, alongside attenuation in First Street, a minimum surface water discharge of 7.5 l/s has been calculated as practically achievable.

The split of this as this stage is 2.5 l/s peak discharge from the building and 5 l/s from the external works. The 2.5 l/s discharge from the blue roof system may be reduced following detailed design of this element. This flow rate would allow reasonable space for attenuation structures to be provided with coordination around existing services and existing easements on these services.

United Utilities have confirmed that a surface water discharge rate of 7.5l/s would be accepted for Plot 9a.

A copy of these calculations can be found in Appendix 4.

7.3 Design Codes

The following British Standards and design guides shall be used for storm water design purposes. Please note that this list is not exhaustive but covers the overall general drainage requirements.

- BS EN 752 Drain and Sewer Systems Outside Buildings
- BS EN 12056-3 Gravity Drainage Systems Inside Buildings – Part 3 Roof Drainage
- BS EN 16933-2 Drain and Sewer Systems Outside Buildings – Part 2: Design
- CIRIA C753 The SuDS Manual
- HR Wallingford Drainage Wallingford Procedure for Design and Analysis of Urban Storm
- PPG3 Environment Agency Pollution Prevention Guidelines 3 (Withdrawn but remains best practice)
- SSG 2019 Sewer Sector Guidance (formerly Sewers for Adoption)
- Building Regulations 2010 Approved Document H – Drainage and Waste Disposal 2015

In accordance with Building Regulations 2010 Approved Document H, Section H5, separate foul and surface water systems shall be designed for the proposed development.

7.4 Review of Sustainable Drainage Techniques

Planning policy promotes sustainable management of surface water run-off from a new development or redevelopment, and the use of SuDS is recommended. Due to the restrictions imposed on the surface water discharge attenuation will need to be incorporated within the design of the Plot 9a application site.

A review of potential sustainable drainage systems has been undertaken to identify the likely form of attenuation which could be included, and which methods are possible.

<u>Possible Sustainable Drainage/Attenuation Systems</u>

- Infiltration measures: Soakaways which infiltrate directly into the ground as opposed to discharging to a watercourse or sewer are only possible for small areas of the site due to the space restrictions on the site between substructure and easements of public sewer and/or gas pipeline.

- Tank/Cellular Storage: A method involving storage tanks or geocellular crates installed below the lowest ground level that can be used to provide large volumes of storage prior to discharge. Cellular storage has the advantage of having a 95% void ratio allowing it to attenuate large volumes. The use of a tank solution is possible on this site within the extension of First Street between the buildings, possible crane base locations and the public sewer easement (subject to divestment response).

- Increased pipe sizes: The use of large diameter pipework could be used for attenuation and convey rainwater to the discharge point. The use of large pipes could be possible however due to the fall across the site and the gas easement to the Medlock Street elevation this could only be used along the south elevation.

- Rainwater Harvesting: The use of rainwater harvesting for greywater use within the buildings would decrease the volume and rate of surface water runoff. This will reduce the roof runoff in low return period events, however it cannot be considered to reduce peak flows since the drainage strategy has to assume that the rainwater tank is full and therefore overflowing. Whilst this may be possible this has not been utilised at this stage of the design and therefore excluded from the drainage strategy.

- Green/Brown Roofs: Multi-layered system that covers the roof of a building with vegetation cover/landscaping over a drainage layer. Designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows. These structures are not a reliable attenuation system for extreme storm events due to the potential to become saturated. There are no proposals to install a green roof on the building due to the height or the building and future maintenance. As such the use of green roofs have been excluded from the drainage strategy.

- Blue Roofs: A blue roof is a system which is a method of storing water at roof level within geocellular shallow crates and restricted discharge at roof level. Cellular storage has the advantage of having a 95% voids ratio allowing it to attenuate roof drainage however this would need to be combined with additional attenuation for external works. A blue roof solution has been included for within the drainage strategy.

- Permeable or porous surfaces: Surfacing systems which allow water to infiltrate through the surface to an underlying gap-graded sub-base or into a sub-base tank and attenuated before discharge either through infiltration or restricted discharge. This use of permeable surfacing has been included for in some of the paved areas but due to space and coordination of services it is proposed that this would need to be incorporated with other sustainable drainage options.

<u>Sustainable Drainage Systems/Attenuation Not Possible on This Site</u>

- Detention Basins: Surface storage basins are normally dry and can provide attenuation of surface water run-off in peak storm conditions. The spatial requirements for detention basins are not possible on this development.

- Swales: A grassland depression which is shallow and wider than a conventional ditch. Swales convey surface water run-off from the drained surface into a storage or infiltration system or let the surface water infiltrate directly and provide storage for peak surface water runoff flows. Swales require a large plan area for construction and therefore are not possible on this development.

The proposed strategy for the Plot 9a is to install surface water attenuation within a blue roof, small areas of permeable surfacing with collection pipework for drainage that will not infiltrate and underground geocellular storage tanks.

Based on a Plot 9a site area of 0.480 ha and a discharge rate of 7.5 l/s a total storage volume will be required on site between 220m^3 to 348m^3.

The proposed drainage strategy is indicated on the drawing in Appendix 6.

8 FOUL SEWAGE PROPOSALS

8.1 Strategy

In accordance with Building Regulations 2010 Approved Document H, foul and surface water drainage systems will be kept separate on the application site prior to discharge.

UU have confirmed that unrestricted foul flows from Plot 9 would be acceptable into the public combined sewer system adjacent to the site at a point appropriate to the buildings construction.

The strategy for Plot 9a would be to construct a separate foul drainage system which would either connect directly into public sewer system at manhole 7301.

The below ground foul network shall be designed to achieve a minimum self-cleansing velocity of 0.70 m/s.

The drainage discharge strategy is indicated on the drawing in Appendix 6.

8.2 Proposed Peak Foul Water Flows

Allowing for 6m^2 of office space per person the peak foul water flow rate using the Population Method as prescribed in BS EN 752, BS EN 16933-2 and British Water Flows and Loads Code of Practice has been calculated and a flow rate of 3.2 l/s has been determined.

The peak foul flow rate using the probability method has been calculated also and a flow rate of 8.6 l/s has been determined with a frequency factor of 0.5.

The proposed foul drainage pipes shall be sized using the Probability Method as prescribed by BS EN 752, BS EN 12056-2, and BS EN 16933-2.

Foul calculations can be found in Appendix 4.

8.3 Design Codes

The following British Standards and design guides shall be used for foul water design purposes. Please note that this list is not exhaustive but covers the overall general drainage requirements.

- BS EN 752 - Drain and Sewer Systems Outside Buildings
- BS EN 12056-2 - Gravity Drainage Systems Inside Buildings – Part 2 Sanitary Drainage
- BS EN 16933-2 - Drain and Sewer Systems Outside Buildings – Part 2: Design
- SSG 2019 - Sewer Sector Guidance (formerly Sewers for Adoption)
- BW COP 4 - British Water Flows and Loads 4
- Building Regulations 2010 - Approved Document H – Drainage and Waste Disposal 2015

8.4 Summary of total discharge rate

The total discharge rate for foul and surface water has been calculated as 16 l/s for the application site.

The existing sewer outfall pipe is a 610mm diameter pipe at an approximate 1 in 300 gradient. This has a full-bore capacity of 413 l/s. CCTV survey indicates that this sewer currently serves only Plot 9 and 10.

This sewer formerly served a portion of Plot 11. However, the existing portion of sewer in Plot 11 has already been divested as part of the Plot 11 development proposals and is therefore not considered any further in this report.

The sewer discharges into a public sewer storage tank at the junction between River Street and Wilmott Street. The downstream pipe leaving the tank is a 300mm combined sewer which appears to be serving foul discharge from several existing buildings plus potentially surface water from the adjacent Macintosh Mills.

A review of the downstream levels indicates that the 300mm diameter sewer is at a gradient of 1 in 300 therefore would have a capacity of 65 l/s.

These results suggest that there is existing capacity in the system.

9 MAINTENANCE OF DRAINAGE SYSTEMS

9.1 Performance Objectives

The operational maintenance need of the installed below ground drainage system is to provide a system that will continue to perform in accordance with the design and that the operation of the system is safe, environmentally acceptable, economically efficient and provide the client with a functional and easily operated asset.

9.2 Maintenance Requirements

Effective maintenance includes a combination of planned and reactive tasks and looks to ensure that the system is kept in a condition that it can function as required.

The tasks may include:

- Localised repair or replacement of damaged pipework or other structures
- Removal of natural occurring sediments, abnormal obstructions etc. to restore hydraulic capacity
- Maintenance of mechanical plant
- Rodent and insect control

9.3 Maintenance Schedule

A strategy for the maintenance of the underground drainage elements will be developed incorporating normal regular maintenance requirements, any potential long term maintenance work and any monitoring required.

Any parties involved with the disposal of any waste materials from the underground drainage system should hold appropriate management licenses to undertake any such activities. Disposal of any site materials is required to be made in accordance with current legislation and guidance.

This initial maintenance schedule has been prepared using guidance provided in 'CIRIA C625 – Model agreements for sustainable water management systems', CIRIA 626 – Rainwater and Greywater systems and manufacturers recommendation for specialist drainage elements. The detailed design drawings will incorporate the maintenance requirements for the project.

The following table notes the likely maintenance requirements for this project, and this is to be developed further at the next stage of the design.

Table 9.1 – Indicative Maintenance Requirements

Conventional Drainage Systems		
Foul and surface water gravity pipework and manholes		
Silt accumulation, blockage, structural integrity		
Maintenance Schedule	Requirement	Recommended minimum frequency
Regular	Litter/Debris removal	Monthly (or as required)
	Excess silts to silt traps and gully pots to be removed	Monthly (or as required)
Occasional	Pipe cleaning and inspection	As required
Monitoring	Inspection of manholes/chambers to identify evidence of sedimentation accumulation	Quarterly per annum
Storm Water Attenuation Tank and Flow Controls		
Silt accumulation, blockage, structural integrity		
Maintenance Schedule	Requirement	Recommended minimum frequency
Regular	Removal of excess silts	Monthly (or as required)
Occasional	Removal and disposal of oil or petrol residues using safe standard practices	As required
Monitoring	Inspect upstream and downstream manholes and flow control devices for evidence of silt accumulation and integrity of system	Quarterly per annum

APPENDIX 1
SITE LOCATION PLAN

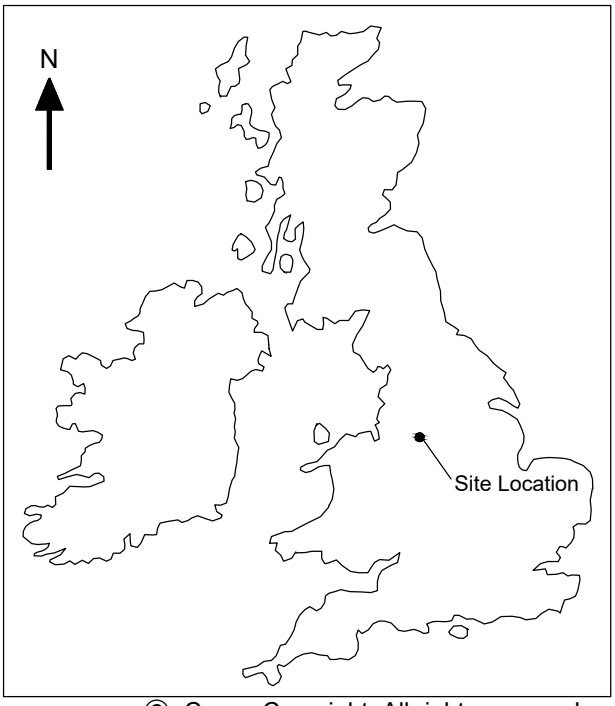
tel 01244 311855 chester@ramboll.co.uk
www.ramboll.co.uk

PLOT 9a, FIRST STREET

SITE LOCATION PLAN

Project No:	Scale (@A4):	Drawn:	Date:
1620002943	NTS	SG	05/18

Drawing No:	Rev:
RAM-XX-XX-DR-D-00000	P04



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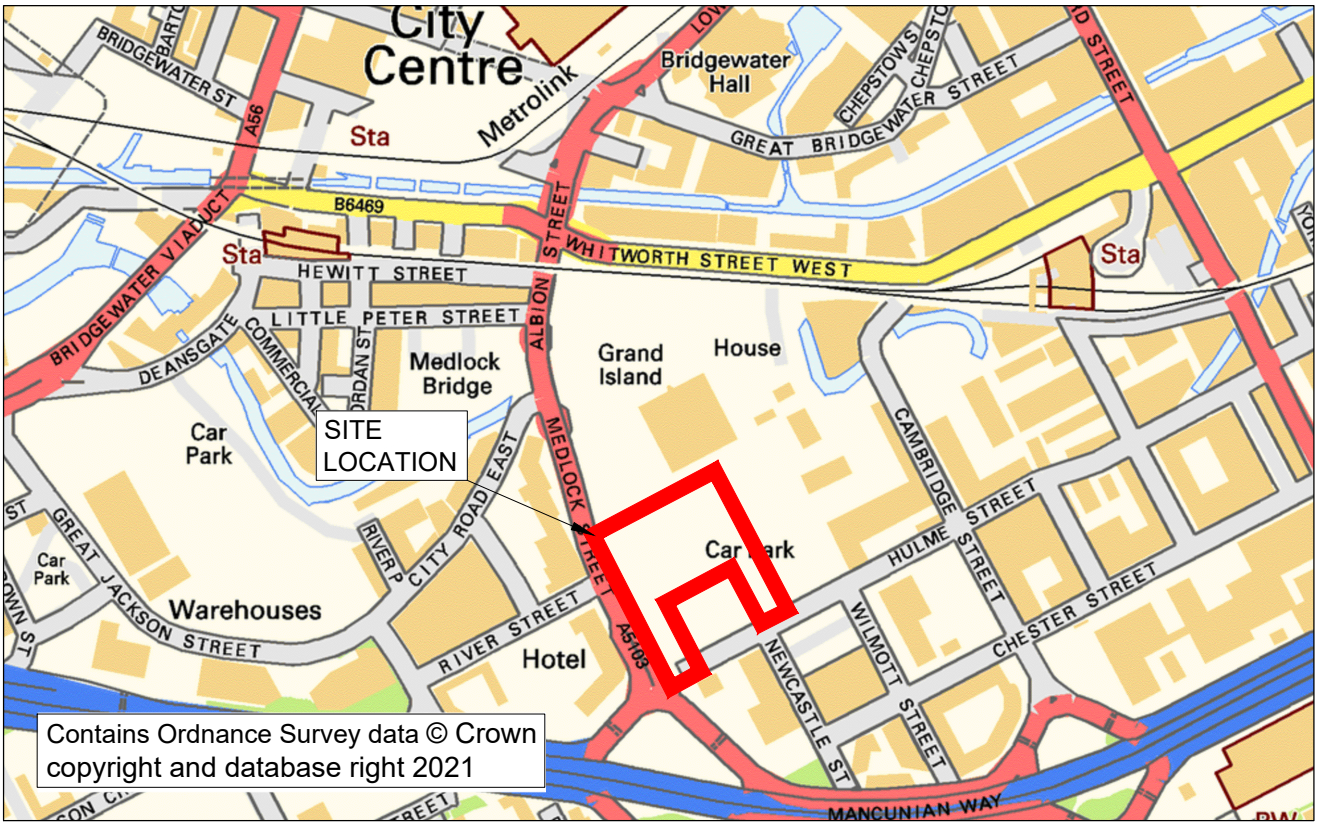

APPENDIX 2
CONSULTATIONS

Conor O Loughlin

From: Conor O Loughlin
Sent: 07 October 2021 18:01
To: Flood Risk Management
Subject: RE: Plot 9 Pre Developer Enquiry Advice

Good afternoon Oliver,

Thank you for your response. In regards to your question on providing evidence to confirm that discharge via infiltration or to a watercourse/main river is not feasible. Please see the below:

Infiltration

Existing ground conditions comprise of hard standing/gravel surfacing overlying granular and cohesive made ground which overlays alluvium. It may be possible to infiltrate some of the water, however the development proposals for the application site indicate minimal external space between the 5m easement from proposed substructure, future buildings, and restrictions due to the easements of existing Cadent gas services. Whilst small areas of permeable surfacing is proposed within the scheme an infiltration scheme cannot be proposed for the full Plot 9a scheme.

Watercourse

The River Medlock is located approximately 80m northeast of the application site and is culverted in this location. Surface water drainage was installed as part of the First Street North Development which starts at the north of Plot 9a within River Street.

The sewer records indicate there is also an overflow from the combined public sewer in the north-east corner of the site into the River Medlock, but survey work indicated this as being no longer utilised.

A review has been undertaken to determine whether a gravity connection could be installed to discharge to the watercourse. To enable a connection to be constructed a minimum of approximately 130m of 300mm pipework would be required which will need to cross existing infrastructure. Based on the information known on the existing services routing through would be complex and may require significant existing services diversion outside of the redline boundary in third party land or a pumped system to be installed from our site.

The private surface water drainage within First Street which discharges to the watercourse appears to drain River Street, First Street, and the existing Plot 5 and 6 buildings. A high-level capacity check of this has been undertaken to identify if there is any residual capacity for collection of Plot 9 and 10 surface water drainage. The review of the brownfield rates from the external works alone indicates that there would be limited capacity within the network for an additional connection and therefore this has been discounted.

Please can you confirm if you require any additional detailed information as evidence as the text above is what is being indicated in the planning report which we are proposing to issue in the near future.

Thank you,

Kind regards
Conor O'Loughlin
Apprentice Engineer

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conor.oloughlin@ramboll.co.uk

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From: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Sent: 07 October 2021 08:39
To: Conor O Loughlin <conor.oloughlin@ramboll.co.uk>
Subject: RE: Plot 9 Pre Developer Enquiry Advice

Good Morning Conor,

In principle, we can agreed with United Utilities that a maximum pass flow of 7.5l/s to the combined sewer is acceptable. However, this can only be accepted if evidence is produced confirming that discharge via infiltration or to a watercourse/main river is not feasible. If discharge via infiltration or via watercourse/main river is feasible then discharge rates would need to be limited to the 1 in 1 year greenfield run-off rate (and addition correspondence would be needed with the Environment Agency – if the proposal is to discharge to a main river).

Kind Regards,

Oliver

Oliver Timmins
Engineer (Flood Risk Management)

Lead Local Flood Authority
Highways
Growth & Development and Neighbourhoods Directorate
Manchester City Council
PO Box 532 Town Hall
Manchester
M60 2LA

Web: http://www.manchester.gov.uk

From: Conor O Loughlin <conor.oloughlin@ramboll.co.uk>
Sent: 27 September 2021 16:42
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Subject: RE: Plot 9 Pre Developer Enquiry Advice

Good afternoon Oliver,

Please see attached for the brownfield runoff calculations as per your request below. If there is any additional information that is required, please let me know and I will be happy to share this with you.

I have also attached the response that we have received from UU, again please let me know if you would like any further information from myself or UU.

We will be carrying out a SuDS assessment as part of the planning submission, I can share this with you once this has been undertaken prior to submission.

Thank you,

Kind regards

Conor O'Loughlin
Apprentice Engineer

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conor.oloughlin@ramboll.co.uk

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Registered office: 240 Blackfriars Road, London SE1 8NW

From: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Sent: 03 September 2021 12:07
To: Conor O Loughlin <conor.oloughlin@ramboll.co.uk>
Subject: RE: Plot 9 Pre Developer Enquiry Advice

Good Morning Conor,

Thanks for your email.

In order to agree discharge rates we would need to see evidence of the existing and proposed discharge rate calculations from the site to ensure that this is in line with MCC local policy.
In addition, if a connection to the United Utilities network is proposed then we would need to have evidence of up to date correspondence, which confirms that in principle the proposed point of connection and discharge rates are acceptable to UU.

In regards to SuDS, we would request that a SuDS assessment is carried out as part of the drainage strategy, which identifies the feasibility of a range of SuDS both infiltration and non-infiltrating.

Kind Regards,

Oliver

Oliver Timmins
Engineer (Flood Risk Management)

Lead Local Flood Authority
Highways
Growth & Development and Neighbourhoods Directorate
Manchester City Council
PO Box 532 Town Hall
Manchester
M60 2LA

Web: http://www.manchester.gov.uk

From: Conor O Loughlin <conor.oloughlin@ramboll.co.uk>
Sent: 27 August 2021 14:06
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Cc: Lisa Sawyer <Lisa.Sawyer@ramboll.co.uk>
Subject: Plot 9 Pre Developer Enquiry Advice

Good afternoon,

I am writing to you with regards to a predevelopment enquiry that we previously discussed in 2018. Since our last correspondence the project gained planning but then was put on hold. It has now restarted with an amended site boundary and scope of works. The proposed new development will only be for Plot 9a therefore making the building smaller. This will be submitted under a new planning application. The application site has reduced in size since our previous correspondence. The attached sketch indicates the proposed redline boundaries and the existing drainage.

We had agreed previously to a 10 l/s surface water discharge into the United Utilities public sewer with United Utilities. This was split between a 5 l/s discharge from the Plot 9 roof system and a 5 l/s discharge rate for the public realm areas. The proposed roof area has reduced in size with Plot 9b being constructed under a separate planning application in the future. The external works for the Plot 9a scheme will however include some of the Plot 9b site.

It is therefore proposed to reduce the proposed Plot 9a building discharge to 2.5 l/s (utilising a blue roof system) and keep the external hardstanding discharge restricted to 5 l/s. A total of 7.5 l/s is proposed into the combined public sewer from the new Plot 9a site. We have reconsulted with UU on this and are awaiting their response.

I have attached previous correspondence with the LLFA, along with correspondence with United Utilities on the matter which explains why a connection into the River Medlock to the north of the site would not be achievable due to the distance from the site, third party land ownership of private drainage systems.

The previous advice given stated 'If soakaways or discharge into the River Medlock is not feasible then at least a 50% reduction in existing runoff rates is appropriate to the combined sewer (assuming acceptance from UU). Where possible green SuDS should be incorporated into the proposed layout.'

We are proposing to utilise a blueroof system for the building on Plot 9a but unfortunately due to the CADENT gas pipe and easement and levels along the proposed First Street extension we are unable to include for Green SuDS elsewhere within the site. A below ground tank will need to be installed for the attenuation of the external works drainage which will be collected via channels. Whist we don't have information on the existing systems that were within Plot 9a we do believe they connected to the public sewer crossing Plot 10, therefore we have not been able to model the existing system to confirm the actual existing rate and have aimed as close to greenfield as we can with the proposed site constraints.

If you have any questions about any of the above please let me know.

Your earliest response would be appreciated as we are resubmitting to planning at the end of September.

Kind regards
Conor O'Loughlin

Apprentice Engineer
1621993 - Highways North

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Please note, I will be on annual leave on the 23rd & 24th of August.

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Conor O Loughlin

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 09 September 2021 09:58
To: Conor O Loughlin
Cc: Wastewater Developer Services
Subject: FW: Repeat PDE 4200021084 Plot 9 and 10 First Street Manchester
Attachments: RE: Repeat 6 due 7/4 - First Street Manchester Redevelopment Plot 9 and 10 - 4200021084; RE: First Street Manchester Redevelopment Plot 9 and 10 - 4200021084; RAM-XX-XX-SK-D-00044.pdf

> You don't often get email from graham.perry@uuplc.co.uk. Learn why this is important

Hello Conor

Thanks for getting in touch

Ordinarily we would ask that a new predevelopment enquiry is sent if the original response is older than 12 months so would ask that this is done in future.

On this occasion I can confirm that If discharge to the watercourse is not achievable then the connection to the combined network is acceptable at a maximum pass forward flow rate of 7.5 l/s. for the revised site

Thanks

Graham Perry

Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
unitedutilities.com

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From: Conor O Loughlin [mailto:conor.oloughlin@ramboll.co.uk]
Sent: 27 August 2021 13:54
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Cc: Lisa Sawyer <Lisa.Sawyer@ramboll.co.uk>
Subject: Plot 9 Predevelopment Enquiry Advice - 4200021084

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good afternoon,

I am writing to you with regards to a predevelopment enquiry with the reference number 4200021084. Since our last correspondence the project gained planning but then was put on hold. It has now restarted with an amended site boundary and scope of works. The proposed new development will only be for Plot 9a therefore making the building smaller. This will be submitted under a new planning application. The application site has reduced in size since our previous correspondence. The attached sketch indicates the proposed redline boundaries and the existing drainage.

We had agreed previously to a 10 l/s surface water discharge into the United Utilities public sewer. This was split between a 5 l/s discharge from the Plot 9 roof system and a 5 l/s discharge rate for the public realm areas. The proposed roof area has reduced in size with Plot 9b being constructed under a separate planning application in the future. The external works for the Plot 9a scheme will however include some of the Plot 9b site.

It is therefore proposed to reduce the proposed Plot 9a building discharge to 2.5 l/s (utilising a blue roof system) and keep the external hardstanding discharge restricted to 5 l/s. A total of 7.5 l/s is proposed into the combined public sewer from the new Plot9a site.

I have attached previous correspondence with a former colleague of yours, Matthew Dodd which demonstrate the agreements that were made previously, and why a connection into the River Medlock to the north of the site would not be achievable due to the distance from the site, third party land ownership of private drainage systems.

Please note, we are also going back to discuss the project with the LLFA so these proposals may change depending on the advice received from them. Previously we were advised that a 50% betterment on brownfield flow rates would be agreed. Whilst there is a public sewer crossing the Plot 10 site with connections indicated which would have accepted water when the Plot 9 site was previously developed we could not confirm that an existing drainage system was in place now and draining to the sewer system in full.

If you have any questions about any of the above please let me know.

Your earliest response would be appreciated as it is proposed that the resubmission to planning will be at the end of September.

Kind regards
Conor O'Loughlin

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Please note, I will be on annual leave on the 23rd & 24th of August.

APPENDIX 3
EXISTING DRAINAGE INFORMATION

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KEY

EXMH CL ----- IL -----	EXISTING MANHOLE
EG	EXISTING GULLY
—— —— —C——	EXISTING COMBINED UNITED UTILITIES SEWER
—— —— —C——	EXISTING COMBINED PRIVATE DRAIN
—— —— —SW——	EXISTING PRIVATE SURFACE WATER DRAIN
- - - - - - - - -	ASSUMED EXISTING DRAIN
UTL	UNABLE TO LIFT
—— BD —●— C——	BACKDROP INTO MANHOLE
	RED LINE - PLOT 9a BOUNDARY

Rev	Description	Date	By / Chk	App
P01	UPDATED PLANNING ISSUE	20/12 2021	CO / LS	LS
P01	PLANNING ISSUE	29/09 2021	CO / LS	LS

STAGE 2

PLOT 9A
FIRST STREET
MANCHESTER

RAMBOLL

tel 01244 311855 chester@ramboll.co.uk
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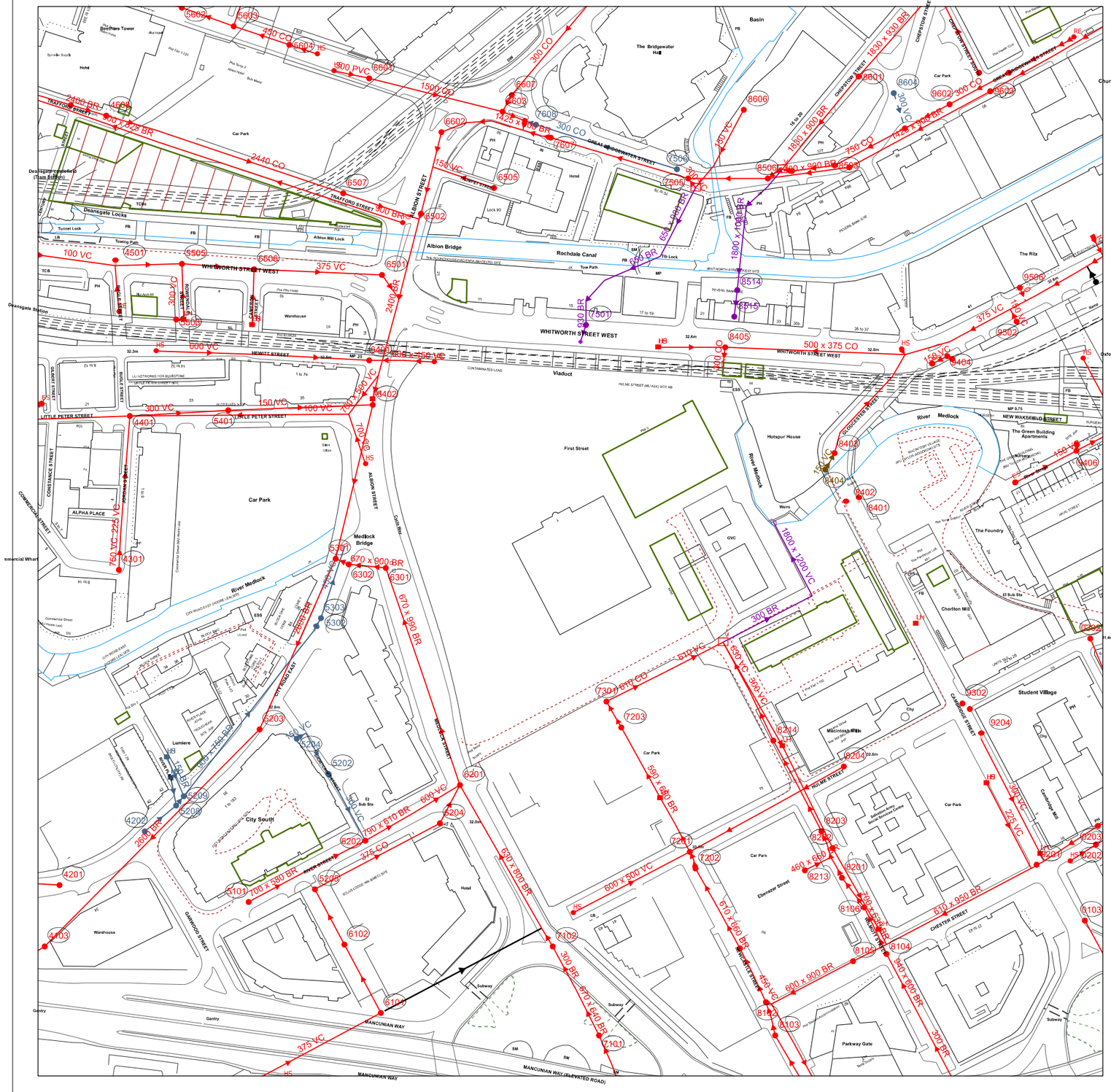
EXISTING BELOW
GROUND DRAINAGE

Project No:	Scale (@A1):	Drawn:	Date:
1620002943	1:250	CO	09/2021

Drawing No: RAM-XX-XX-DR-D-10010

Rev: P02

20/12/2021 15:51:23



Relno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
4103	33.46	CO							
4104	32.93	CO							
4201	33.28	CO	31.45	225		CI	VC	86.15	84
4202		SW	0	830	580	EG	BR	22.02	
4301	28.73	CO	25.33	750		CI	VC	19.03	
4401	30.31	CO							
4404		CO							
4501	33.52	CO	26.52	375		CI	VC	36.01	
4608		CO	0	2400		CI	BR	27.9	
4609		CO							
5101	34.1	CO	30.15	700	580	EG	BR	36.24	117
5202	33.5	SW	30.06	300		CI	VC	3.61	
5203	32.79	CO							
5204		SW	0	150		CI	VC	5.83	
5205	34.42	CO							
5208		SW							
5209		SW							
5301	32.32	CO							
5302	32.45	SW	25.84	450		CI	VC	8.06	
5303		SW	0	450		CI	VC	41.11	
5401		CO							
5503	33.4	CO	30.67	300		CI	VC	34.02	8
5505	33.83	CO							
5506	34.08	CO							
5602	35.48	CO							
5603	35.59	CO							
5604	35.71	CO							
6101	33.74	CO	28.74	375		CI	CO	41.82	199
6102	34.7	CO							
6201	31.75	CO	27.54	630	800	RE	BR	62.3	92
6202	33.39	CO	29.44	790	610	EG	BR	30.02	94
6204	32.35	CO							
6301	32.03	CO	26.18	670	900	RE	BR	10.05	32
6302	32.33	CO	25.48	450		CI	VC	7.52	3
6401	33.84	CO							
6402	33.36	CO							
6501	34.91	CO							
6502	36.02	CO							
6505	35.84	CO		150		CI	VC	34.92	
6507	9.01	CO							
6601	35.88	CO							
6602	36.37	CO							
6603	37.02	CO	31.39	1500		CI	CO	13	10
6607	38.01	CO							
7101	31.73	CO	28.06	670	640	EG	BR	26.83	
7102	34.29	CO	0	300		CI	BR	11.45	
7201	33.22	CO							
7202	33.49	CO	27.59	600	780	RE	BR	5.1	510
7203	33.57	CO	26.75	590	680	RE	BR	8.06	403
7301	30.46	CO	26.68	610		CI	CO	35.78	156
7501	33.14	OV	27.68	1330	900	EG	BR	9.49	
7505	37.28	CO							
7506	37.31	SW	34.55	300		CI	CO	79.7	347
7607	37.09	CO							
7608	37.09	SW							
7609	37.12	CO							
8101	34.27	CO	27.89	610	660	RE	BR	25.06	167
8102	34.55	CO	27.78	450		CI	VC	3.16	
8103	34.69	CO	27.92	600	510	FT	BR	9.22	
8104	34.45	CO	30.54	740	620	FT	BR	14.32	95
8105	34.38	CO							
8106	34.07	CO	30.23	720	580	FT	BR	10	125
8201	33.69	CO	30.97	720	600	FT	BR	6.71	
8202	33.34	CO	25.23	300		CI	VC	59.55	
8203	33.27	CO	29.41	760	560	FT	BR	28.18	28
8204	33.53	CO	29.85	600	500	FT	BR	47.01	45
8213	33.6	CO	30.37	460	660	RE	BR	15.65	
8214	31.33	CO	27.36	590	640	RE	BR	29.97	59
8401	30.6	CO							
8402	30.6	CO							
8403	30.8	CO	25.75	375		CI	VC	66.33	
8404	30.6	FO	26.55	150		CI	VC	5.83	15
8405	32.34	CO							
8502	36.36	CO	23.56	1400	900	EG	BR	44.41	**444**
8503	36.47	CO	31.55	750		CI	CO	23.19	63
8504	36.93	CO							
8506	36.98	CO							
8514		OV							
8515		OV							
8601	36.5	CO							
8604	35.83	SW	33.35	300		CI	VC	19.92	25
8608		CO	0	150		CI	VC	49.49	
9201	34.12	CO	24.48	940	620	EG	BR	1.41	
9204	32.62	CO	24.97	300		CI	VC	74.24	
9301	32.21	CO							
9302	32.22	CO							
9403		CO	0	150		CI	VC	3.15	
9404		CO							
9406		CO							
9407		CO							
9502		CO	0	150		CI	VC	7.37	
9506		CO	0			CI		7.87	
9601	36.54	CO							
9602	36.14	CO							
9603	36.26	CO							
9604	36.45	CO	33.34	300		CI	CO	36.24	59
9609	36.22	CO	29.73	300		CI	VC	50.54	
0103		CO							
0104	32.41	CO	28.37	1100	600	EG	BR	50.12	
0201	34.75	CO	24.93	900	610	EG	BR	18.79	
0202	34.27	CO							
0203	34.37	CO	0	970	620	EG	BR	34.67	
0205		CO	0	680	600	RE	VC	80.23	
0302	31.5	CO							
0402	30.83	CO	25.93	300		CI	VC	44.55	
0416		CO							
0502	34.06	CO							
0602	37.86	CO							
4402		CO							
4505		CO							
4603		CO	0	830	550	UN	VC	79.39	
4605		CO							
4606		CO							
5201		CO							
5402		CO	0	600		CI	VC	58.03	
5403		CO							
5606		CO	0	450		CI	CO	15.81	
5607		CO	0	300		CI	PVC	19.42	
5610		CO	0	2440		CI	CO	106.57	
6203		CO							
6304		CO							
6305		CO							
6404		CO	0	600	450	EG	VC	17.03	
6405		CO	0	700		CI	VC	28.46	
6408		CO							
6503		CO	0	900		CI	BR	140.09	
7104		CO	0	600	500	EG	VC	71.12	
7105		CO							
7106		CO							
7205		CO							
7206		CO							
7302		CO							
7303		CO							
7502		CO	0	930		CI	BR	27.87	
7508		OV	0	650		CI	BR	32.7	
8111		CO							
8112		CO							
8113		CO							
8114		CO							
8115		CO							
8205		CO							
8206		CO							
8207		CO							
8208		CO							
8209		CO							
8302		OV	0	1800	1200	EG	VC	45.18	
8304		CO							
8410		FO							
8501		CO							
8511		OV							

Relno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
9102		CO							
9207		CO	0	610	550	EG	BR	16.64	
9208		CO	0	610	950	RE	BR	110.48	
9209		CO							
9402		CO	0	500		CI	VC	3.61	
9501		CO							
0209		CO							
0210		CO							
0406		CO	0	508	381	EG	VC	129.29	
0520		CO		300		CI	VC	37.74	
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4105		CO							
4303		CO							
4607		CO							
4691		CO							
4692		CO	0	500	750	UN	BR	18.38	
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5207		SW							
5210		SW							
5211		SW							
5502		CO							
5508		CO							
5609		CO							
6403		CO							
6406		CO							
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6508		CO							
6606		CO							
7103		CO							
7204		CO							
7401		CO							
7611		CO							
8108		CO							
8109		CO							
8110		CO							
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8216		CO							
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9203		CO							
9205		CO							
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9303		CO							
9401		CO	0	500	375	EG	CO	97.08	
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9507		CO							
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9616		CO	0	1425	900	EG	BR	38.95	
9617		CO							
0403		CO							
0417		CO							
0508		CO							
0526		CO							
0612		CO							
6103		CO							
0507		CO							
7504		CO	30.31	300		CI	VC	6.41	1
8301		CO	0	300		CI	BR	54.14	
8507		CO							

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

- Manhole
- Manhole, Side Entry
- MainSewer, Public
- MainSewer, Private
- MainSewer, S104
- Rising Main, Public
- Rising Main, Private
- Rising Main, S104
- Highway Drain, Private

Foul Surface Combined

- WW Site Termination
- Air Valve
- Cascade
- Non Return Valve
- Extent of Survey
- Flow Meter
- Gulley
- Hatch Box
- Head of System
- Hydrobrake / Vortex
- Inlet
- Inspection Chamber
- Bifurcation
- Catchpit
- Contaminated Surface Water
- WW Pumping Station
- Sludge Pumping Station
- Sewer Overflow
- TJunction/Saddle
- LampHole
- OilInterceptor
- PenStock
- Pump
- RoddingEye
- Soakaway
- Summit
- Valve
- Valve Chamber
- Washout Chamber
- DropShaft
- WW Treatment Works
- Septic Tank
- Vent Column
- Network Storage Tank
- Orifice Plate
- Vortex Chamber
- Penstock Chamber
- Blind Manhole

Foul Surface Combined Overflow

- Screen Chamber
- Discharge Point
- Outfall

- Sludge Main, Public
- Sludge Main, Private
- Sludge Main, S104

ABANDONED PIPE

- MainSewer
- Rising Main
- Highway Drain
- Sludge Main

- Control Kiosk
- Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

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

SEWER MATERIAL

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

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available.
The actual positions may be different from those shown on
the plan and private pipes, sewers or drains may not be recorded.
United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.

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OS Sheet No:

Scale: 1: 1250 Date: 23/02/2015

211 Nodes

Sheet 1 of 1

United Utilities
helping life flow smoothly

SEWER RECORDS

OS Sheet No:

Scale: 1: 1250 Date: 23/02/2015

Printed By: Jodie Lloyd

APPENDIX 4
FOUL & SURFACE WATER CALCULATIONS

PLOT 9A MANCHESTER
BROWNFIELD CALCULATIONS SHEET

1. Site Information

Nearest Postcode: M15 4RB XY Coordinates: 383757, 397282

M5-60: 18.000 mm r: 0.365 z_1: 0.360 for a five-minute event

2. Drained Area Calculations

The project has the following areas to consider:

- Plot 9a Roof Area: 1,880 m^2 or 0.188 ha
- Plot 9a Externals Area: 2,920 m^2 or 0.292 ha
- Redline Boundary Area: 4,800 m^2 or 0.480 ha
- Existing hard landscaping within redline boundary: 3,300 m^2 or 0.330 ha

3. Brownfield Calculations

Surface water discharge calculated as per the Wallingford procedure:

M5-5 =	18	x	0.36	=	6.48	mm

[4] z2 values for various storm events:

M1 =	0.62	M30 =	1.43
M2 =	0.79	M100 =	1.79
M5 =	1.02		

Therefore, a M5-5 storm can be scaled as follows:
M5-5 x z2 value (for each storm event)

M1-5	=	6.48	x	0.62	=	4.018	mm
M2-5	=	6.48	x	0.79	=	5.119	mm
M5-5	=	6.48	x	1.02	=	6.610	mm
M30-5	=	6.48	x	1.43	=	9.245	mm
M100-5	=	6.48	x	1.79	=	11.599	mm

Therefore, the average point intensities are the intensity divided by the time period:
M5-5 value for each storm ÷ (5÷60)

M1-5	=	4.018	/	1/12	=	48.211	mm / hr
M2-5	=	5.119	/	1/12	=	61.430	mm / hr
M5-5	=	6.610	/	1/12	=	79.315	mm / hr
M30-5	=	9.245	/	1/12	=	110.938	mm / hr
M100-5	=	11.599	/	1/12	=	139.190	mm / hr

Surface water runoff:		Q = CiA	Where	C =	2.78	Cr Cv
Q =	Peak flow rate	l / s		Cr =	Routing Coefficient	1.3
Cv =	Runoff Coefficient	0.84		i =	Rainfall intensity	mm / hr
A =	Area	ha		C =	2.78 * (1.3) * (0.84) =	3.036

Plot 9a Roof Area Only		
Storm Event	Existing Runoff	Proposed Discharge with a 50% Betterment
M1 - 5	26.344 l/s	13.172 l/s
M2 - 5	33.568 l/s	16.784 l/s
M5 - 5	43.341 l/s	21.670 l/s
M30 - 5	60.620 l/s	30.310 l/s
M100 - 5	76.059 l/s	38.029 l/s

Plot 9a Externals Area Only		
Storm Event	Existing Runoff	Proposed Discharge with a 50% Betterment
M1 - 5	42.736 l/s	21.368 l/s
M2 - 5	54.454 l/s	27.227 l/s
M5 - 5	70.308 l/s	35.154 l/s
M30 - 5	98.340 l/s	49.170 l/s
M100 - 5	123.384 l/s	61.692 l/s

Plot 9a Redline Boundary Area		
Storm Event	Existing Runoff	Proposed Discharge with a 50% Betterment
M1 - 5	70.252 l/s	35.126 l/s
M2 - 5	89.514 l/s	44.757 l/s
M5 - 5	115.575 l/s	57.788 l/s
M30 - 5	161.654 l/s	80.827 l/s
M100 - 5	202.823 l/s	101.412 l/s

Existing hard landscaping within redline boundary		
Storm Event	Existing Runoff	Proposed Discharge with a 50% Betterment
M1 - 5	48.298 l/s	24.149 l/s
M2 - 5	61.541 l/s	30.771 l/s
M5 - 5	79.458 l/s	39.729 l/s
M30 - 5	111.137 l/s	55.569 l/s
M100 - 5	139.441 l/s	69.721 l/s

PLOT 9A MANCHESTER
FOUL FLOW CALCULATION SHEET

Due to the nature of the office space the peak foul flow rate will only occur for a typical office working day. Therefore, an eight-hour peak period will be utilised for the calculations. All below ground drainage will be designed to sustain a self-cleansing velocity during quitter periods.

At this stage, above ground flow calculations have not been undertaken so flow rates are subject to change.

To assess the foul flow calculations the population & expected probability rates as outlined within BS EN 752 & BS EN 12056 will be calculated and will be compared to gain an understanding of the flow rate.

1. Population Method

At this moment in time, occupancy figures have not been provided for the proposed Plot 9a building. However, utilising information within building regulations Approved Document B2, 'Fire safety: Buildings other than dwelling houses' Table C1 – Floor space factors. The floor space factor for an office is stated as 6.0 m^2 / person. The most recent plans (as of 13/12/2021) states the following office space per floor.

Basement	Ground	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	Roof	Total
0	0	1270	1410	1450	1450	1450	1450	1450	1025	0	0	10955

Occupancy value: 1 person per 6m^2 therefore 10955 / 6 = 1825.8 people, round down.

A total area of 10,955m^2 would provide a maximum occupancy value of 1,825.

To establish the expected flow per person 'Flows & Loads 4' will be utilised to determine the most suitable scenario. The most applicable activity would be 'Office / Factory without canteen' which gives a base flow of 50 litres per person per day. Applying this value to the 2,045 expected capacity of the stand, a total foul flow volume can be calculated.

Therefore, U = 1825 * 50 l/p/d = 91,250 litres.
As mentioned previously, an eight-hour duration for an event is being utilised for a peak value for the foul flows. The peak foul flow, Q_{pop} can be calculated as follows: $Q_{pop} = \frac{U\ (in\ litres)}{t\ (in\ seconds)}$ l/s

Therefore, $Q_{pop} = 91250/\ (8 * 60 * 60)$ = 3.168 l/s

2. Probability Method

The number of appliances below are as per JMA layout dated 03/12/2021. Number of floor gullies have been assumed within plant spaces. For these calculations 'System II: Single discharge stack system with small bore discharge branch pipes' will be utilised, and a frequency factor of 0.5 will be utilised which is used for 'Intermittent use, e.g. in dwelling, guesthouse, office'.

The breakdown of the appliances are as follows:

- Basement Level (Level -1):
  - No foul drainage within basement
    - Total DU: 0

- Ground floor (level 0):
    - 6 WC's (1.8 DU): 10.8 DU
    - 6 Wash hand basins (0.3 DU): 1.8 DU
    - 13 Showers (0.4 DU): 5.2 DU
    - 4 FG's (assumed) (1.2 DU): 4.8 DU
        - Total DU: 22.6
- Level 1 to 8:
    - 16 WC's (1.8 DU): 28.8 DU per level therefore, 230.4 DU overall
    - 16 Wash hand basins (0.3 DU): 4.8 DU per level therefore, 38.4 DU overall
    - 1 Sinks (0.6 DU): 0.6 DU per level therefore, 4.8 DU overall
        - Total DU: 34.2 per level therefore, 273.6 DU overall
- Level 9:
    - External plant so no foul drainage assumed
        - Total DU: 0
- Total Discharge Units from all levels: 206.3 DU

Peak foul flow, Q_{ww} can be calculated as follows: $Q_{ww} = k\sqrt{\sum DU}$
Therefore, $Q_{ww} = 0.5 * \sqrt{296.2}$ = 8.605 l/s

Note, this value may increase/decrease dependent on any design changes at detailed design.

PLOT 9A MANCHESTER
GREENFIELD CALCULATIONS SHEET

1. Site Information

Nearest Postcode: M15 4RB XY Coordinates: 383757, 397282

M5-60: 18.000 mm r: 0.365 z_1: 0.360

2. Drained Area Calculations

For the following Greenfield calculations, the following hard standing areas will be utilised:

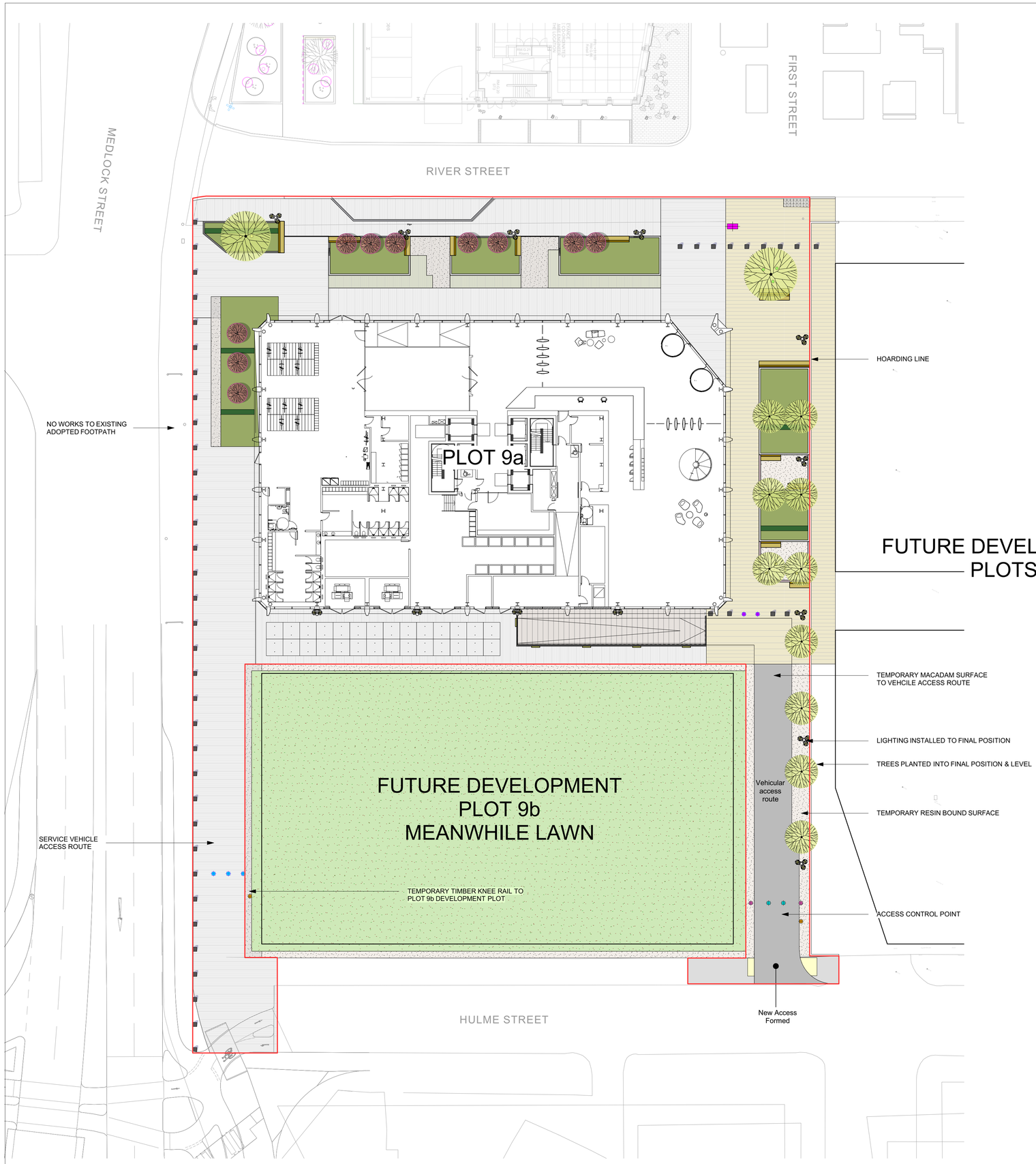
- Plot 9a Roof Area: 1,880 m^2 or 0.188 ha
- Plot 9a Externals Area: 2,920 m^2 or 0.292 ha
- Redline Boundary Area: 4,800 m^2 or 0.480 ha

3. Greenfield Calculations

Due to IH 124 recommendations site areas less than 50 ha are to be calculated for 50 ha, and the figures are to be scaled.

Storm Event	Greenfield Runoff	Plot 9a Roof Area Only	Plot 9a Externals Area Only	Redline Boundary Area
M1 - 5	247.1 l/s	0.9 l/s	1.4 l/s	2.4 l/s
M2 - 5	264.6 l/s	1.0 l/s	1.5 l/s	2.5 l/s
M5 - 5	338 l/s	1.3 l/s	2.0 l/s	3.2 l/s
M30 - 5	481.6 l/s	1.8 l/s	2.8 l/s	4.6 l/s
M100 - 5	590.8 l/s	2.2 l/s	3.5 l/s	5.7 l/s

APPENDIX 5
PROPOSED LANDSCAPE PLAN



KEY

Application Boundary

LEVELS & CONSTRAINTS

31.21+ **SPOT LEVEL - Existing**
Levels as per Topographic Survey

+31.37 **SPOT LEVEL - Proposed**

FFL 31.350+ **FINISHED FLOOR LEVEL - Proposed**

HARDWORKS

PAVING TYPE A
- Sandstone paving to match specification of existing First Street surfacing

PAVING TYPE B
- Linear concrete permeable paving
- To include portions gravel gaps as shown

PAVING TYPE C
- Large format feature concrete units
- 2m x 2m

PAVING TYPE D
- Linear concrete paving with grass infill

PAVING TYPE E
- Gravel strip banding set within wider paving area

RESIN BOUND GRAVEL
- Resin bound porous gravel
- To match First Street

PEDESTRIAN CROSSING - TACTILE PAVING
- Granite to match wider estate

FLUSH EDGING
- Flush granite edge

UPSTAND EDGING
- Raised granite upstand edge

KERB
- Granite kerb along River Street

FURNITURE & LIGHTING

PROPOSED SEATING BENCH
- Subject to further design
- Single facing aspect

BUILDING TOTEM SIGNAGE
- subject to further design

PROPOSED AUTOMATED TELESCOPIC BOLLARD
- To match the implemented works on First Street

PROPOSED MANUAL TELESCOPIC BOLLARD
- To match the implemented works on First Street

PROPOSED INTERCOM POST
- To manage maintenance access along service route

GAS MAIN MARKER
- **Product**: TBC
- **Other**: Subject to further detail design

FIXED BOLLARD
-subject to further design

PROPOSED LIGHTING COLUMN
- To match the implemented works on First Street

PROPOSED BUILDING MOUNTED LIGHTING
- to service area

PROPOSED PLANTING UPLIGHTER SPIKE MOUNTED
- To illuminate feature trees

PROPOSED PAVING UPLIGHTER- FLUSH
- To illuminate feature tree

SOFTWORKS

EXISTING TREE TO BE REMOVED
- To enable development of plot

SEMI-MATURE TREE - Proposed
- Refer to planting schedule.

MULTI-STEM TREE - Proposed
- Refer to planting schedule.

ORNAMENTAL GRASSES & PLANTING BED
- Refer to planting schedule.

FORMAL CLIPPED LOW HEDGING
- Refer to planting schedule.

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3. All dimensions are in millimetres unless otherwise stated.
4. All setting out, levels and dimensions to be agreed on site.
5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

Revision	Date	Description	Drawn	Apprvd.
P27	17-12-21	PLANNING	RM	RM
P26	08-12-21	PLANNING	RM	RM
P25	02-12-21	PLANNING	RM	RM
P24	29-11-21	PLANNING	BT	RM
P23	27-09-21	PLANNING	JC	RM

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Tempest 5.3, 12 Tithebarn Street, Liverpool, L2 2DT
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Client First Street Developments LTD

Project First Street Plot 9

Drg Title Landscape GA

Created on	Created by	Approved by
13-06-19	JC	RM

Scale	Size	Workstage
1:200	A1	Planning

Drg No.	Suitability	Revision
PL1471.1-PLA-XX-00-DR-L-0001	S1	P27

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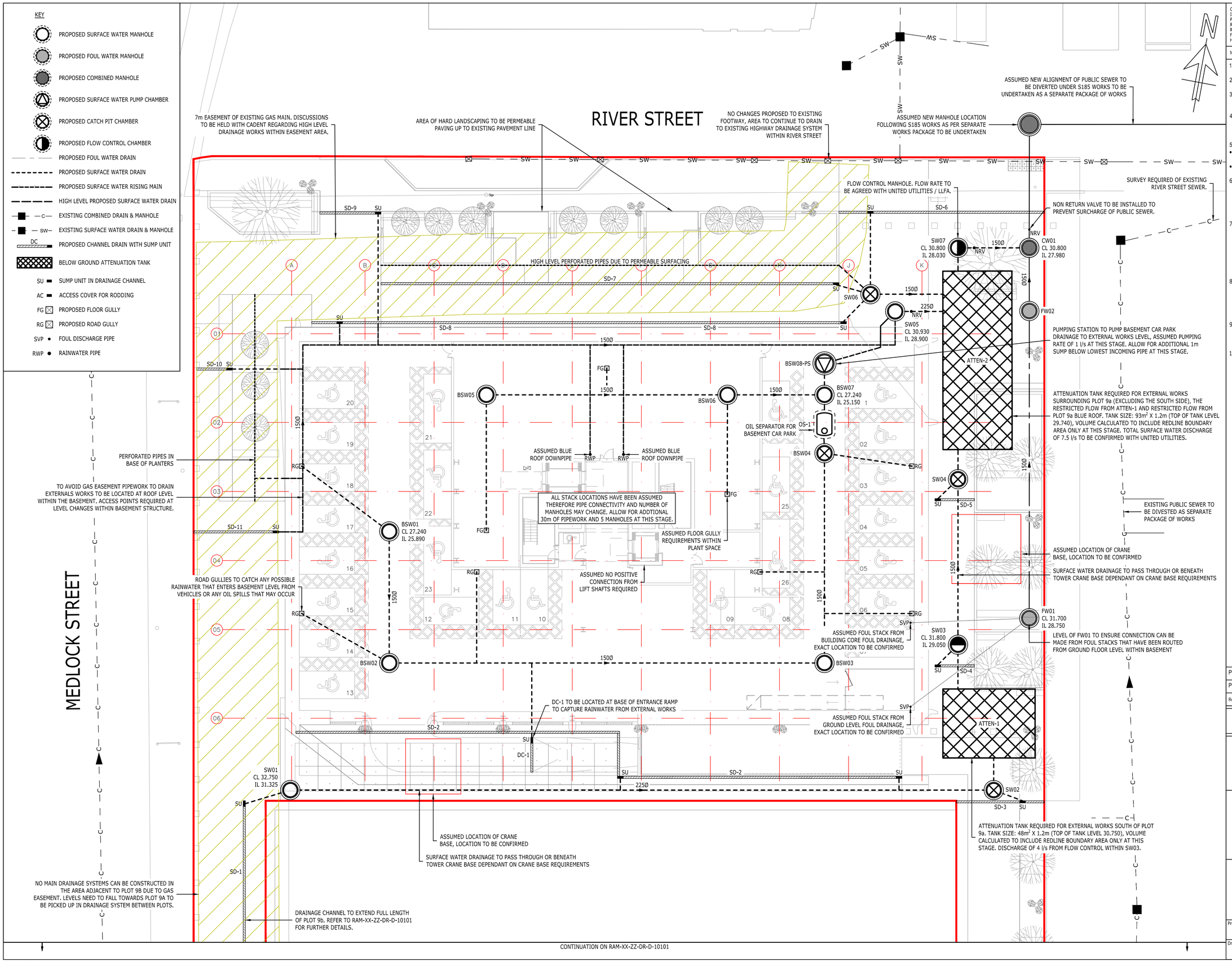
APPENDIX 6
PROPOSED DRAINAGE STRATEGY



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5. THIS LAYOUT IS BASED ON :
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   - BASEMENT LAYOUT 05662_B1_02_2199 BY JMA
6. THIS DRAWING IS A CONCEPT DESIGN AT THIS STAGE THEREFORE IS SUBJECT TO CHANGE ONCE INFORMATION IS AVAILABLE ON FOUNDATIONS, STACK LOCATIONS, BLUE ROOF DESIGN, PROPOSED EXTERNAL LEVELS AND FLOW RATES.
7. 7.5 l/s SURFACE WATER DISCHARGE AND UNDRESTRICTED FOUL FLOWS HAVE BEEN AGREED BY UNITED UTILITIES INTO THE PUBLIC SEWER SYSTEM. AWAITING CONFIRMATION FROM THE LEAD LOCAL FLOOD AUTHORITY OF THIS STRATEGY THEREFORE CHANGES MAY BE REQUIRED ONCE CONSULTATIONS HAVE BEEN COMPLETED.
8. SURFACE WATER FROM THE ROOF IS ASSUMED TO COLLECT INTO A 100mm DEEP BLUE ROOF SYSTEM WITH FOUR OUTLETS INTO TWO DOWNPIPES BELOW GROUND WITH COMBINED DISCHARGE OF 2.5 l/s. CONFIRMATION OF THIS DESIGN BY SPECIALIST.
9. ASSUME ALL EXTERNAL WORKS DRAINAGE CHANNELS TO BE ACO MULTIDRAIN M150D WITH D400 BRICKSLOT COVERS.
10. ALL PIPE SIZES AND LEVELS ARE TO BE INDICATIVE AT THIS STAGE.

Rev	Description	Date	By / Chk	App
P02	UPDATED PLANNING ISSUE	20/12 2021	CO / LS	CK
P01	STAGE 2 ISSUE	10/09 2021	CO / LS	CK

STAGE 2

PLOT 9a
FIRST STREET
MANCHESTER

RAMBOLL

tel 01244 311855 chester@ramboll.co.uk
www.ramboll.co.uk

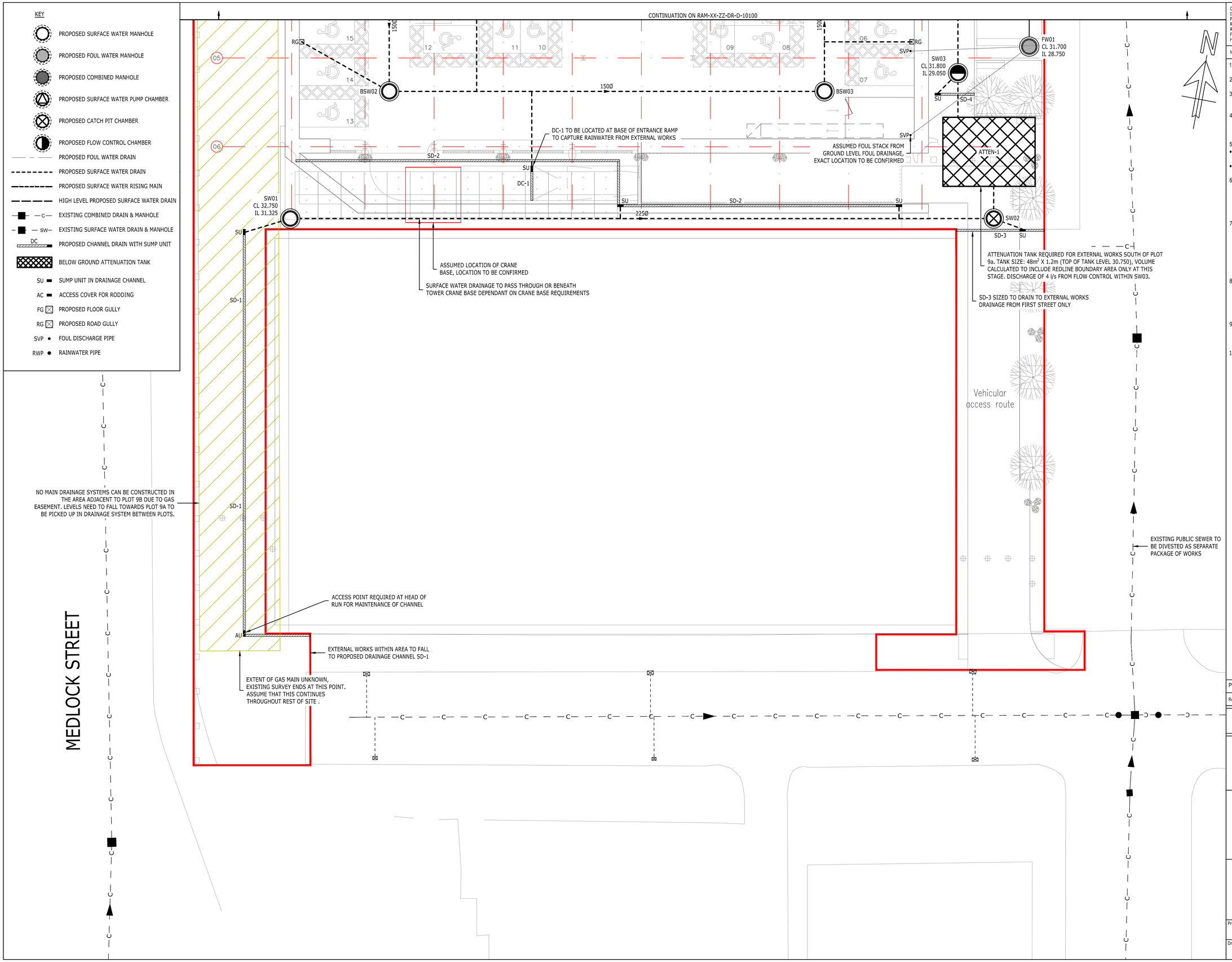
PROPOSED DRAINAGE STRATEGY

SHEET 1 OF 2

Project No:	Scale (@A1):	Drawn:	Date:
1620002943	1:150	CO	SEPT 21

Drawing No: RAM-XX-ZZ-DR-D-10100
Rev: P02

20/12/2021 15:50:47



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9. ASSUME ALL EXTERNAL WORKS DRAINAGE CHANNELS TO BE ACO MULTIDRAIN M150D WITH D400 BRICKSLOT COVERS.
10. ALL PIPE SIZES AND LEVELS ARE TO BE INDICATIVE AT THIS STAGE.

Rev	Description	Date	By / Chk	App
P01	PLANNING ISSUE	20/12 2021	CO / LS	CK

STAGE 2

PLOT 9a
FIRST STREET
MANCHESTER

RAMBOLL

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PROPOSED DRAINAGE STRATEGY

SHEET 2 OF 2

Project No:	Scale (@A1):	Drawn:	Date:
1620002943	1:150	CO	DEC 21

Drawing No:	Rev:
RAM-XX-ZZ-DR-D-10100	P01

20/12/2021 15:51:05