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ONE MEDLOCK STREET COMBINED FLOOD RISK & DRAINAGE STRATEGY



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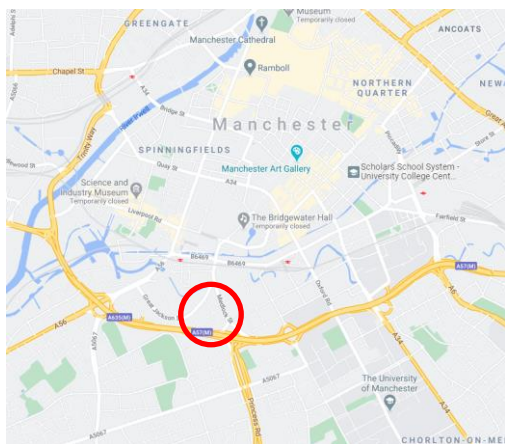
Proposed Calculations

1. INTRODUCTION

Ramboll UK Ltd (Ramboll) has been appointed by Premier Inn Hotels and Dominvs Group as Multi-disciplinary Engineers for the One Medlock Street, Manchester, M15 5GR. This report has been developed to support a planning application regarding flood risk and proposed drainage strategy for the redevelopment.

The proposed development comprises the demolition of the existing hotel building and structures and the development of the site for office uses (Use Class E), flexible office/community use (Use Class E/F1/F2) and purpose-built student accommodation (Sui Generis) comprising two separate buildings, along with associated ancillary internal and external amenity space, hard and soft landscaping and associated highway works.

The proposed development will hereafter be referred to as the "Application Site". An indicative location (Figure 1.1) and site plan (Figure 1.2) can be found below.



National Grid Reference
SJ 83630 97200

X Co-ordinates
383630

Y Co-ordinates
397200

WhatThreeWords:
pads.party.agents

Source: Google Earth Extract ©2021 Google

Figure 1.1: Site Location



Figure 1.2: Proposed Development Location Plan

2. SCOPE AND OBJECTIVES

This Drainage Strategy report should be read in conjunction with all other planning documents.

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

- Existing and proposed flood risk for the Application Site
- Existing drainage systems on the Application Site
- Proposals for any works to existing public sewer assets in the vicinity of 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 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 believes these information sources to be reliable and where possible has tried to verify the information.

This report has been prepared based on the proposed end use defined by the Client at the time of writing. If this proposed end use or duration is altered, 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 July 2021. 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.

In regard to peak discharge this states:

For greenfield developments the peak runoff rate from the development to any highways, sewer, or surface water body for the 1 in 1 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

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.

In regard to volume control this states.

S4: Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.

S5: Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

S6: Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

In regard to flood risk within the application site this states;

S7: The drainage system must be designed so that, unless an area is designated to hold

and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.

S8: The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of a building (including a basement); or in any utility plant susceptible to water (e.g., pumping station or electricity substation) within the development.

S9: The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.

4.2 Strategic Flood Risk Assessment (SFRA)

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 Lead Local Flood Authority (LLFA) – Manchester City Council (MCC)

Initial consultation was undertaken with the LLFA in July 2019, for a previous iteration of the proposed development with regard to surface water drainage strategy. They confirmed the following requirements:

- A minimum 50% betterment of existing flow rates, based on existing drainage capacity;
- A +40% increase in rainfall intensity due to climate change should be applied to the new development; and
- The use of 'Green SuDS' should be incorporated into the scheme where possible.

The LLFA were subsequently re-approached during December 2020 to discuss the current development proposals and to confirm if there were any changes to their original stance. The response confirmed that the requirements from 2019 were still relevant and applicable.

5.2 United Utilities (UU)

Initial consultation was also carried out with UU in July 2019, for the earlier version of the development, for foul and surface water drainage strategy. UU confirmed that:

- Foul water from the new development can be discharged at unrestricted rates into the nearby foul/combined sewer located within the public highway
- Storm water should drain via infiltration, or where not possible, drain into the nearby 375mm combined sewer passing through the development boundary at a peak flow rate no greater than 50 l/s (in accordance with LLFA guidance)

UU also advised that a sewer diversion would be required for the existing DN375 combined sewer and further details should be submitted in due course.

Ramboll subsequently approached UU during October 2021 to discuss the revised scheme and to confirm their previous requirements. UU confirmed the following, which matches with the previous advice that was provided.

- Foul water can drain at an **unrestricted** rate into the 375mm combined sewer crossing the site
- Storm water can drain to the 375mm combined sewer at **50 l/s** pass forward rate, equivalent of a 50% betterment in line with MCC LLFA policies – subject to formal S106
- The 375mm combined sewer could be diverted around the proposed development – subject to a formal S185 application

Refer to Appendix 1 for details of all correspondence undertaken to date.

6. EXISTING SITE DESCRIPTION

6.1 Topography

A topographical survey was undertaken during 2019 of the existing site and area immediately surrounding. The levels from this survey indicate that the topography generally falls West to East towards the Premier Inn building and Medlock Street.

Existing ground levels typically vary from 34.60 mAOD on the Western boundary to 33.60 mAOD at the building line. The finished floor level lies at 33.86 mAOD and the external ground level bounding Medlock Street in the East is set lower, at approximately 32.10 mAOD on the NE corner.

6.2 Existing Drainage

The United Utilities sewer records indicate that there are several public sewer assets within the vicinity of the Application Site.

- A 630 x 800mm combined brick sewer running South-North within Medlock Street. Approximately 4.24m deep;
- A 375mm combined sewer running along the Western and Northern boundaries of the site before converging with the above Medlock Street Sewer at UU manhole 6201. The sewer is approximately 5.0-6.0m deep;
- A 540 x 730mm (turning into a 610 x 790mm) combined brick sewer running West-East within River Street and combining with the Medlock Street Public Sewer at manhole 6201. This sewer is approximately 4.04m deep; and
- A 300mm storm water sewer running south in Shortcroft Street before combining with the River Street Public Sewer at manhole 6202. Upstream depth currently unknown.

The Application Site is currently served by two separate drainage systems - foul and storm water - before discharging into the 375mm combined public sewer system in three different locations.

6.2.1 Foul Drainage

The on-site foul drainage collects effluent from within the existing hotel and discharges into UU public sewer manhole MH 6204 - via a DN225 diameter drain and backdrop connecting at 30.26 mAOD.

Details of the existing on-site foul drainage can be found in Appendix 2.

6.2.2 Storm Water Drainage

The on-site private storm drainage is served by several drainage runs, each connecting into the 375mm combined public sewer in three separate locations:

The main car parking and external areas are drained via a series of road gullies, channels and kerb drains before passing through a petrol interceptor. From here, the drain is understood to connect into public sewer manhole MH 5205 - via a DN225 drain discharging at high level.

The existing access road and carpark entrance is served by road gullies and kerb drains and is understood to connect into the public sewer upstream of the main carpark in manhole 6102, via a high level DN150 pipe.

The building is believed to partially connect into the car park drainage system as well as the final foul private manhole before discharging into the public sewer system.

A number of road gullies serve the interface with River Street and the footway adjacent and these are believed to discharge directly into the brick public sewer within River Street.

Details of the existing on-site drainage can be found in Appendix 2.

6.3 Existing Surface Water Run-Off

To establish the existing peak storm run-off rates, two different methods have been assessed and compared against each other.

- Partial hydraulic modelling of the existing system – will provide information on existing peak run-off rates at the outfall locations; and
- Assessment of peak rainfall figures based on Wallingford Procedure and drained impermeable area

The tables below compare the peak storm water run-off figures for the above methodologies.

Table 6.1: Existing Hydraulic Model

Return Period	Outfall/Drainage System		Overall Existing Storm Water Discharge from Application Site *
	Premier Inn Site	Edge Street	
M1-5	44.3 l/s	11.5 l/s	55.8 l/s
M2-5	52.1 l/s	14.9 l/s	67.0 l/s
M30-5	81 l/s	28.3 l/s	109.3 l/s (model indicates c.5m ³ on-site flooding)
M100-5	84.4 l/s	36.5 l/s	120.9 l/s (model indicates c.16m ³ on-site flooding)
Based on site area = 0.526ha			
* Area surrounding perimeter and access from River Street currently drains via road gullies into the River Street public sewer and as such, existing flow rates are expected to be higher than calculated in this table			

An assessment was also undertaken for the impermeable site area using the Wallingford Procedure. This considered the full site development area (0.743ha), not just the area within the Premier Inn site as these areas also discharge directly into the adjacent the public sewer via road gullies. The total impermeable area was taken as approximately 85%, and therefore had an equivalent impermeable area of 0.631ha.

Table 6.2: Existing Run-off - Wallingford Procedure

Return Period	Peak Run-off Rate (l/s)
M1-5	84.4 l/s
M2-5	108.1 l/s
M30-5	197.7 l/s
M100-5	249.8 l/s
<i>Based on Full-Site Area = 0.743ha</i>	

7. FLOOD RISK ASSESSMENT

7.1 Overview

The flood risk to site has been assessed based on a review of the baseline flood risk conditions, the vulnerability and susceptibility of the development and the potential for the development to adversely impact on flood risk elsewhere. Where a source of flooding is considered to be present, mitigation measures will be included to manage this risk.

7.2 Fluvial

A review of the Environment Agency flood risk mapping¹ indicates the site is within flood zone 1, low risk, having a less than 1 in 1,000 annual probability of river or sea flooding. The closest source of fluvial flooding is the River Medlock located approximately 200m to the north. The site is situated far beyond the maximum modelled flood extent, and the land climbs away sufficiently to prevent future risk of flooding occurring to the site from the Medlock. The risk of flooding from fluvial sources is therefore considered to be low.

7.3 Surface Water

A review of the Environment Agency flood map for surface water indicates the majority of the site is at very low risk, indicating that each year this area has a chance of flooding of less than 0.1%. There is however a small area indicated to be at low risk, indicating an annual chance of flooding of between 0.1% and 1%. Notwithstanding the predominantly low risk of surface water flooding, a number of mitigation measures is proposed; these are outlined in brief in section 7.9.

7.4 Sewer Flooding

The United Utilities sewer records indicate a large amount of sewerage infrastructure in the vicinity of the site (see section 6.2). Whilst no information was provided relating to the capacity of the existing network or issues with flooding, the topography and location of the public sewers in the vicinity of the site do suggest a pathway for sewer flooding could be present. In order to maintain a conservative approach to managing flood risk, a number of mitigation measures are proposed below.

7.5 Groundwater Flooding

The plans propose a basement level for Block 2, and as such there is a potential risk of either groundwater ingress, or entry of runoff from surface level. An assessment of the closest British Geological Survey Logs² indicated ground water level of around 12 m BGL. Whilst this would be subject to seasonal variation, it is unlikely to fluctuate to an extent which may encroach on the basement level. The flood risk to the site from groundwater sources is therefore considered to be low.

7.6 Artificial Sources

The flood map for reservoir flooding does not indicate the site to be at risk, and there are no other artificial sources (canals, culverts etc.) that could present a risk. The risk of flooding from artificial sources is therefore considered to be low.

¹ <https://flood-map-for-planning.service.gov.uk/confirm-location?eastings=387522&northing=395403&placeOrPostcode=M15%205GR>

² <https://mapapps.bgs.ac.uk/geologyofbritain/home.html>

7.7 Assessment of Development

Table 2 (Flood Risk Vulnerability Classification) of the Planning Practice Guidance to NPPF, buildings used for residential uses are classified as "Less Vulnerable". Table 3 (Flood Risk Vulnerability and Flood Zone Compatibility) in the Planning Practice Guidance to NPPF, states that "Less Vulnerable" developments are appropriate to locate in Flood Zones 1.

7.8 Sequential Test

The Sequential Test aims to steer development to areas with the lowest probability of flooding. In accordance with the NPPF "Less Vulnerable" developments are suitable for location in Flood Zone 1; therefore, the sequential test is deemed to have been passed and the Exception Test is not required for the proposed development.

7.9 Mitigation Measures

The review of flood risk from all sources indicated that there is potentially a risk to the development from surface water and/or sewer flooding. In order to ensure the development can remain safe across its lifetime, the following mitigation measures should be included:

- Design of external area gradients - where possible, are be designed to fall away from buildings, so that any overland flow resulting from extreme events would be channelled away from building entrances; or
- Raised building thresholds - to prevent the ingress of surface water, and should engineering of site levels not be possible; or
- Inclusion of linear interceptor drains - to be located at all building entrances towards which there is a positive gradient for surface water to flow. The drains will intercept and remove runoff preventing ingress into buildings; and
- Design of a new drainage system - designed to have sufficient capacity to be effective in future, intensive rainfall events (described in more detail in Chapter 8). This will also manage the risk of overland flow emanating from the development.

The above should form part of the detailed site design once the final masterplan is available, and once the design of external areas has been undertaken.

7.10 Summary

A review of the flood risk to the site has been undertaken, and largely has identified the site to be at a low risk from flooding. However, due to the potential for surface water and sewer flooding to occur, a number of minor mitigation measures are proposed. This represents modern design best practice, and should not incur the site design, and can be incorporated into the existing development proposals. Subject to the inclusion of these mitigation measures, it is anticipated the flood risk to the site can be managed in a safe and sustainable manner.

8. PROPOSED SURFACE WATER DRAINAGE

8.1 Strategy

The proposed surface water drainage system for the Applications 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 suit 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% increased allowance for climate change.

It is acceptable to allow car parks or areas of soft landscaping to flood during 1:100-year annual probability events providing that it does not impact safe access/egress to the development for emergency services, emergency escape routes or impact third-parties.

The following hierarchy has been reviewed in regard to discharge of surface water from the Application Site to confirm the discharge strategy taken forward.

- To Ground/Infiltration
- To Surface Water Body/Watercourse
- To Sewer

Ground/Infiltration

Preliminary soakaway tests carried out during the ground investigations indicated that infiltration into the ground may be feasible for part of the site. Other areas viable for infiltration will be located beneath the proposed building footprint.

As the proposed building footprints cover the majority of the site area, any locations for infiltration will be very limited. When this is combined with proximity existing highways, underground services and existing public sewers, this area is reduced further.

As such infiltration is not considered to be feasible to discharge storm water arising from the application site.

Surface Water Body/Watercourse

The River Medlock is located approximately 200m North of the Application Site, where it passes into a culvert beneath Medlock Street and the wider First Street development area.

Any new connection into this watercourse would need to pass across multiple areas of third-party land, avoiding several buildings and public highways. As such, this is not considered feasible for the development.

Surface Water Sewer or Combined Sewer

There are several foul/combined public sewers identified on sewer records within the vicinity of the Application Site. One of these sewers, a 375mm combined sewer runs through the development boundary and currently receives on-site surface water.

Given that infiltration and discharge to watercourse are not viable discharge locations, it is proposed to connect the proposed development site into the existing combined public sewer network.

In accordance with Building Regulations Part H, it is proposed that foul and surface water drainage systems will be kept separate up until the point of discharge into the public sewer network. There will also be separate drainage networks serving each building within the Application Site for ease of future maintenance and construction phasing.

Details of the indicative drainage strategy can be found within Appendix 3.

8.2 Proposed Area Breakdown

The proposed development comprises 2 no. buildings and will be designed and constructed separately each with discrete drainage networks. Therefore, it is proposed that the overall discharge rate from the existing development will need to be divided between the two developments – in a pro-rata fashion.

The proposed development will increase the overall impermeable area of the site due to the buildings being high-rise and, in effect, will intercept rainfall that would have previously landed outside the site boundary. As such the following area breakdown has been estimated.

- Proposed Blue-line boundary (plan) = 7,430m² (0.743ha)
- Total Area including building façades and roofs = 9,460m²
- Block A = 5,220m² (0.522 ha)
 - Plan Area – 4,020m²
 - Façade Area (2 sides) – 1,200m²
- Block B = 4,420m² (0.442 ha)
 - Plan Area – 3,410m²
 - Façade Area (2 sides) – 1,010m²

At this stage, assuming a 95% impermeable area to accommodate for vegetation, absorption and evaporation. This gives:

- Total Impermeable Area = 9,160m²
 - Block A = 4,960m² = approx. 55% overall split
 - Block B = 4,200m² = approx. 45% overall split

8.3 Proposed Surface Water Flows

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

- Restrictions imposed by LLFA to suit local and site development plans – 50% betterment on existing flows
- Restrictions imposed by UU to suit local public sewer capacity – assumed to be max 50 l/s
- Restrictions imposed by BREEAM to achieve certain credits – min. 30% betterment on existing flows
- Capacity of the existing downstream system
- Proposed site layout and adjacencies dictating viable space for attenuation or SuDS.

As such, an assessment has been taken based on the above information and can be found in the table below.

Table 8.1: Proposed Discharge Rates – Application Site

Return Period	Predevelopment run-off rate (l/s)	LLFA 50% Betterment (l/s)	UU Flow Rate Requirement (l/s)	Proposed Development Discharge Rates (i.e. lowest per storm period and indicated % betterment)	
M1-5	55.8	27.9	50	27.9 l/s	50%
M2-5	67.0	33.5	50	33.5 l/s	50%
M30-5	109.3	54.6	50	50.0 l/s	54.3%
M100-5	120.9	60.4	50	50.0 l/s	58.6%
M100-5 + 40% CC	- *	60.4 **	50 **	50.0 l/s	(>58.6%)

* The M100 + Climate Change figure does not exist for the existing system

** The Proposed discharge rate for the M100 + Climate Change shall be restricted to no more than the pre-development M100 year rate.

The above figures apply to the entire Application Site blue-line boundary. As the development is split into two buildings, and there is a phasing requirement to construct these buildings independently, the overall discharge rate must be split accordingly.

When viewed in conjunction with the area split calculated in Section 8.2, the following table summarises the proposed discharge rate split between the two developments.

Table 8.2: Proposed Discharge Rates - Per Building

Return Period	Overall Combined (l/s)	Block A (l/s) – 55%	Block B (l/s) – 45%
M1-5	27.9 l/s	15.3 l/s	12.6 l/s
M2-5	33.5 l/s	18.4 l/s	15.1 l/s
M30-5	50.0 l/s	27.5 l/s	22.5 l/s
M100-5	50.0 l/s	27.5 l/s	22.5 l/s
M100-5 + 40% CC	50.0 l/s	27.5 l/s	22.5 l/s

To achieve these staged discharge rates, it may be necessary to utilise complex or multiple control systems (i.e. vortex flow controls) with varying discharge rates for equivalent storm periods/water levels. This shall be reviewed during detailed design.

8.4 Proposed Attenuation Requirements

Using the above figures, it has been possible to estimate the volume of storm water attenuation required for the proposed development for a M100 year probability event with an additional 40% allowance for climate change. The following table indicates the required storage volumes for each development.

Table 8.3: Approximate Storage Volumes – Brownfield Discharge Rates

Return Period	Overall Site (m ³) <i>0.916ha, 50.0 l/s</i>	Block A (m ³) <i>0.496ha, 27.5 l/s</i>	Block B (m ³) <i>0.420ha, 22.5 l/s</i>
M100 + 40% CC	223-383 m ³	120-206 m ³	104-177 m ³

The above volumes will be achieved by utilising a combination of attenuation features throughout the Application Site. Further details of the types of suitable systems can be found in Section 8.6 and within Appendix 3.

Refer to Appendix 4 for preliminary surface water calculations.

8.5 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	Wallingford Procedure for Design and Analysis of Urban Storm Drainage
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 before connection into an existing combined Public Sewer.

8.6 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 rate, attenuation will need to be incorporated within the design of the surface water drainage design for the 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 viable for the Application Site.

- **Infiltration measures**
Whilst infiltration may be achievable in small, isolated areas, soakaways are **not** deemed a viable method of attenuation and discharge the entire Application Site impermeable area. This is due to issues associated with site layout and building/landscaping ratio, existing services and public sewers, adjacent buildings and public highways.
- **Permeable paving/Porous Surfacing**
Surfacing systems which allow water to infiltrate through the surface to an underlying gap-graded sub-base or into a sub-base geo-cellular system **may** be considered possible for this

development. Further consideration would be required with regard to surfacing materials, vehicular access and loading requirements, existing and proposed underground services and proximity to buildings.

- Rainwater Harvesting

The use of rainwater harvesting for greywater use within the building would decrease the volume and rate of surface water runoff from the building. This would reduce the roof runoff in low return period events; however, it cannot be considered to reduce peak flows off-site since the drainage strategy has to assume that the rainwater tank is full and therefore overflowing. As such this is **excluded** from the below ground drainage strategy.

- Detention Basins

Surface storage basins are normally dry and can provide attenuation of surface water runoff in peak storm conditions. The space requirements for detention basins are **not** suited to this development given the extent of the works boundary and requirement to minimise disruption to the wider site.

- 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.

- Green/Brown Roofs

Planted roof areas which provide a degree of rainfall storage and attenuation for small return period storms. Well maintained green/brown roofs are able to decrease the volume of surface water runoff by up to 40% in low return period storms. The design of the structure would need to take these into account, but this solution **may** be possible for this site.

- Blue Roofs

A method of storing water at roof level within plastic geo-cellular shallow crates and providing several points of 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. The use of a blue roof solution **may** be possible for the development and could potentially be used in conjunction with areas of Green/Brown Roofs.

- Oversized Pipes

The use of large diameter pipes as attenuation tanks either in lieu or in addition to conventional drainage systems. These are deemed **viable** for use within the proposed development and if laid to shallow gradients will assist in keeping the drainage system as shallow as possible. The tanks can be suitable for vehicular loading therefore being suited to the Application Site.

- Below ground tank/cellular storage

A method involving storage tanks or geo-cellular crates installed below the lowest ground level has the advantage of having a 95% void ratio allowing it to attenuate large volumes. The use of a tank solution is considered **viable** beneath the external vehicular or pedestrian landscaped areas. However, further consideration will be required in relation to vehicular loading, service co-ordination, phasing and burial depths.

9. FOUL DRAINAGE PROPOSALS

9.1 Strategy

The proposed foul drainage shall be split into two main systems: one serving each building. Each network shall be kept separate from surface water serving the development, until the point of discharge into the public sewer. Here the foul and storm network for each building will converge to form a single, combined demarcation chamber and drain into public sewer in their respective locations.

Block A shall be served by both a gravity and pressure drainage system to accommodate for drainage arising in the basement areas of the commercial spaces. Foul effluent is expected to be of a domestic nature, serving offices and associated welfare and plant spaces.

Block B shall be served by a gravity drainage system, collecting domestic foul waste from student accommodation units and communal areas.

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

Details of the indicative drainage strategy can be found within Appendix 3.

9.2 Proposed Peak Foul Water Flows

Peak and average foul water flow rates shall be calculated using the Population Method as prescribed in BS EN 752, BS EN 16933-2 and British Water Flows and Loads Code of Practice.

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.

At the time of writing, finalised peak and average foul flow rates have not yet been established for the development. However, to estimate the potential peak flow arising from occupancy rates, the following elements have been assessed:

- Block A – peak occupancy based on net internal area (NIA)
 - 36,494m² GIA
 - 26,242m² NIA with an occupancy density of 1pax/6m²
- Block B – PBSA
 - 1014 bed spaces

Using the above metrics, the following table summarises the potential peak and average foul flow rates arising from the Application Site.

Table 9.1: Indicative Foul Flow Rates

Building	Population	Estimated Daily Volume Flows and Loads 4	Average Flow	Estimated Peak Flow
	Flow/Person/Day Flows and Loads 4		Block A period – 12 hrs Block B period – 24 hrs	
Block A – Commercial 26,242m²	4,374	218.7.0 m³	5.06	6x DWF = 30.36 l/s
	50 l/h/d			4x DWF = 20.24 l/s
Block B – 1014 PBSA bed spaces	1,280	256.0 m³	2.96	6x DWF = 17.76 l/s
	200 l/h/d			
Note the above values are approximate and will be assessed further during detailed design and sizing of above and below ground systems				

9.3 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

In accordance with Building Regulations 2010 Approved Document H, Section H5, separate foul and surface water systems shall be designed for the proposed development before connection into an existing combined Public Sewer.

10. MAINTENANCE OF DRAINAGE SYSTEMS

10.1 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.

10.2 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, obstructions etc. to restore hydraulic capacity
- Maintenance of mechanical plant
- Rodent and insect control

10.3 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 10.1: Indicative Maintenance Requirements – Pipes and Manholes

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

Table 10.2: Indicative Maintenance Requirements – Attenuation Structures

Storm Water Attenuation Tank and Flow Controls		
Silt accumulation, blockage, structural integrity		
Maintenance Schedule	Requirement	Recommended minimum frequency
Regular	<i>Removal of excess silts</i>	<i>Monthly (or as required)</i>
Occasional	<i>Removal and disposal of oil or petrol residues using safe standard practices</i>	<i>As required</i>
<i>Monitoring</i>	<i>Inspect upstream and downstream manholes and flow control devices for evidence of silt accumulation and integrity of system</i>	<i>Quarterly per annum</i>

APPENDIX 1 CONSULTATIONS

Gavin Smith

From: Gavin Smith
Sent: 05 February 2021 09:55
To: Gavin Smith
Subject: FW: Enquiry on Surface Water Run-off Restrictions - Existing Premier Inn Site, Manchester
Attachments: Manchester City Council - SuDS Requirement for Developers 2019.pdf

From: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Sent: 06 January 2021 16:58
To: Conor O Loughlin <conor.oloughlin@ramboll.co.uk>
Subject: RE: Enquiry on Surface Water Run-off Restrictions - Existing Premier Inn Site, Manchester

Good Afternoon Conor,

All of our advice listed within the correspondence dated 8th July 2019 is still valid.

I have attached our SuDS Requirement for Developers 2019 document for your reference.

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: 21 December 2020 17:52
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Cc: Gavin Smith <Gavin.Smith@ramboll.co.uk>
Subject: RE: Enquiry on Surface Water Run-off Restrictions - Existing Premier Inn Site, Manchester

Good afternoon,

I am writing to you in relation to a previous enquiry to yourselves, see below. The project has been on hold for a number of months and has recently restarted, and the advice given at the time is 17 months old at the time of writing. Please could I check with yourselves that the advice given below remains current?

Primarily that a 50% betterment is required based on the existing capacity of the sewers. Please note, talks have been resumed with UU on the capacity of the sewer. An assumption of a 50 l/s discharge rate based off a previous agreement with UU is being used at present, which is in exceedance of the 50% betterment figures. Also, is a 40% climate change allowance what should be used within the design? Current design assumptions are being based on this figure, but can be amended if required.

The design is currently in a concept stage and green SuDS are being proposed at the time of writing, but please note this may be reduced as the design is developed further. Confirmation of SuDS being utilised within the

design can be provided once concept designs have been created. Please note, there has been a change to the masterplan of the site which has resulted in a reduction in the number of buildings being proposed.

If you would like any further information from ourselves at this stage, please let me know and I would be happy to assist where possible.

Kind regards

Conor O Loughlin

Apprentice Engineer

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conor.oloughlin@ramboll.co.uk

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Please note, my working days are Monday, Tuesday, Wednesday & Friday.



From: e.ainsworth@manchester.gov.uk <e.ainsworth@manchester.gov.uk> **On Behalf Of**
floodriskmanagement@manchester.gov.uk

Sent: 08 July 2019 15:08

To: Terry McCormick <Terence.McCormick@ramboll.co.uk>

Cc: Chay Kilpatrick <Chay.Kilpatrick@ramboll.co.uk>; Emma Green <Emma.Green@ramboll.co.uk>; Gavin Smith <Gavin.Smith@ramboll.co.uk>; Jason Lynn <Jason.Lynn@ramboll.co.uk>

Subject: Re: Enquiry on Surface Water Run-off Restrictions - Existing Premier Inn Site, Manchester

Hi Terry,

Please find response to your queries in blue below:

1. Surface water run-off restrictions to be applied to development within the Brownfield site [assumed to be 50% betterment]. **We would require at least a 50% betterment in flows which should be based on the existing capacity of the drainage system not just Wallingford calcs. In this instance the capacity of the UU sewer may be the limiting factor for the higher return period flows.**
2. Details of any site-specific drainage issues that you may be aware of. **We are not aware of any drainage issues in this area.**
3. Confirmation of climate change allowances to be applied to the surface water drainage design. **40% allowance for climate change should be applied to the drainage design.**
4. Requirements regarding any potential SuDS proposals for the site. **Where possible Green SuDS should be incorporated into the design.**

I've attached our developers requirements guidance.

Kind regards

Flood Risk Management
Highways Service, Growth and Neighbourhoods Directorate
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: <http://www.manchester.gov.uk/>

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Terry McCormick < Terence.McCormick@ramboll.co.uk >	To: floodriskmanagement@manchester.gov.uk < floodriskmanagement@manchester.gov.uk >,
27/06/2019 16:20	

	cc	Jason Lynn < Jason.Lynn@ramboll.co.uk >, Gavin Smith < Gavin.Smith@ramboll.co.uk >, Emma Green < Emma.Green@ramboll.co.uk >, "Chay Kilpatrick" < Chay.Kilpatrick@ramboll.co.uk >
	Subject	Enquiry on Surface Water Run-off Restrictions - Existing Premier Inn Site, Manchester

Dear Sir / Madam,

We are involved in the proposed drainage design for a site located at the existing Premier Inn, off Medlock Street, Manchester, M15 5FJ.

The site is centred around coordinates 383638, 397199.

Please find attached the following:

- Site Location Plan (showing approximate site red line boundary & approximate development area sub-plots)
- DRAFT Existing Drainage Sketch (showing locations of public sewers and private sewers located to date – the full CCTV Drainage Survey is still being completed so this plan will be amended accordingly). This sketch was produced as part of a current pre-development enquiry with United Utilities for the site.

Site Proposals

The site proposals are currently being finalised, however, the site is expected to contain a mix of:

- Residential housing
- High rise residential / office / retail

Existing Drainage

The total site area is approximately 7373m² (0.737Ha), which is sub-divided as follows:

- Existing impermeable area = 6566m² approx.
- Existing soft landscaped area = 807m² approx.

Therefore, the existing impermeable area is approximately 89.1% of the total site area.

The existing impermeable areas drain via channels, gullies, and RWPs into a private drainage system prior to ultimately discharging into the surrounding public sewers via multiple connection points.

Preliminary surveys of the site indicate that surface water from the existing car park area discharges to the public combined sewer to the west of the site, whilst roof drainage and foul drainage generally discharge to the public sewer north-east of the site.

A CCTV Drainage Survey is being completed in order to assess the condition of the existing outfalls from the site.

Nearest Watercourse

The nearest watercourse to the site is the River Medlock, and is situated approximately 160m north of the site across numerous 3rd party land. It is not considered feasible to make a connection from the development site to the watercourse.

United Utilities Comments

We have approached United Utilities regarding the proposed development, and they have confirmed that they would accept drainage flows from the site as follows:

- Foul Water: Unrestricted, to the nearest public foul / combined sewer located within a public highway.
- Surface Water: If infiltration is not feasible, connection can be made to the 375mm combined sewer within the site at a peak flow not greater than 50 l/s.

Existing & Proposed Brownfield Runoff Rates

The existing brownfield runoff rates for the site have been calculated as follows, using the Wallingford method with an existing impermeable area = 90% of total site area.

We have reviewed the Level 2 Strategic Flood Risk Assessment and note that the site is located within Manchester's Conurbation Core Critical Drainage area. As such we understand that surface water should be restricted to provide a minimum of a 50% betterment compared to the existing brownfield rates.

Therefore, the discharge rates for the proposed site have been based on the lowest value of:

- A 50% reduction on existing (assumed LLFA requirement); or

- 50 l/s (UU requirement).

Storm Event	Existing Brownfield Runoff Rate (l/s)	Proposed Discharge Rates (l/s)	Proposed reduction on
1:1	88.4	44.2	50%
1:2	113.2	50	56%
1:30	207.2	50	76%
1:100	261.7	50	81%
1:100 + 30% Climate Change	348.8	50	86%

Information Requested from the LLFA

Please can the LLFA advise on the following points?

1. Surface water run-off restrictions to be applied to development within the Brownfield site [assumed to be 50% betterment].
2. Details of any site-specific drainage issues that you may be aware of.
3. Confirmation of climate change allowances to be applied to the surface water drainage design.
4. Requirements regarding any potential SuDS proposals for the site.

Thank you and I look forward to your response at your earliest convenience.

Yours sincerely

Terry McCormick

MEng (Hons)

Engineer

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Gavin Smith

From: McDermott, Daniel <Daniel.McDermott@uuplc.co.uk>
Sent: 09 July 2019 13:28
To: Terry McCormick
Cc: Wastewater Developer Services
Subject: RE: Pre-Development Enquiry - Existing Premier In Site, Manchester 4200026594
Due date 17/07/2019
Attachments: Standard conditions for working adjacent pipelines.pdf
Follow Up Flag: Follow up
Flag Status: Flagged

Good Morning Terence,

Please find attached a copy of work adjacent to pipe lines, which offers guidance regarding demolition, In the first instance the asset should be diverted or the foot print altered. Should you wish to connect into 375 once diverted UU will have no objection. With regards to the flow rate it's what I believe is currently draining from the site with a 50% reduction in line with Manchester's local policy.

If I can be of any further assistance please don't hesitate to contact me.

Daniel McDermott

Developer Services Engineer
Developer Services and Planning
Operational Services
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WA5 3LP

Unitedutilities.com

From: Wastewater Developer Services
Sent: 03 July 2019 14:44
To: McDermott, Daniel <Daniel.McDermott@uuplc.co.uk>
Subject: FW: Pre-Development Enquiry - Existing Premier In Site, Manchester 4200026594 Due date 17/07/2019

Many thanks

Sharon

From: Terry McCormick [<mailto:Terence.McCormick@ramboll.co.uk>]
Sent: 03 July 2019 14:30
To: McDermott, Daniel <Daniel.McDermott@uuplc.co.uk>
Cc: Joe Whittingham <joe.whittingham@ramboll.co.uk>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>; Jason Lynn <Jason.Lynn@ramboll.co.uk>
Subject: RE: Pre-Development Enquiry - Existing Premier In Site, Manchester

Hi Daniel,

Further to my previous email dated 25th June 2019 (response pending), I have also noted that in your initial response you imposed a restriction of 50 (fifty) l/s on surface water pass forward rates.

Is this restriction of 50 l/s due to any known flooding issues which we should be aware of on the public sewers within the vicinity of the site? Or is it simply a matter of capacity on the downstream public sewer network?

I also note that you have proposed that foul can discharge from the site to the nearest available foul/combined drain 'within a public highway'. I assume this extends to the public combined sewers which are currently within the site (which may be proposed for diversion)?

I look forward to your response on the above queries, and queries from my previous email, at your earliest convenience.

Kind Regards,

Yours sincerely
Terry McCormick
Engineer

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From: Terry McCormick
Sent: 25 June 2019 16:42
To: 'McDermott, Daniel' <Daniel.McDermott@uuplc.co.uk>
Cc: Joe Whittingham <joe.whittingham@ramboll.co.uk>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: Pre-Development Enquiry - Existing Premier In Site, Manchester

Hi Daniel,

Many thanks for your response.
Please could I also ask your opinion on the following:

The existing building on the site looks to be within the 6m protection zone of the existing public sewers on the site.

Would United Utilities have any comment or advice regarding:

- Demolition of the existing building (within the 6m protection zone);
- Potential 'Build-Over Agreement' required for new buildings within the site (including where existing footprint is maintained);
- Any preference / hierarchy in terms of Build Over / Diversion / Abandon & Divert?

Yours sincerely
Terry McCormick
Engineer

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terence.mccormick@ramboll.co.uk

From: McDermott, Daniel <Daniel.McDermott@uuplc.co.uk>
Sent: 25 June 2019 15:09
To: Terry McCormick <Terence.McCormick@ramboll.co.uk>
Cc: Joe Whittingham <joe.whittingham@ramboll.co.uk>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: Pre-Development Enquiry - Existing Premier In Site, Manchester

Good Afternoon Terry,

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months.

Foul

The foul water flows emanating from this site will be allowed to drain freely in to the nearest available public foul/combined sewerage system located within a public highway.

Surface Water

The surface water flows generated from this site should drain via infiltration, United Utilities will require evidence that draining via infiltration is not feasible. If infiltration is not feasible connection can be made to the 375mm dia combined sewer within the boundary of your proposed development at a pass forward not greater than 50l/s.

Connection Application

Although we may discuss and agree discharge points & rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below

<http://www.unitedutilities.com/connecting-public-sewer.aspx>

Existing Sewers Crossing the Site

A proposed sewer diversion must be submitted for further comment. The abandon sewer to the best of UU knowledge was 735 combined sewer.

There are public sewers crossing the site of which, we will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of (6m refer to table 2.1 SFA) which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified detail would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.

Please refer to the link below to obtain full details of the processes involved with sewer diversions.

<http://www.unitedutilities.com/sewer-diversion.aspx>

Sewer Adoption Agreement

You may wish to offer the proposed new sewers for adoption. United Utilities assess adoption application based on Sewers adoption 6th Edition and for any pumping stations our company addenda document. Please refer to link below to obtain further guidance and application pack:

<http://www.unitedutilities.com/sewer-adoption.aspx>

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Please note, if you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to 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 United Utilities. 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.

If I can be of any further assistance please don't hesitate to contact me.

Daniel McDermott

Developer Services Engineer
Developer Services and Planning
Operational Services
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From: Terry McCormick [<mailto:Terence.McCormick@ramboll.co.uk>]

Sent: 12 June 2019 12:20

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Cc: Joe Whittingham <joe.whittingham@ramboll.co.uk>

Subject: Pre-Development Enquiry - Existing Premier In Site, Manchester

Dear Neil,

Thank you very much for your time on the telephone yesterday, regarding a proposed development site bounded by River Street / Medlock Street / Mancunian Way in Manchester.

Further to our conversation, please find attached the following:

- Completed Pre-Development Enquiry form
- Site Location Plan (showing approximate site red line boundary & approximate development area sub-plots)
- DRAFT Existing Drainage Sketch (showing locations of public sewers and private sewers located to date – the full CCTV Drainage Survey is still being completed so this plan will be amended accordingly).

Proposals For The Site

The site proposals are currently being finalised, and your response to this pre-development enquiry is anticipated to impact on final proposals.

However, the site is expected to contain a mix of:

- Residential housing
- High rise residential / office / retail

Information Requested from United Utilities

Please refer to the attached 'existing drainage' sketch, which contains a number of potential options to which we would welcome your opinion.

Generally, the following information is requested:

- Any surface water / foul water flow restrictions which may be applied to the potential connection from the site to the public sewer
- UU opinion on potential sewer diversion
- UU opinion on potential sewer abandonment
- UU opinion on potential reinstatement of 'abandoned' public sewer
- Fees and timescales for the above
- Any further information you may have regarding the abandoned sewer located to the south of the site (note that we have been able to survey part of this sewer but we have not yet been able to confirm if it is capped off at connection to public sewer)

Yours sincerely

Terry McCormick

MEng (Hons)

Engineer

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Gavin Smith

From: Gavin Smith
Sent: 05 February 2021 09:55
To: Gavin Smith
Subject: RE: UU Email Ref: 4200026594

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 22 December 2020 15:52
To: Conor O Loughlin <conor.oloughlin@ramboll.co.uk>
Subject: UU Email Ref: 4200026594

Good Afternoon Conor,

Thank you for contacting United Utilities.

I have passed your details to our inspector, Matthew Dodd, who will respond in due course.

Kind Regards,



Louise Dack
Customer Advisor Advanced
Developer Services & Metering
Customer Services
T: 01925 233063 (33063 internal)
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From: Conor O Loughlin [<mailto:conor.oloughlin@ramboll.co.uk>]
Sent: 21 December 2020 17:48
To: DeveloperServicesWater <DeveloperServicesWater@uuplc.co.uk>
Cc: Gavin Smith <Gavin.Smith@ramboll.co.uk>
Subject: UU Email Ref: 4200026594

Good afternoon,

I am writing to you in relation to a predevelopment enquiry which was submitted on the 25th of June 2019, with the reference 4200026594. The project has been on hold for a number of months and has recently restarted, but the advice given at the time is 18 months old at the time of writing and is therefore in exceedance of the parameters set for the advice. There has been a change to the masterplan of the site which has resulted in a reduction in the number of buildings being proposed.

In your previous correspondence with my colleagues, you stated that the public sewer had a capacity for 50 l/s, is this still the case? A brief capacity check on the sewer based on survey information indicates that the sewer system has a capacity for 143.5 l/s in the pipework between MH5205 and MH6204.

If so, would the flow restriction on the site be acceptable to be 50 l/s? The site is a brownfield site, and in accordance with the Wallingford procedure based on the site area of 0.743 ha, this would result in a 54% betterment in a 1 in 1 year storm event. This would result in a 64% betterment for a 1 in 2 year, 80% betterment for a 1 in 30 year and an 84% betterment for the 1 in 100 year event.

Due to the layout of the site, the existing sewer runs through the building line and thus the sewer would require a diversion through River street which runs parallel to it? In principle would you have any objections to this being done? This is of course subject to any necessary formal applications.

Also, please note that the site will be a two phase construction so we would require separate connections for each one. We will ensure that the overall discharge rate is restricted to 50 l/s overall. There are also works currently being proposed for River street, but this is excluded from the design of this development. The works in this area will be covered during a 278 works package and we will submit these applications in due course as a separate package.

If you have any questions on any of the above, please let me know and I would be happy to answer them.

Thank you,

Kind regards

Conor O Loughlin

Apprentice Engineer
1621993 - Highways North

D +44 7870 806776
M +44 7870 806776
conor.oloughlin@ramboll.co.uk

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EMGateway3.uuplc.co.uk made the following annotations

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Conor O Loughlin

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 17 November 2021 21:42
To: Gavin Smith
Cc: Wastewater Developer Services
Subject: FW: Repeat Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ
Attachments: Working near pipelines Issue 3.1.pdf

Hello Gavin

I attach the most current version of the document you refer to

I would be happy to discuss any potential diversions before submitting under a S185 application if it helps save abortive work

Thanks

Graham Perry



Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
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From: Wastewater Developer Services
Sent: 11 November 2021 16:41
To: Perry, Graham <Graham.Perry@uuplc.co.uk>
Subject: Repeat Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ

Good Afternoon Graham,

Please see repeat below, this has been saved to sharepoint:

<https://uusp/asset/DSDD/Development%20Documents/Forms/AllItems.aspx?RootFolder=%2Fasset%2FDSDD%2FDevelopment%20Documents%2FManchester%2FPre%20Enquiry%2F2019%2F4200026594%20River%20St%2C%20Medlock%20St%2C%20Mancunian%20way&View=%7B012D10BC%2D8A6E%2D465F%2D9704%2D60731F4571F6%7D&InitialTabId=Ribbon%2ERead&VisibilityContext=WSSTabPersistence>

Kind Regards,



Louise Dack
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<https://www.unitedutilities.com/builders-developers/> or you can email us at WastewaterDeveloperServices@uuplc.co.uk

From: Gavin Smith [<mailto:Gavin.Smith@ramboll.co.uk>]
Sent: 11 November 2021 14:03
To: Perry, Graham <Graham.Perry@uuplc.co.uk>
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: Repeat Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ

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Hi Graham

I just have another few questions if I may?

1. We are looking at routes for the DN375 sewer diversion and trying to co-ordinate within the site wide masterplan and pedestrian zones. UU have previously issued the below document for guidance on infrastructure in and around easements/public sewers. Can I check if this is still the latest version, or have UU updated their advice/requirements?



Standard Conditions for Works Adjacent to Pipelines

Document Ref. 90048

Issue 3 March 2015



2. Further to the above, are there any other limitations on infrastructure in the area surrounding public sewers/easements? i.e. seating, raingardens, low-level planting, etc. Also, is it possible to install the final private combined demarcation chamber partially within the protection strip or does it need to be fully outside?
3. Previous UU advice stated that a proposed sewer diversion must be submitted for further comment. Initially, I assume this is just a few sketches indicating routes, constraints, etc. for your review, rather than a specific application? If agreed in principle, would we then be able to set up a meeting/workshop with yourself and the landscape team to run through more detail, etc. prior to going through a formal S185 application?
The design/location has a large impact on the surrounding masterplan and therefore we need comfort that the proposed design route, etc. would be accepted later down the line without major changes. We are therefore keen to work closely with yourselves to ensure a positive outcome.
4. For removing the previously abandoned UU sewer to the south, would this form part of the S185 application or would this be undertaken separately? Noting this is already understood to have been abandoned, and therefore our development would simply be grubbing up and capping off within our boundary.

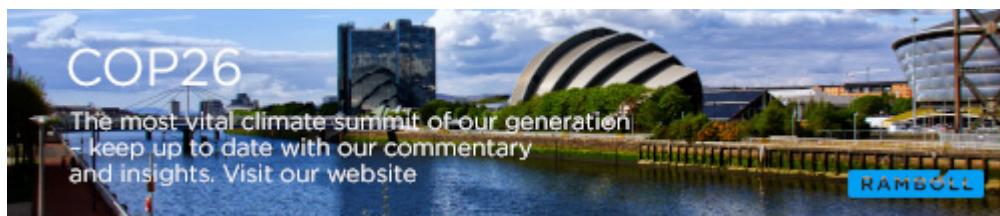
Hope the above makes sense, but happy to have a quick call to discuss if it is easier.

Many thanks
Gavin

Kind regards
Gavin Smith
Senior Engineer

M +44 7870807730
gavin.smith@ramboll.co.uk

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From: Gavin Smith

Sent: 09 November 2021 10:05

To: Perry, Graham <Graham.Perry@uuplc.co.uk>

Subject: RE: Repeat Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ [Filed 09 Nov 2021 10:06]

Hi Graham

Many thanks for your response.

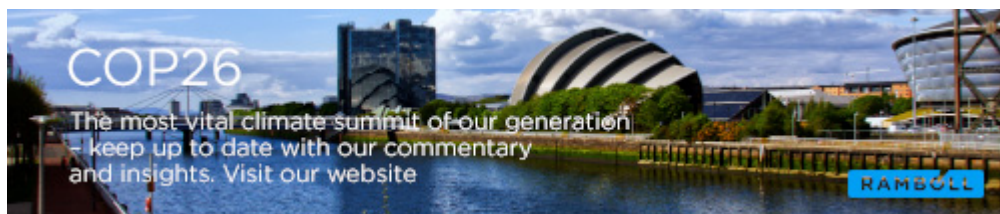
We will be in touch with updates on the proposed connection points, applications, etc. in due course.

Thanks again.
Gavin

Kind regards
Gavin Smith
Senior Engineer

M +44 7870807730
gavin.smith@ramboll.co.uk

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From: Perry, Graham <Graham.Perry@uuplc.co.uk>

Sent: 09 November 2021 09:31

To: Gavin Smith <Gavin.Smith@ramboll.co.uk>

Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: FW: Repeat Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ

You don't often get email from graham.perry@uuplc.co.uk. [Learn why this is important](#)

Hello Gavin

I can confirm that the terms previously agreed would still stand therefore :

- Foul water can drain at an **unrestricted** rate into the 375mm combined sewer crossing the site
- Storm water can drain to the 375mm combined sewer at **50 l/s** pass forward rate, equivalent of a 50% betterment in line with MCC LLFA policies – subject to formal S106
- The 375mm combined sewer could be diverted around the proposed development – subject to a formal S185 application

Thanks

Graham Perry



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

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From: Wastewater Developer Services

Sent: 01 November 2021 10:51

To: Perry, Graham <Graham.Perry@uuplc.co.uk>

Subject: Repeat Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ

Morning Graham ☺

Please find customer repeat below and attached.

This is one of Matt Dodd's old ones.

This has been saved to Sharepoint:

<https://uusp/asset/DSDD/Development%20Documents/Forms/AllItems.aspx?RootFolder=%2Fasset%2FDSDD%2FDevelopment%20Documents%2FManchester%2FPre%20Enquiry%2F2019%2F4200026594%20River%20St%2C%20Medlock%20St%2C%20Mancunian%20way&View=%7B012D10BC%2D8A6E%2D465F%2D9704%2D60731F4571F6%7D&InitialTabId=Ribbon%2ERead&VisibilityContext=WSSTabPersistence>

Kind Regards,



Louise Dack
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From: Gavin Smith [<mailto:Gavin.Smith@ramboll.co.uk>]

Sent: 31 October 2021 21:09

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Pre-Development Enquiry Ref: 4200026594 - One Medlock Street, Manchester, M15 5FJ

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Hello

We have previously discussed the above site with yourselves prior to the scheme being put on hold. The scheme has recently recommenced, and we are looking to confirm with yourselves if your previous advice and parameters remain current before we can develop the site wide drainage strategy.

Under previous email correspondence with United Utilities reference 4200026594, you had advised that the existing DN375 public sewer (extract attached) within the existing premier Inn site:

- would be able to receive foul water at an **unrestricted** rate – subject to formal S106
- would be able to receive storm water at **50 l/s** pass forward rate, equivalent of a 50% betterment in line with MCC LLFA policies – subject to formal S106
- could be diverted around the proposed development – subject to a formal S185 application

Please can UU advise if the pre-development information above remains current as well as in line with the below proposals?

Proposed Development

As a brief overview of the proposed scheme, the site has changed slightly since the previous submission – with two buildings being proposed. These comprise; a circa 13-story office block and a circa 40-story, c.1,000-bed student residence, associated public realm and service yard, etc.

Due to the building locations, it is also envisaged that the existing DN375 public sewer will require a diversion, either in part or in full. We will of course provide further information in the future in relation to this (and subject to formal applications), however, please can UU advise, in principle, if this sewer can be diverted within River Street to the North?

We are currently in an early concept stage of the design and so details shall be developed as the design progresses. However, it is currently envisaged that there will be two no. connections into the diverted public sewer (i.e. one for the office block and a separate one for the student residence) to suit a phased construction. The on-site systems (foul and storm) shall be kept separate until communication with the Public Sewer via a combined connection for each building.

It is proposed that foul would discharge via gravity at an unrestricted rate, however there may be a small lifting station serving the office to collect effluent from the basement (i.e. plant spaces, floor gullies, lift pits sumps, etc.). This will connect into the site wide system upstream of any connection into the public sewer and therefore the pass forward flow will be under gravity.

Surface water for each building shall be attenuated via the use of blue/green SuDS as well as more traditional attenuation tanks and flow controls to limit the flows. The site discharge rate shall be proportionally split between the two buildings to ensure the 50 l/s maximum is not exceeded. A 40% allowance for climate change shall also be factored into any attenuation requirements, etc.

I would be happy to forward over any additional information as it becomes available, however, please can UU advise if the pre-development advice previously issue remains current – subject to formal applications, i.e. S106, S185?

Should you require any further information in the meantime, please do not hesitate to contact me.

Many thanks.

Kind regards
Gavin Smith

BEng (Hons)
Senior Engineer
1622362 - Development

M +44 7870807730
gavin.smith@ramboll.co.uk

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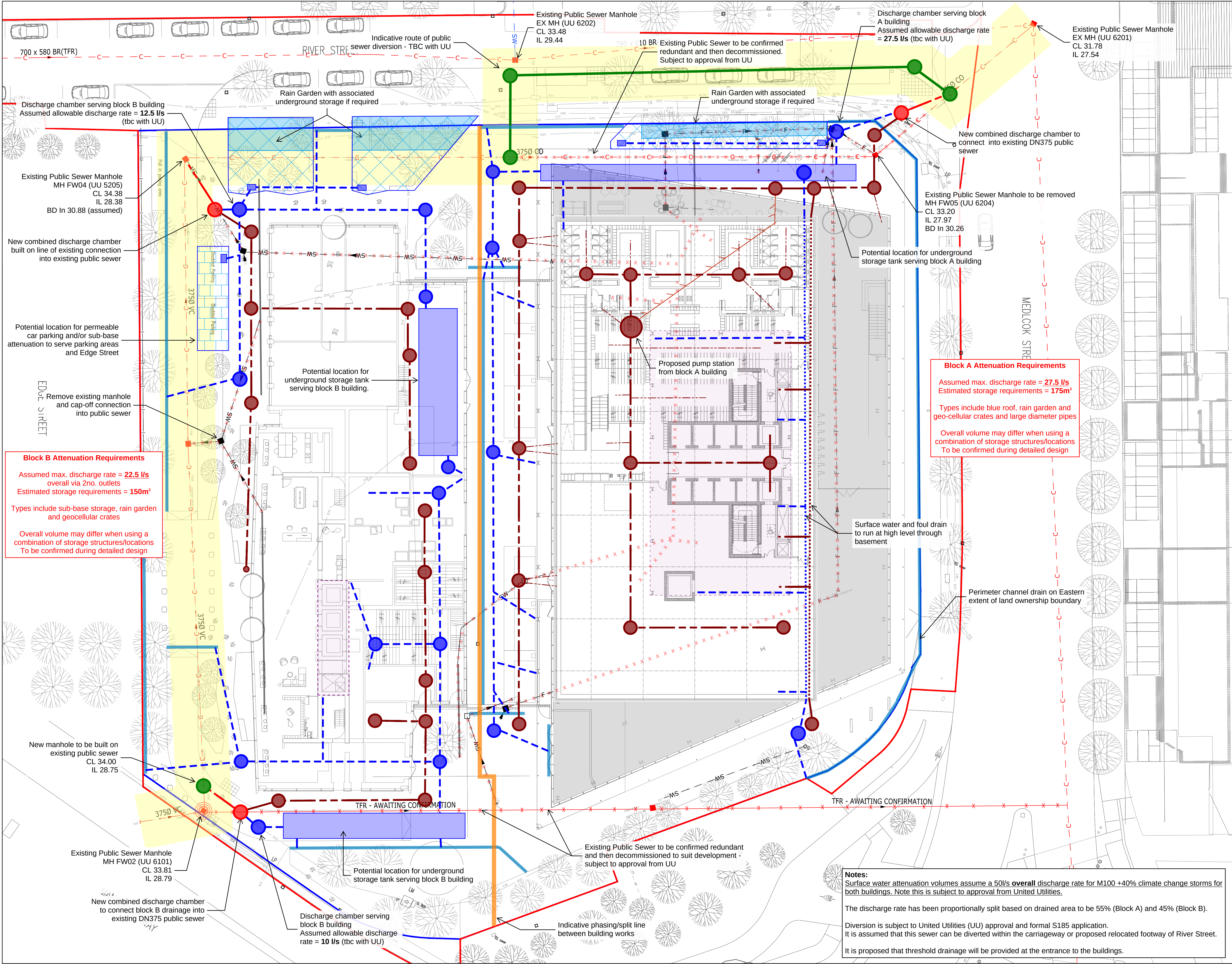
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APPENDIX 2 EXISTING DRAINAGE

APPENDIX 3

PROPOSED DRAINAGE STRATEGY



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Notes

- DO NOT SCALE FROM THIS DRAWING
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- ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O
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- THIS SKETCH IS BASED ON:
 - PLANT LANDSCAPE MASTERPLAN 2072-PLA-XX-XX-DR-L-0003 [P02 Dated 21/09/2022]
 - JMA ARCHITECT LAYOUTS [Dated March 2021]
 - 100_B1_02_2200
 - 100_B2_02_2199
 - 100_B2_02_2200
- THIS SKETCH ONLY RELATES TO THE BUILDING DRAINAGE SYSTEM FOR BLOCK A, BLOCK B AND THE ASSOCIATED LANDSCAPING WITHIN THE BLUE LINE (LAND OWNERSHIP) BOUNDARY.

IT IS UNDERSTOOD THAT THERE WILL BE A REQUIREMENT TO UNDERTAKE DRAINAGE WORKS WITHIN THE PUBLIC HIGHWAY (RIVER ST) AND TIE IN WITH MEDLOCK STREET. HOWEVER THE EXTENT OF WHICH IS NOT YET KNOWN AND WILL REQUIRE DETAILED CONSULTATION WITH THE LOCAL HIGHWAYS AUTHORITY TO DEFINE SCOPE OF WORKS PRIOR TO DEVELOPING ANY DRAINAGE STRATEGIES

KEY

Existing drain to be removed x x x x x

Proposed public sewer diversion/works to public sewer

Indicative public sewer easement (assumed 3m from centreline)

Proposed storm drain & manhole

Proposed foul drain & manhole

Proposed combined drain & manhole

Proposed sub-base attenuation

Proposed underground tank

Proposed rain garden & underground tank

Proposed channel drain

Indicative phasing line

P04	FOR PLANNING	11/10 2022	CO	CF
P03	FOR PLANNING	23/09 2022	CO	CF
P02	FOR PLANNING	17/02 2021	SG	GS
P01	FOR PLANNING	05/01 2021	SG	GS
Rev	Description	Date	By Chk	App

SKETCH

ONE MEDLOCK STREET

RAMBOLL

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

PROPOSED DRAINAGE STRATEGY

Project No:	Scale (@A1):	Drawn:	Date:
1620005811	1:200	SG	FEB'21
Drawing No:	Rev:		
5811-RAM-XX-XX-SK-D-0006	P04		

APPENDIX 4 PROPOSED CALCULATIONS

Ramboll UK Ltd		Page 1
240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
Date 15/01/2021 File 20210115_ExistingSite_S...	Designed by GS Checked by	
Micro Drainage		Network 2019.1

Time Area Diagram for Storm at outfall ExS-MH FW04 (pipe ExS-2.004)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.326	4-8	0.120

Total Area Contributing (ha) = 0.446

Total Pipe Volume (m³) = 4.062

Time Area Diagram at outfall ExS-MH FW03 (pipe ExS-3.000)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.079	4-8	0.000

Total Area Contributing (ha) = 0.080

Total Pipe Volume (m³) = 0.067

Ramboll UK Ltd		Page 2
240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
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Micro Drainage	Network 2019.1	

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
ExS-2.000	17.669	0.230	76.8	0.041	4.00	0.0	0.600	o	150	Pipe/Conduit
ExS-2.001	31.864	0.400	79.7	0.176	0.00	0.0	0.600	o	225	Pipe/Conduit
ExS-2.002	2.852	0.070	40.7	0.229	0.00	0.0	0.600	o	225	Pipe/Conduit
ExS-2.003	47.220	0.280	168.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
ExS-2.004	12.368	0.660	18.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
ExS-3.000	3.801	0.560	6.8	0.080	4.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
ExS-2.000	32.570	0.041	0.0	1.15	20.3
ExS-2.001	32.340	0.217	0.0	1.47	58.3
ExS-2.002	31.940	0.446	0.0	2.06	81.7
ExS-2.003	31.820	0.446	0.0	1.00	39.9
ExS-2.004	31.540	0.446	0.0	3.04	120.8
ExS-3.000	30.770	0.080	0.0	3.89	68.8

Ramboll UK Ltd		Page 3
240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
Date 15/01/2021 File 20210115_ExistingSite_S...	Designed by GS Checked by	
Micro Drainage	Network 2019.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	Classification	Hardstanding/Road	85	0.048	0.041	0.041
2.001	Classification	Hardstanding/Road	85	0.207	0.176	0.176
2.002	Classification	Hardstanding/Road	85	0.099	0.084	0.084
	Classification	Building	100	0.145	0.145	0.229
2.003	-	-	100	0.000	0.000	0.000
2.004	-	-	100	0.000	0.000	0.000
3.000	Classification	Hardstanding/Road	85	0.094	0.080	0.080
				Total	Total	Total
				0.592	0.525	0.525

Ramboll UK Ltd		Page 4
240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
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Micro Drainage	Network 2019.1	

Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
ExS-2.000	ExS-MH (UTL)	150	0.800	0.950	Unclassified	1200	0	0.800	Unclassified
ExS-2.001	ExS-MH SW02	225	0.875	1.355	Unclassified	1200	0	0.875	Unclassified
ExS-2.002	ExS-MH SW03	225	1.355	1.515	Unclassified	1200	0	1.355	Unclassified
ExS-2.003	ExS-MH SW04 (Intcptr)	225	1.565	2.535	Unclassified	1200	0	1.565	Unclassified
ExS-2.004	ExS-MH SW05 (Blocked)	225	2.535	3.275	Unclassified	1200	0	2.535	Unclassified
ExS-3.000	ExS-MH SW06	150	3.430	3.830	Unclassified	1200	0	3.430	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

ExS-2.004	ExS-MH FW04	34.380	30.880	30.880	1500	0
-----------	-------------	--------	--------	--------	------	---

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

ExS-3.000	ExS-MH FW03	34.190	30.210	30.210	1500	0
-----------	-------------	--------	--------	--------	------	---

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.840
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.363		

Ramboll UK Ltd		Page 5
240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
Date 15/01/2021 File 20210115_ExistingSite_S...	Designed by GS Checked by	
Micro Drainage	Network 2019.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Storage Structures 0
Number of Online Controls 0 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.363
Region	England and Wales	Cv (Summer)	0.840
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood
ExS-2.000	ExS-MH (UTL)	15 Summer	1	+0%	30/15 Summer	30/15 Summer
ExS-2.001	ExS-MH SW02	15 Summer	1	+0%	30/15 Summer	30/15 Summer
ExS-2.002	ExS-MH SW03	15 Summer	1	+0%	1/15 Summer	100/15 Summer
ExS-2.003	ExS-MH SW04 (Intcpttr)	15 Summer	1	+0%	1/15 Summer	
ExS-2.004	ExS-MH SW05 (Blocked)	15 Summer	1	+0%		
ExS-3.000	ExS-MH SW06	15 Summer	1	+0%		

PN	US/MH Name	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
ExS-2.000	ExS-MH (UTL)			32.627	-0.093	0.000	0.31
ExS-2.001	ExS-MH SW02			32.447	-0.118	0.000	0.45
ExS-2.002	ExS-MH SW03			32.246	0.081	0.000	1.20
ExS-2.003	ExS-MH SW04 (Intcpttr)			32.142	0.097	0.000	1.16
ExS-2.004	ExS-MH SW05 (Blocked)			31.643	-0.122	0.000	0.43
ExS-3.000	ExS-MH SW06			30.820	-0.100	0.000	0.25

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240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
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Micro Drainage	Network 2019.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
ExS-2.000	ExS-MH (UTL)		5.9	OK	6
ExS-2.001	ExS-MH SW02		24.6	OK	8
ExS-2.002	ExS-MH SW03		44.8	SURCHARGED	2
ExS-2.003	ExS-MH SW04 (Intcptr)		44.2	SURCHARGED	
ExS-2.004	ExS-MH SW05 (Blocked)		44.3	OK	
ExS-3.000	ExS-MH SW06		11.5	OK	

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240 Blackfriars Road London SE1 8NW	One Medlock Street Existing Site Drainage Site Area = 0.526ha	
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Micro Drainage	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

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Margin for Flood Risk Warning (mm) 300.0      DVD Status OFF
      Analysis Timestep      Fine Inertia Status OFF
      DTS Status      ON
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Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

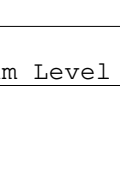
PN	US/MH		Storm	Return Period	Climate Change	First (X)		First (Y)	
	Name					Surcharge	Flood		
ExS-2.000	ExS-MH (UTL)	15	Summer	2	+0%	30/15	Summer	30/15	Summer
ExS-2.001	ExS-MH SW02	15	Summer	2	+0%	30/15	Summer	30/15	Summer
ExS-2.002	ExS-MH SW03	15	Summer	2	+0%	1/15	Summer	100/15	Summer
ExS-2.003	ExS-MH SW04 (Intcpttr)	15	Summer	2	+0%	1/15	Summer		
ExS-2.004	ExS-MH SW05 (Blocked)	15	Summer	2	+0%				
ExS-3.000	ExS-MH SW06	15	Summer	2	+0%				

PN	US/MH Name	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.
				Level (m)	Depth (m)	Volume (m³)	
ExS-2.000	ExS-MH (UTL)			32.636	-0.084	0.000	0.40
ExS-2.001	ExS-MH SW02			32.517	-0.048	0.000	0.57
ExS-2.002	ExS-MH SW03			32.425	0.260	0.000	1.41
ExS-2.003	ExS-MH SW04 (Intcpttr)			32.285	0.240	0.000	1.37
ExS-2.004	ExS-MH SW05 (Blocked)			31.653	-0.112	0.000	0.50
ExS-3.000	ExS-MH SW06			30.828	-0.092	0.000	0.32

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
ExS-2.000	ExS-MH (UTL)		7.6	OK	6
ExS-2.001	ExS-MH SW02		31.2	OK	8
ExS-2.002	ExS-MH SW03		52.7	SURCHARGED	2
ExS-2.003	ExS-MH SW04 (Intcptr)		52.2	SURCHARGED	
ExS-2.004	ExS-MH SW05 (Blocked)		52.1	OK	
ExS-3.000	ExS-MH SW06		14.9	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.363
Region	England and Wales	Cv (Summer)	0.840
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood
ExS-2.000	ExS-MH (UTL)	15 Summer	30	+0%	30/15 Summer	30/15 Summer
ExS-2.001	ExS-MH SW02	15 Summer	30	+0%	30/15 Summer	30/15 Summer
ExS-2.002	ExS-MH SW03	15 Summer	30	+0%	1/15 Summer	100/15 Summer
ExS-2.003	ExS-MH SW04 (Intcptr)	15 Summer	30	+0%	1/15 Summer	
ExS-2.004	ExS-MH SW05 (Blocked)	15 Summer	30	+0%		
ExS-3.000	ExS-MH SW06	15 Summer	30	+0%		

PN	US/MH Name	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
ExS-2.000	ExS-MH (UTL)			33.520	0.800	0.055	0.60
ExS-2.001	ExS-MH SW02			33.445	0.880	4.682	0.98
ExS-2.002	ExS-MH SW03			33.425	1.260	0.000	2.23
ExS-2.003	ExS-MH SW04 (Intcptr)			33.055	1.010	0.000	2.12
ExS-2.004	ExS-MH SW05 (Blocked)			31.690	-0.075	0.000	0.78
ExS-3.000	ExS-MH SW06			30.854	-0.066	0.000	0.60

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
ExS-2.000	ExS-MH (UTL)		11.3	FLOOD	6
ExS-2.001	ExS-MH SW02		53.7	FLOOD	8
ExS-2.002	ExS-MH SW03		83.2	FLOOD RISK	2
ExS-2.003	ExS-MH SW04 (Intcptr)		81.0	SURCHARGED	
ExS-2.004	ExS-MH SW05 (Blocked)		81.0	OK	
ExS-3.000	ExS-MH SW06		28.3	OK	

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Micro Drainage	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
ExS-2.000	ExS-MH (UTL)		12.3	FLOOD	6
ExS-2.001	ExS-MH SW02		63.6	FLOOD	8
ExS-2.002	ExS-MH SW03		86.2	FLOOD	2
ExS-2.003	ExS-MH SW04 (Intcptr)		83.5	SURCHARGED	
ExS-2.004	ExS-MH SW05 (Blocked)		84.4	OK	
ExS-3.000	ExS-MH SW06		36.5	OK	