

Room2 Homotel Piccadilly, Manchester

Flood Risk Assessment and Drainage Report

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Contents

Page

1	Introduction	4
1.1	Relevant Policy	
2	Site Description and Location	5
2.1	Existing Drainage	
3	Development Proposal	7
4	Flood Risk Assessment	8
4.1	Flood Risk from Watercourses	
4.2	Flood Risk from Groundwater	
4.3	Flood Risk from Surface Water and Overland Flows	
4.4	Flood Risk from Reservoirs	
4.5	Flood Risk from Canals	
5	Surface Water Run-off Assessment	13
5.1	Existing Run-off	
5.2	Proposed Impermeable Area and Discharge Rates	
5.3	Surface Water SUDS Strategy	
6	Surface Water Maintenance Strategy	16
7	Foul Water Assessment	19
8	Conclusions	20

Appendices:

Appendix A	Topographical Survey
Appendix B	United Utilities Sewer Asset Map
Appendix C	Manchester, Salford, Trafford SFRA Groundwater Flooding Map
Appendix D	Manchester, Salford, Trafford SFRA Critical Drainage Areas Map
Appendix E	Manchester, Salford, Trafford SFRA Canal and Urban Zoning Map
Appendix F	Greenfield Runoff Calculations
Appendix G	United Utilities Pre-Development Capacity Check
Appendix H	Surface Water Storage Calculations
Appendix I	Estimated Total Foul Flows Calculations

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Acronyms	
AOD	Above Ordnance Datum
CDA	Critical Drainage Area
CIRIA	Construction Industry Research and Information Association
DCG	Design and Construction Guidance
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage System
SWMP	Surface Water Management Plan

1 Introduction

This report has been prepared by Price and Myers on behalf of Northside (Manchester) Ltd (trading name – Lamington Group) to support a full planning application and Listed Building Consent for an aparthotel development (hereafter referred to as the ‘Proposed Development’) at 12-16 Manchester Piccadilly, Manchester, M1 3AN (hereafter referred to as ‘the Site’).

The National Planning Policy Framework (NPPF) states that an appropriate FRA will be required for all development proposals of 1 ha or greater in Flood Zone 1 and for any development within Flood Zones 2 or 3 or in an area within Flood Zone 1 which is in a Critical Drainage Area (CDA) as identified by the local authority.

The EA’s indicative floodplain map shows that the site is in Flood Zone 1, however the Local Authority has identified the area as a CDA. This assessment will therefore focus on the flood risk to the site from all sources and on surface water management.

This report will also outline the proposed drainage strategy for the site including a detailed SuDS assessment.

1.1 Relevant Policy

This FRA has been carried out in accordance with the NPPF and the accompanying Planning Practice Guidance (PPG) “Flood Risk and Coastal Change”. Advice and guidance from the Environment Agency (EA), the Manchester, Salford, Trafford Strategic Flood Risk Assessment (SFRA) (March 2011), Surface Water Management Plan (SWMP, July 2018) and CIRIA documents has also been incorporated throughout this FRA.

The surface water drainage strategy is in accordance with:

- the Department for Environment, Food and Rural Affairs (DEFRA) “Non-Statutory Technical Standards for Sustainable Drainage Systems”.
- the Lead Local Flood Authority (LLFA) guidance document on SuDS/Drainage.

2 Site Description and Location

The site is located within the Manchester City Centre on the west side of Piccadilly, to the south of Piccadilly Gardens and north of Piccadilly train station. The site area is approximately 0.07ha and encompasses the vacant Grade II Listed former Union Bank building and adjacent vacant land; the Waldorf Public House and Indemnity House (no, 7 Chatham St) immediately adjoin the site but do not form part of the proposal. The site itself is bound by Piccadilly to the east, Gore Street to the south and Chatham Street to the north. Access to the existing building for pedestrians is available on the corner of Chatham Street and Piccadilly; access to the car park is available from Gore Street.

Rochdale Canal is the nearest watercourse to the site, running approximately 75m to the south. The site is located at 12 – 16 Piccadilly, Manchester, M1 3AN and the OS grid reference is 384579, 398140. The topographical survey (Appendix A) carried out for the site shows that the site falls from north-west to south-east, with ground levels varying from 45.68m AOD to 44.90m AOD.

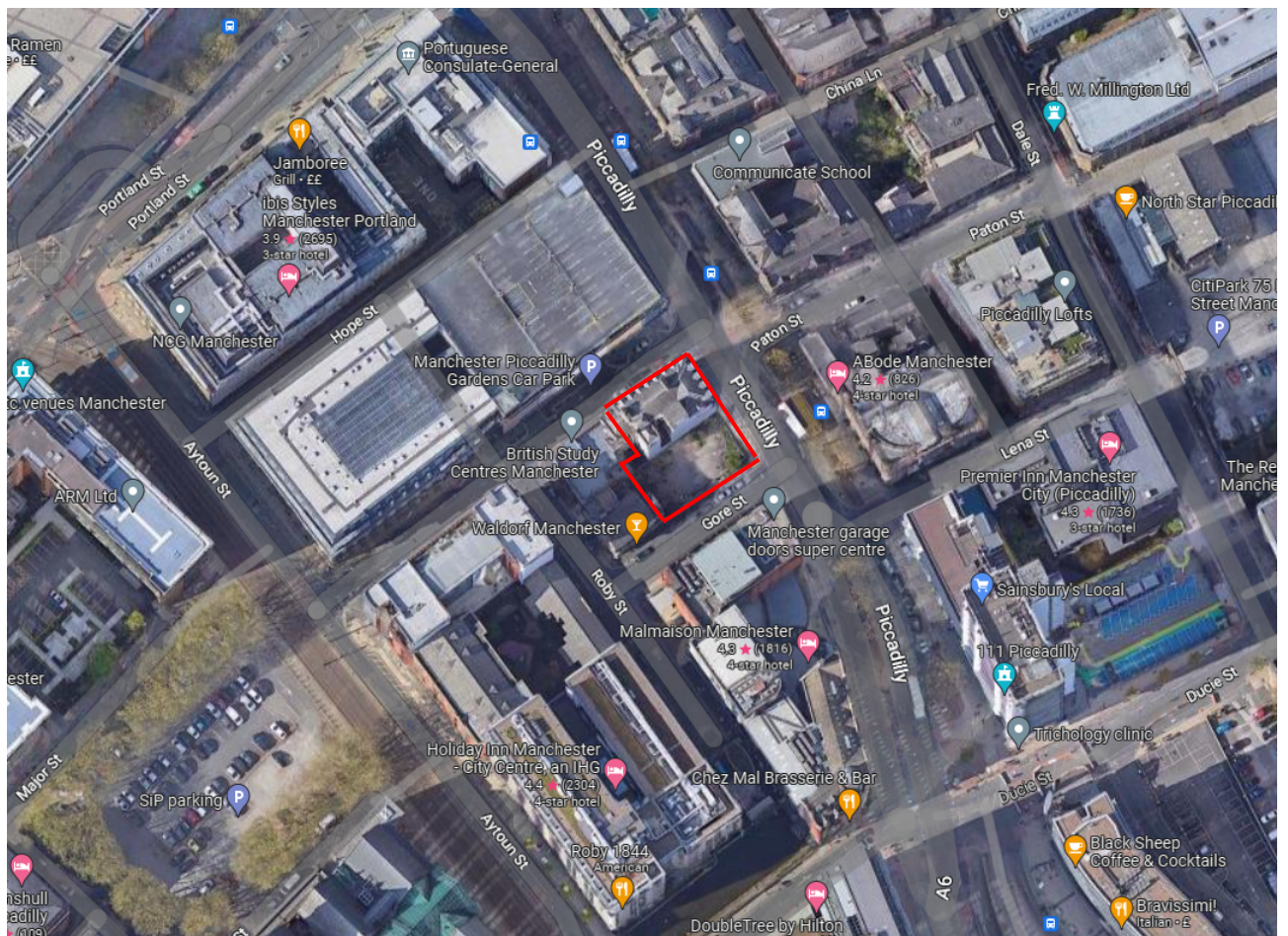


Figure 2.1: Existing site, showing site boundary

2.1 Existing Drainage

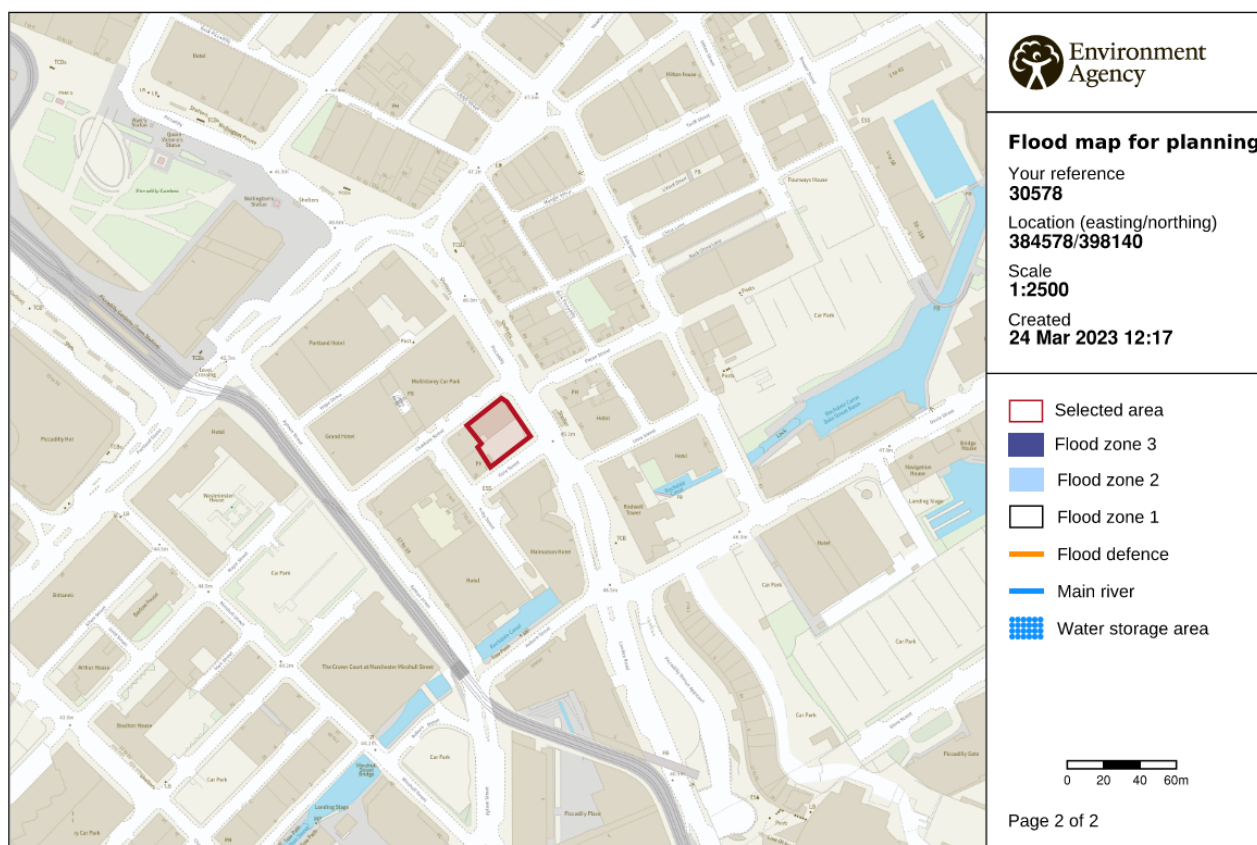
Currently, no CCTV survey has been carried out for the existing network, however, sewer asset plans (Figure 2.2) have been obtained from United Utilities which show a combined sewer network surrounding the existing development. It is assumed that the existing development connects into the 300x400mm combined water sewer located on Chatham Street, which would be confirmed once the CCTV survey has been carried out. The full plan can be found in Appendix B.



4 Flood Risk Assessment

4.1 Flood Risk from Watercourses

The EA's flood map for planning shows that the site is located in Flood Zone 1 and is not at risk of flooding. Developments in this flood zone do not have any restrictions, provided they do not increase the risk of flooding elsewhere.



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Figure 4.1: EA Flood Map for Planning

4.2 Flood Risk from Groundwater

Groundwater flooding occurs when water originating from sub-surface permeable strata emerges from the ground, typically after prolonged rainfall.

During the intrusive ground investigation, a slow seepage of groundwater was found at 2.80m below ground level, but this is considered to be a result of the former basement structure confining the groundwater, creating a shallow perched aquifer. Further monitoring carried out in October 2013 resulted in each well remaining dry for their full depth.

The Manchester, Salford, Trafford SFRA details the likelihood of groundwater flooding from various mechanisms. The site is considered low risk for all, which is also shown on Figure 4.2. The full maps can be found in Appendix C.

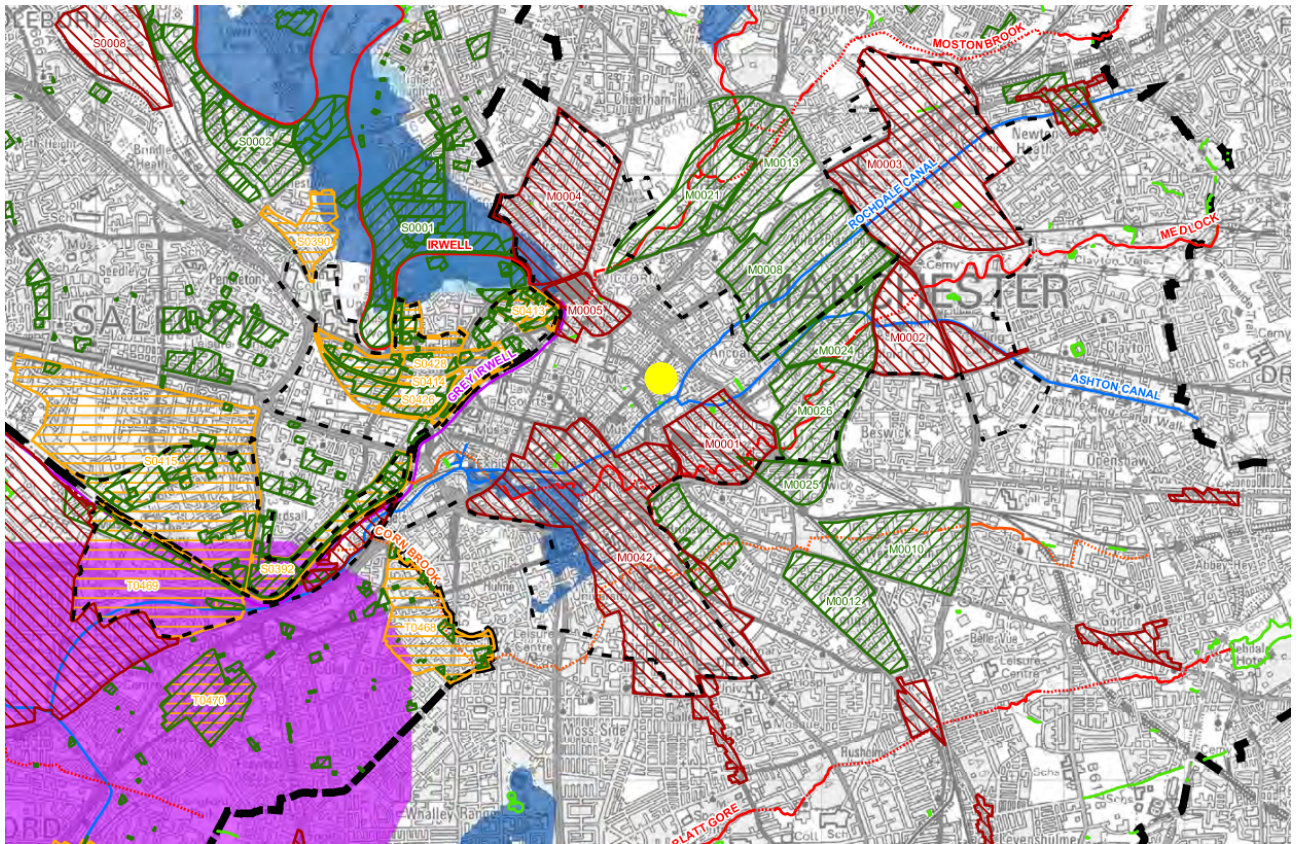


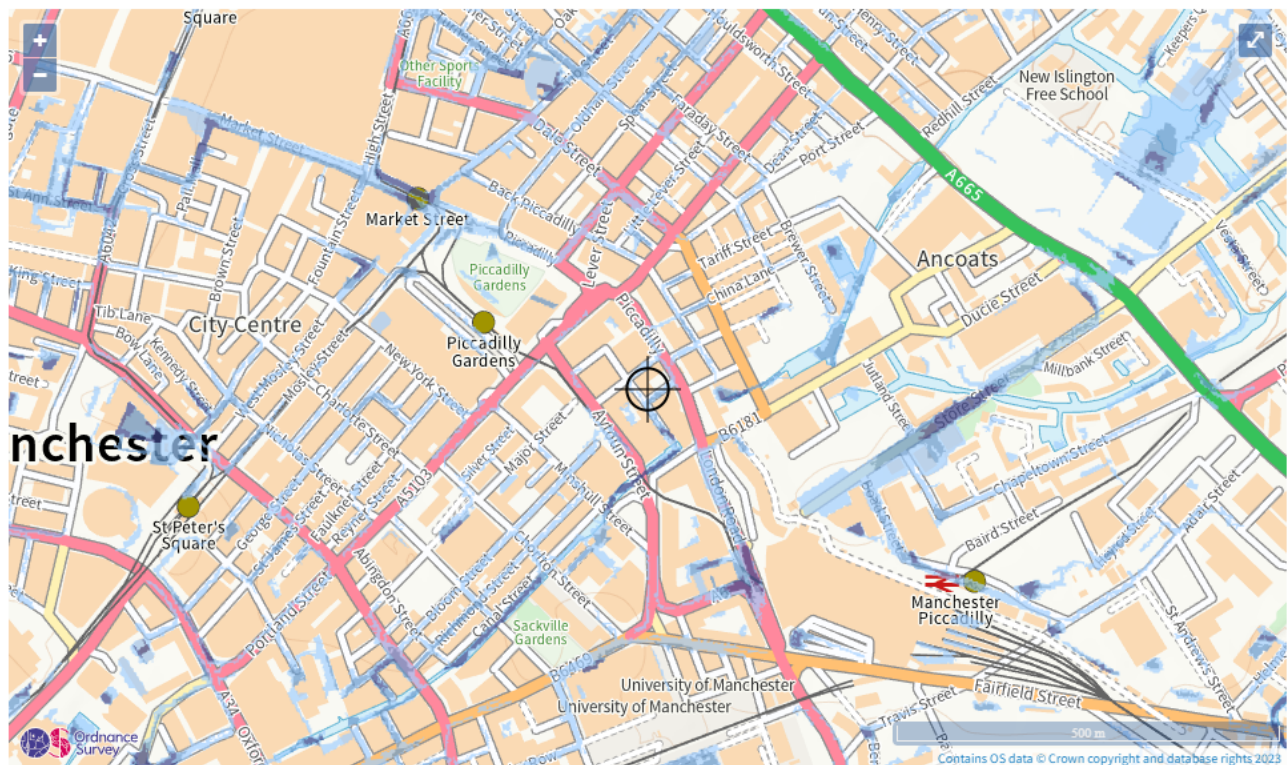
Figure 4.2: Manchester, Salford, Trafford SFRA Groundwater Flooding Map, site shown in yellow.

Therefore, the risk of flooding from groundwater for the site can be considered low.

4.3 Flood Risk from Surface Water and Overland Flows

Surface water flooding occurs when intense rainfall is unable to soak into the ground or enter a drainage system due to blockages or the capacity of the system being exceeded. Overland flows can also be generated by burst water mains, failed dams and any failure in a system storing or transferring water.

The EA's indicative Surface Water Flooding Map, Figure 4.3, shows that the site is at very low/low risk of surface water flooding.



Extent of flooding from surface water

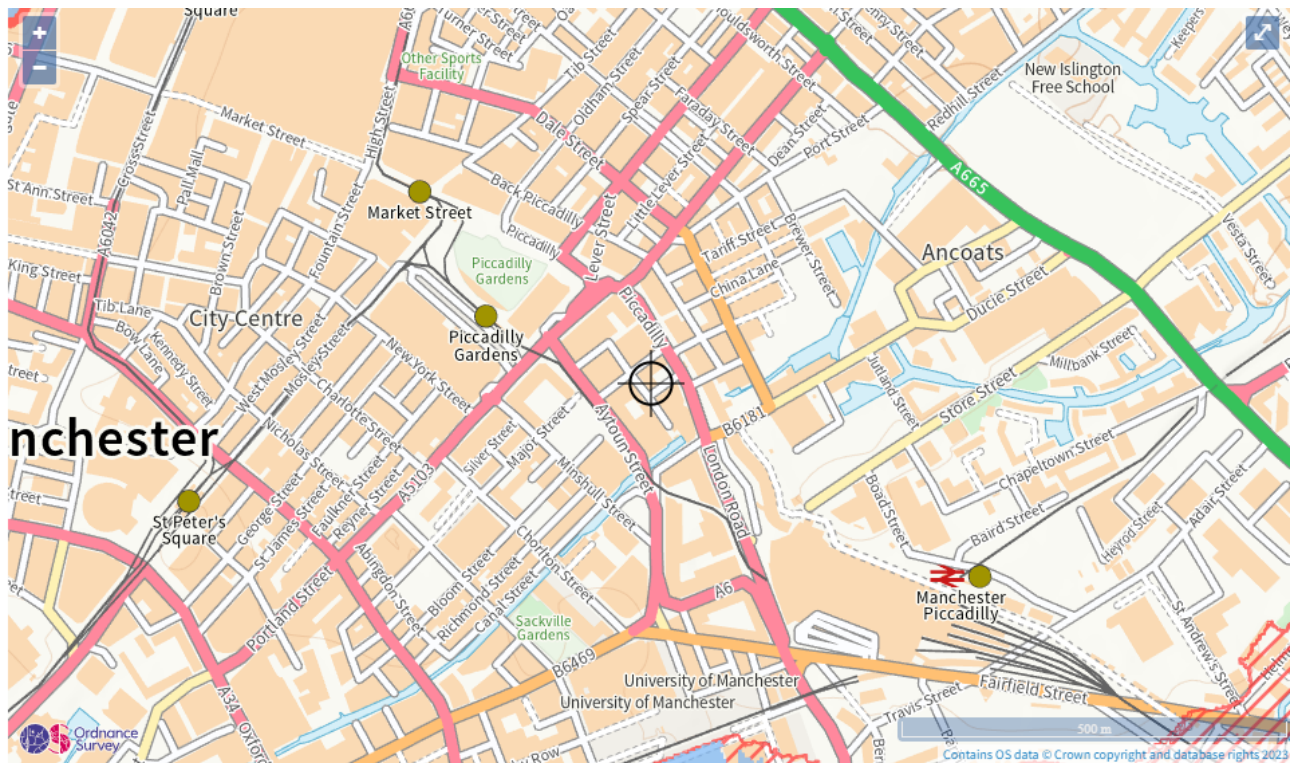
● High
 ● Medium
 ● Low
 Very Low
 ⊕ Location you selected

Figure 4.3 Environment Agency Surface Water Flood Risk Map

The Manchester, Salford, Trafford SFRA places the site within a CDA (Appendix D). The surface water flows in the area can be linked to the natural floodplains that historically ran through the city to serve industrial areas. These have since been lost or hidden due to being culverted by previous developments within the city centre. Therefore, the risk from surface water flooding is considered low.

4.4 Flood Risk from Reservoirs

The EA provides information on flood risk from reservoirs. The map showing the maximum extent of flooding from reservoirs was last updated in 2021 and now shows the combined effects of flooding from reservoirs and rivers. The Figure 4.4 shows that the site is not at risk of reservoir flooding when river levels are normal.



Maximum extent of flooding from reservoirs:

● when river levels are normal ■ when there is also flooding from rivers ⊕ Location you selected

Figure 4.4 Environment Agency Risk of Reservoir Flooding Map

The EA's information states that reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Reservoir Act of 1975 ensures that reservoirs are inspected regularly, and essential safety work is carried out. Therefore, the risk of flooding from reservoirs is considered low.

4.5 Flood Risk from Canals

The Rochdale Canal runs approximately 75m south from the site, as shown in Figure 4.5, with the full map in Appendix E. The EA currently doesn't provide information on flood risk from canals.

The Manchester, Salford, Trafford SFRA defines the Rochdale Canal as a Broad Canal, meaning that the original use was to serve growing industrial centres throughout the city during the Industrial Revolution but are now predominantly used for tourism and carrying small boats due to being fairly shallow.

Therefore, the flood risk from broad canals is considered low.

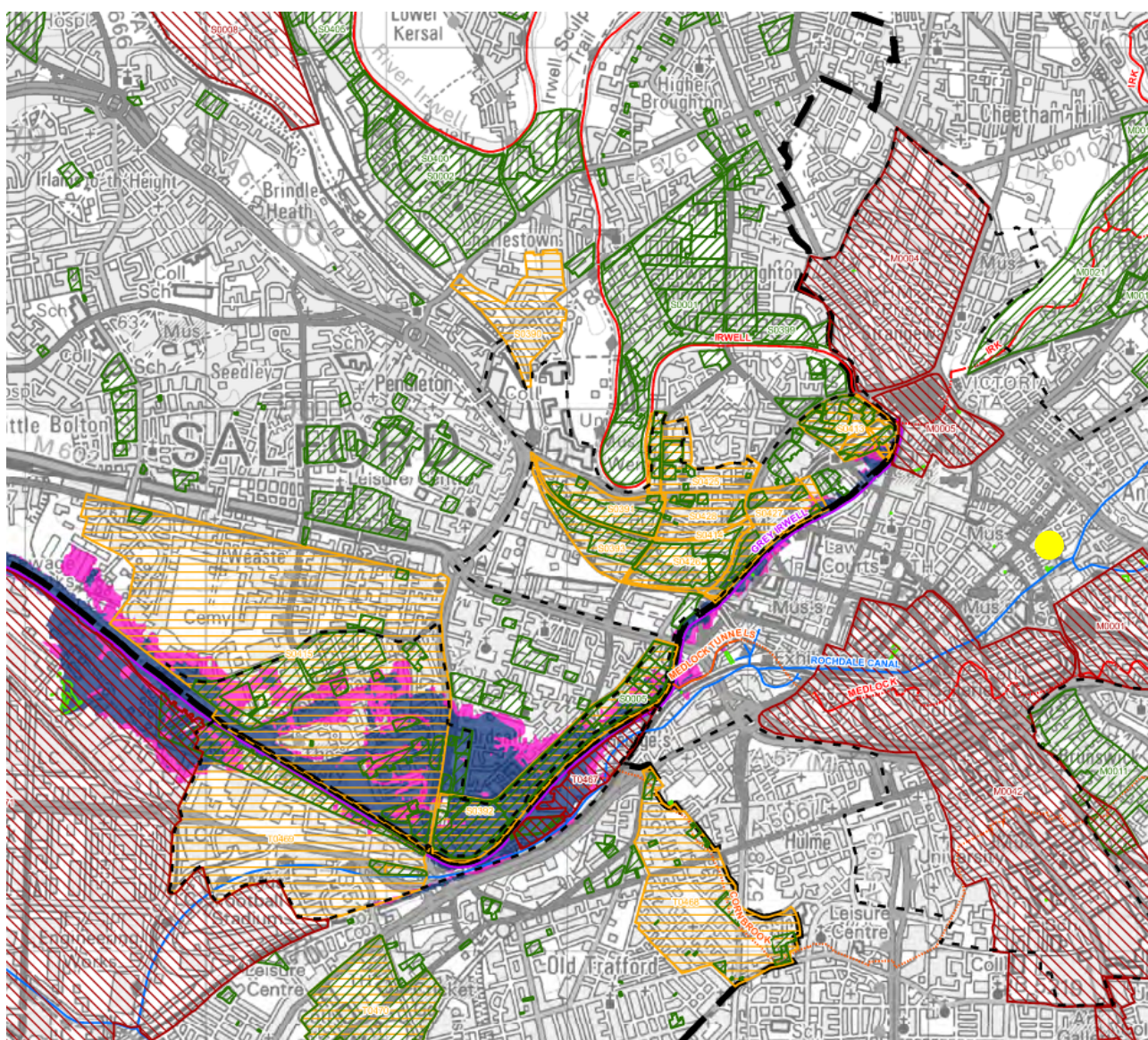


Figure 4.5 Manchester, Salford, Trafford SFRA Canal and Urban Zoning Map, site shown in yellow.

5 Surface Water Run-off Assessment

5.1 Existing Run-off

The total site area is approximately 725m² or 0.07 ha and is all impermeable. As described in Section 0, the site currently drains to a combined sewer network.

The existing run-off rate was calculated using the modified rational method as shown below:

$$Q_{x_{ex}} = 2.78 \times A \times i$$

Where 'x' is the return period in years, 'A' is the catchment area in ha and 'i' is the rainfall intensity in mm/hr provided by the FEH method.

$$Q_{1_{ex}} = 2.78 \times 0.07 \times 34.0 = 6.62 \text{ l/s}$$

$$Q_{30_{ex}} = 2.78 \times 0.07 \times 73.8 = 14.4 \text{ l/s}$$

$$Q_{100_{ex}} = 2.78 \times 0.07 \times 93.3 = 18.2 \text{ l/s}$$

5.2 Proposed Impermeable Area and Discharge Rates

The proposed development does not change the current impermeable area for the site as the existing building is to remain and the existing car park is to be converted into a 34-storey building. However, the area of the proposed development on the existing car park is what will need to be considered within the calculations to be discharged into the public network as the existing building will re-use the current drainage system. Therefore, the proposed impermeable area to be considered for discharge is 0.035ha.

5.2.1 Proposed Discharge Rates

The Manchester City Council Local Flood Risk Management Strategy states that 'within Critical Drainage Areas, developers should aim to minimise surface water runoff from developments and achieve at least a 50% rate reduction for Brownfield sites, with an aim of reducing runoff to the Greenfield rates up to a 1 in 100-year storm event, including consideration of climate change'.

The Greenfield runoff rates for a number of return periods are given below. Supporting calculations are provided in Appendix F.

$$Q_{1_{pr}} = 0.3 \text{ l/s}$$

$$Q_{30_{pr}} = 0.7 \text{ l/s}$$

$$Q_{100+CC_{pr}} = 0.8 \text{ l/s}$$

The minimum discharge rate the proposed development could be restricted to is 2.5 l/s, which would be a greater than 50% reduction on current brownfield runoff rates. Surface water attenuation to Greenfield rates is deemed impractical as the runoff rates are considered too small and would increase flood risk, as a small diameter flow control device would be required to achieve these flow rates.

Building Regulations Part H states that the minimum internal diameter of drains should be 75mm. A Hydrobrake with a minimum diameter of 75mm would reduce the flow rate to 2.5 l/s. This is therefore considered the lowest rate that the development can feasibly be restricted to.

This runoff rate will be the limit for all storm events including the 1 in 100-year storm event with the climate change allowance.

5.2.2 Climate Change

The EA's maps on climate change allowances for FRAs show that the site is within the Irwell Management Catchment.

The current EA guidance on climate change allowance states that new drainage systems must be designed to ensure that there is no increase in the rate of runoff discharged from the site for the "Upper End" allowance. The expected lifetime of this development is 50 years; therefore a 40% allowance must be used in the design.

5.3 Surface Water SUDS Strategy

In accordance with EA guidelines and CIRIA documents, surface water runoff should be managed as close to its source as possible. The NPPF states that the following drainage hierarchy should be used to determine runoff destination.

5.3.1 Infiltration Into the Ground

The underlying ground consists of Gravelly Till Clay which is considered unsuitable for infiltration. In addition, due to the location of the site and the guidance from Building Regulation Part H that recommends that soakaways need to be at least 5m from any building, the use of soakaways on site is considered an unsuitable option.

5.3.2 To a Surface Water Body

The location of the site being in the city centre means that there are no viable surface water bodies within a reasonable proximity to discharge into. Therefore, discharging into a surface water body is considered an unsuitable option.

5.3.3 To a Surface Water Sewer, Highway Drain, or Another Drainage System

There are no surface water sewers in the vicinity of the site. The United Utilities asset maps show that a combined sewer network surrounds the site, and it is assumed the existing building currently discharges into it. Therefore, discharging into a surface water sewer or highway drain is considered unsuitable.

5.3.4 To a Combined Sewer

The asset map provided by United Utilities, found in Appendix B, shows that the site is surrounded by a combined sewer network. It is assumed that the existing building space on site currently discharges into the combined sewer on Chatham Street. The sewer network located on Gore Street would be the most likely points of discharge for the proposed development, as confirmed by United Utilities (Appendix G), with the network running approximately 4.79m deep.

Rainwater harvesting involves the collection and re-use of rainwater runoff from impermeable areas, such as roofs, to meet water demands from within the building. The volume of runoff from the site as well as the volume of attenuation required is also reduced as a result of collecting the water and using it throughout the building from the top down. The suitability of this method would be determined by the intended use of the collected water within the building.

It is proposed to direct all the rainwater pipes from the proposed development to a rainwater harvesting tank which would be used to irrigate the winter garden located on the upper levels.

A rainwater harvesting system that is linked to a rainfall forecast algorithm would be used to allow the tank to be drained at an allowable discharge rate, before a storm event which would generate space within the tank. The design will be developed further during the detailed design phase. The volume of the tank has been calculated as 11m³ (Appendix H) to attenuate the surface water runoff for the 1 in 100-year storm event + 40% climate change allowance.

Therefore, discharging into a combined sewer is considered a suitable option.

6 Surface Water Maintenance Strategy

The successful implementation and operation of a SuDS system depends on a robust and clear maintenance strategy being implemented. The following measures should form part of the site's proposed management plan.

The SuDS will be maintained by the building owner and will form part of the overall maintenance regime for the site.

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
Rainwater Harvesting	Regular Maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually and following poor performance
		Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	
	Occasional Maintenance	Cleaning and/or replacement of any filters	Three monthly, or as required
	Remedial Actions	Repair of overflow erosion damage or damage to tank	As required
		Pump repairs	
		During establishment i.e. year one, replace dead plants as required	Monthly -but usually responsibility of manufacturer
		Post establishment, replace dead plants where > 5% of coverage	Annually in autumn
		Remove fallen leaves and debris from deciduous plant foliage	Half yearly or as required
		Remove nuisance and invasive vegetation, including weeds	
		Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	
	Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
		If drain inlet has settled, cracked or moved, investigate and repair as appropriate	

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
		Replacement of clogged geotextile (will require reconstruction of soakaway)	
		Realign the rip-rap	
		Repair or rehabilitate inlets, outlets and overflows	
		Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	
		Relevel uneven surfaces and reinstate design levels	
		Relevel uneven surfaces and reinstate design levels	
		Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	
		Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	
		Remove and dispose of oils or petrol residues using safe standard practices	
		Clear perforated pipework of blockages	As required
		Relevel uneven surfaces and reinstate design levels	
		Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
	Remedial Actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years
Trees	Monitoring / Inspections	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly
	Regular Maintenance	Remove litter and debris	Monthly, or as required)
		Manage other vegetation and remove nuisance plants	Monthly at start, then as required
		Inspect inlets and outlets	Monthly
	Occasional Maintenance	Check tree health and manage tree appropriately	Annually
		Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
		Water	As required - in periods of drought
		Realignment of rip-rap	
		Repair/rehabilitation of inlets, outlets and overflows	
		Relevel uneven surfaces and reinstate design levels	

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
	Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%.	With effective pre-treatment, this will only be required rarely, e.g. every 25–50 years
	Remedial Actions	Repair erosion or other damage	As required
		Replant, where necessary	
		Aerate pond when signs of eutrophication are detected	
		Realign rip-rap or repair other damage	
		Repair / rehabilitate inlets, outlets and overflows.	

Table 6.1 SuDS Maintenance Strategy as taken from The SuDS Manual

Effective SuDS design must assess all foreseeable risks during construction and maintenance. These must be mitigated during the detailed design stages where effective design will aim to avoid, reduce, and mitigate risks.

This process will also require input from the principal contractor who will ensure the construction of SuDS components are carried out in a safe and sustainable manner.

7 Foul Water Assessment

As outlined in Section 2, it is assumed that the existing building on site has an existing connection which outfalls to the public combined sewers in Chatham Street.

It is proposed to re-use this existing connection to the public combined sewers once the refurbishment work has been completed to the existing building. A new foul water network should be constructed to serve the proposed building. This network would connect into a combined manhole which outfalls via a new connection onto the public sewer located on Gore Street.

All proposed networks will be designed to adoptable standards as outlined in the Design and Construction Guidance (DCG) (Appendix C of the Sewerage Sector Guidance in relation to the adoption of sewerage assets) and in accordance with Building Regulations Part H.

Foul water flows have been calculated using British Water Code of Practice Flows and Loads - 4.

The development will include the construction of 251 hotel rooms, along with a restaurant, café, museum and bar areas which, assuming total gravity connection, equates to a potential proposed total foul water flow of:

Rooms (2 guests per room)	502 guests x 80 litres/day/person =	40,160 litres/day
Staff	60 members of staff x 90 litres/day/person =	5,400 litres/day
Restaurant	200 people x 30 litres/day/person =	6,000 litres/day
Café	40 people x 15 litres/day/person =	600 litres/day
Bar	200 people x 12 litres/day/person =	2,400 litres/day

Total Foul Flow 54,560 litres/day

The peak hours for each area have been assumed as follows:

Rooms	7-9am & 6-8pm
Staff	12-1pm
Restaurant	6-9pm
Café	12-2pm
Bar	8-11pm

The potential proposed peak foul water flow for the development is 5 l/s. Full calculations can be found in Appendix I.

A 'Pre-development Enquiry' was submitted to United Utilities to confirm capacity exists within the receiving public sewers. The response from United Utilities can be found in Appendix H which confirms that there is capacity within the system and that the recommended point of discharge would be within Gore Street.

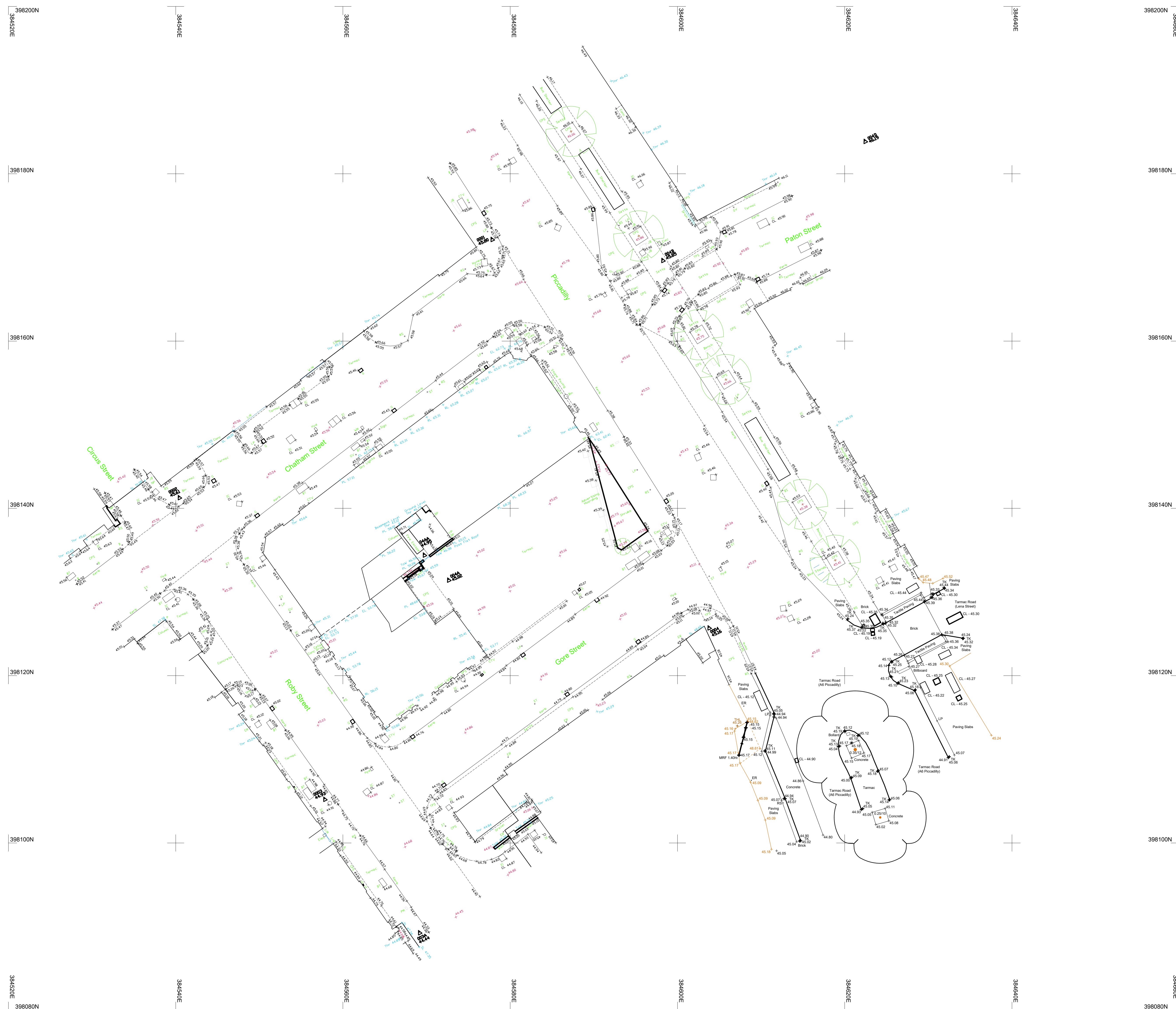
A Section 106 application will be made to United Utilities for consent to connect to the public sewer.

8 Conclusions

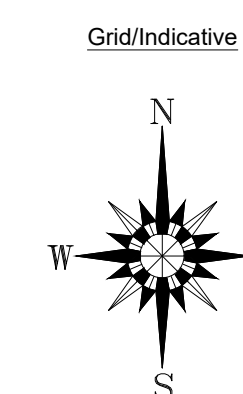
- The EA's indicative floodplain map shows that the site is in Flood Zone 1, however, the Local Authority has identified the area as a CDA due to the historic nature with canals servicing previous industrial centres throughout the city during the Industrial Revolution.
- The proposed development is at low/very low risk from groundwater, surface water, reservoirs and canals.
- Surface water runoff from the proposed development will be restricted before discharging into the existing combined water sewer on Gore Street. The implementation of a rainwater harvesting system for the use of irrigation for the winter garden on the upper levels of the development and attenuation of the surface water runoff is recommended. The system will discharge at a restricted rate and be linked to a rainfall forecast system to allow the tank to be drained prior to significant rainfall events. The volume required for the tank is 11m³ (Appendix H).
- CCTV survey to be commissioned to establish the current condition of the drainage serving the existing development located at 12 Piccadilly.
- The proposed drainage systems are to be kept separate before outfalling to a new combined manhole before connecting onto the existing combined sewer network. United Utilities have confirmed capacity within the system and recommend the point of discharge to be within Gore Street (Appendix G).
- The proposed peak foul water flows for the development is 5 l/s (Appendix I).
- A Section 106 application to United Utilities is needed for consent to connect to the public sewer.
- Therefore, the proposed development has an acceptable flood risk within the terms and requirements of NPPF.

Appendix A

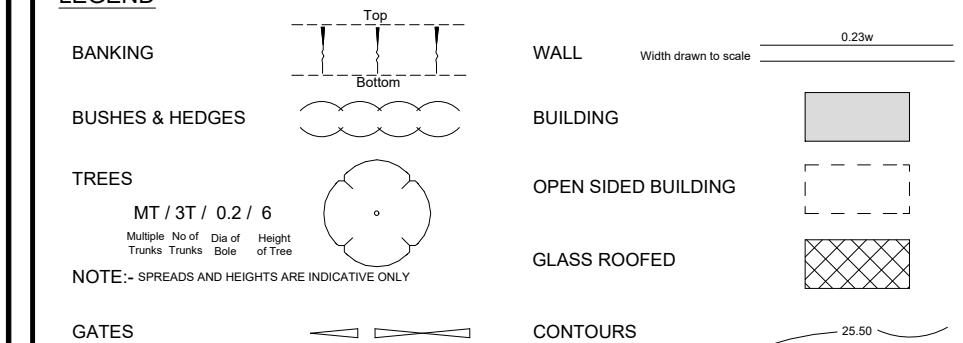
Topographical Survey



Sheet Layout



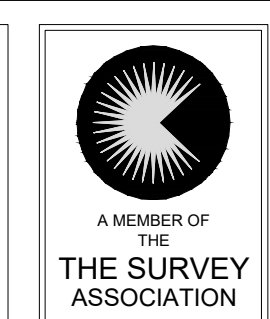
LEGEND



ABBREVIATIONS (WHERE APPLICABLE)

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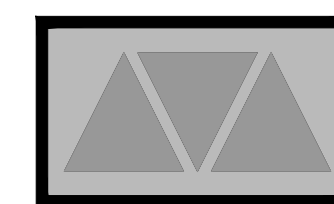
REV.	NOTES	DWN	DAT
	<div style="border: 2px solid black; padding: 10px; display: inline-block;"> PRELIMINARY </div>		



Notes:

Grid and levels relate to August 2012 survey
Sheet is North orientated unless stated.

Maltby Surveys Ltd



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HAYWARDS HEATH
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WebSite: www.maltbysurveys.com

SURVEYED	DW	AVISON YOUNG (UK) LTD
DRAWN	DW	
CHECKED	ITS	



SCALE

1/200 (A0 Sheet)

12 - 16 PICCADILLY, MANCHESTER

TOPOGRAPHICAL SURVEY

Job No	Rev	Drawing Number
24_053		T-24053-01
Date :	FEB 2024	

Appendix B

United Utilities Sewer Asset Map

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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LEGEND

The diagram illustrates the flow of water from various sources into a public sewer system. The sources are categorized into four groups: Abandoned, Foul, Surface Water, and Combined. The flow paths are represented by colored lines: brown for Abandoned, green for Foul, blue for Surface Water, and red for Combined. The flow paths lead to a public sewer system, which is shown as a series of lines branching out to different locations: Public Sewer, Private Sewer, Section 104, Rising Main, Sludge Main, Overflow, Water Course, and Highway Drain.

All point assets follow the standard colour convention:

red	- combined	blue	- surface water
brown	- foul	purple	- overflow

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

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

Address or Site Reference:

THE WALDORF MANCHESTER LLP 12 GORE
STREET,
MANCHESTER,
M1 3AQ

Scale: 1:1250 Date: 12/07/2018
Nodes: 209
Sheet: 1 of 1

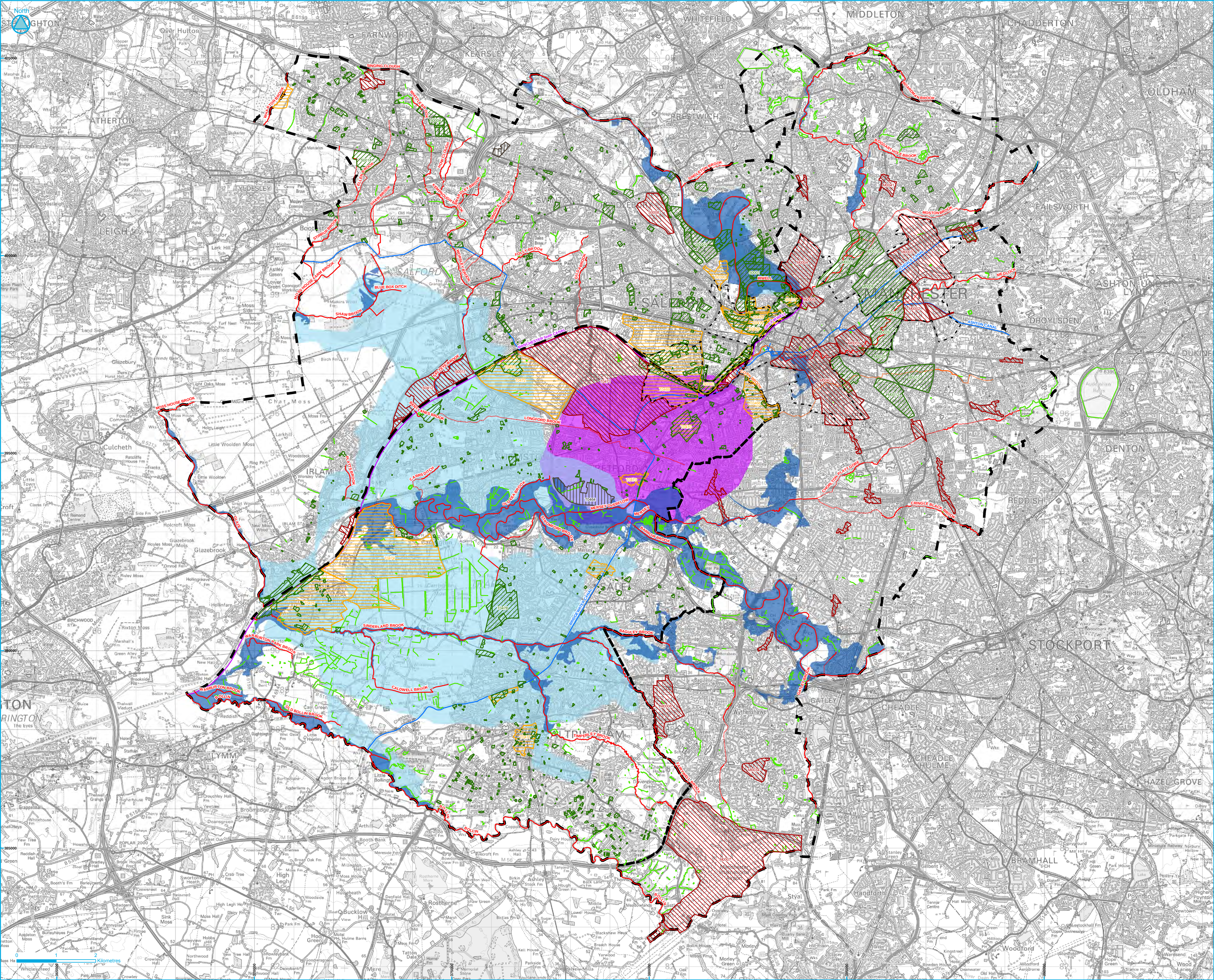
Printed by: Property Searches

SEWER RECORDS



Appendix C

Manchester, Salford, Trafford SFRA Groundwater Flooding Map



- Council Boundary
- Groundwater Issue**
 - Areas at risk of GW Flooding
 - Areas of shallow GW
 - Areas at risk of GW rebound
- Potential Development Sites / Locations**
 - Employment
 - Housing
 - Mixed Use
 - Other
- Main Rivers (V8.0)**
 - Culverted
 - Open
- Digitised River Lines**
 - Culverted
 - Open
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Inwell
- Other Waterbodies
- Regional Centre Boundary

The map has been produced in accordance with PPS25: Development and Flood Risk and its Practice Guide. This map shows areas that are potentially at risk from groundwater flooding and should be used to scope suitable mitigation measures in a site specific Flood Risk Assessment.

The Main River information shown in the SFRA is provided by the Environment Agency; the centreline data may deviate from that shown on basemapping due to inherent differences in data resolution. Further information on Main Rivers is provided on the Environment Agency's website. The mapping of culverted sections of watercourse is a strategic screening only based upon Ordnance Survey 1:10,000 mapping and should be confirmed for more detailed studies such as site specific Flood Risk Assessment. The canals layer does not necessarily cover all the canal arms, but the modelled overtopping/breaching and hydraulic interactions with rivers and other waterbodies is complete and accurate as appropriate for a Strategic Flood Risk Assessment.

The information on the map is based on Environment Agency potential groundwater rebound areas, data from the Coal Authority, BGS drift geology mapping and Defra Groundwater Emergence Maps.

The River Inwell between Victoria Station and Pomona Island is not shown as a Main River on the Environment Agency's Flood Map although Flood Zones related to the river are. The same approach has been taken in this SFRA.



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for

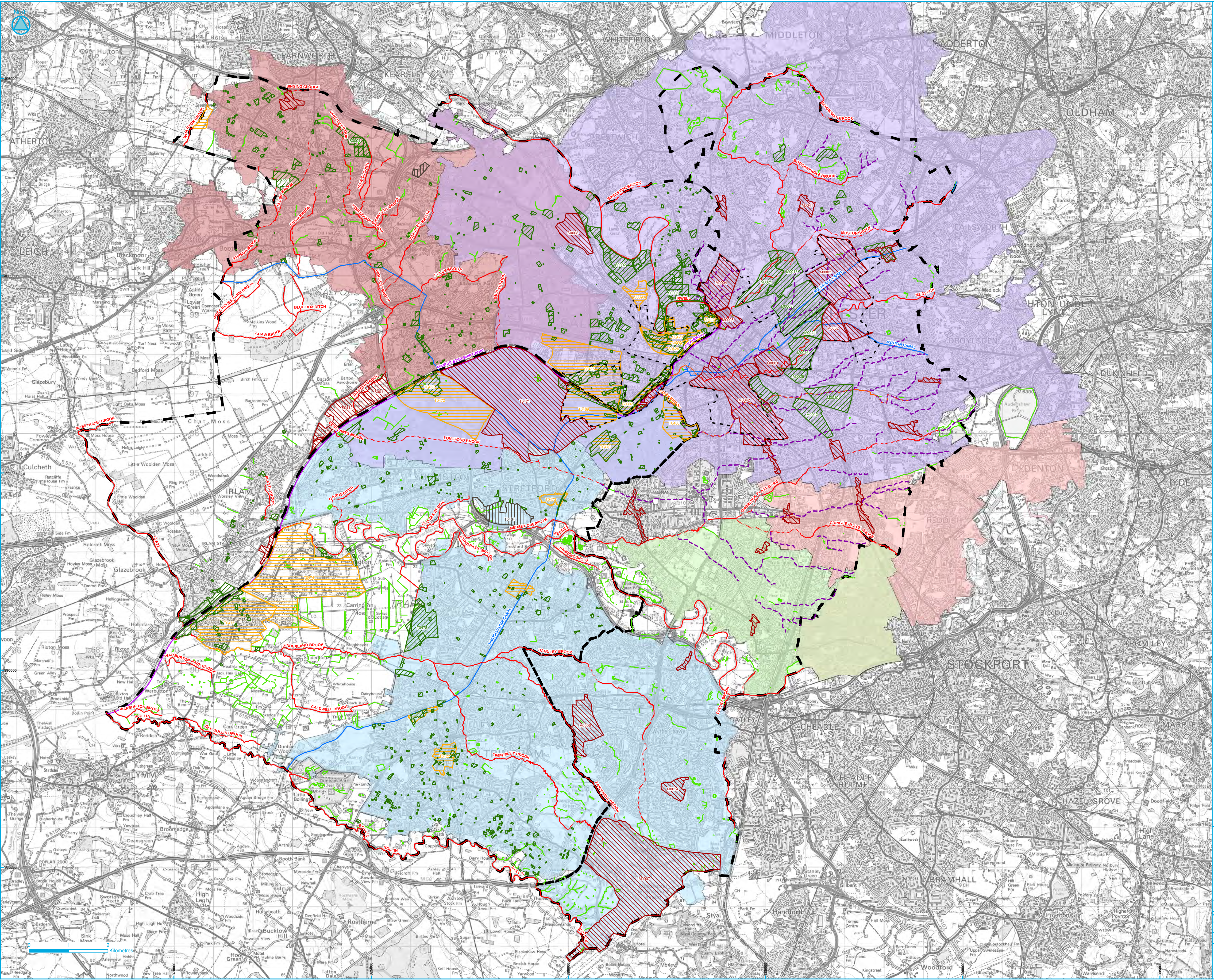
Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

Groundwater Flooding

Drawn by: J Cheetham	Date: 08/03/2011	This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office © Crown copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence number: 100019068 2011.
Checked by: J Dimelow	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: ArcViewMapping\Level1\MS1_GroundwaterFlooding_V1.3.mxd		
Drawing Number:	Status:	Scale:
GW_2.1	FINAL	1:45,000
		Original @ A1

Appendix D

Manchester, Salford, Trafford SFRA Critical Drainage Areas Map



- Council Boundary
- Lost Watercourses
- Critical Drainage Areas**
- Conurbation Core
- Didsbury
- Levenshulme and Fallowfield
- Manchester and Trafford South
- Salford North West
- Potential Development Sites / Locations**
- Employment
- Housing
- Mixed Use
- Other
- Regional Centre Boundary
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Inwell
- Other Waterbodies
- Main Rivers (V8.0)**
- Culverted
- Open
- Digitised River Lines**
- Culverted
- Open

This map has been produced in accordance with PPS25: Development and Flood Risk.

Certain locations are particularly sensitive to an increase in the rate of surface water runoff and/or volume from new development. There are generally known local flooding problems associated with these areas. These areas have been defined as Critical Drainage Areas in the SFRA. Specific drainage requirements are required in these areas to help reduce local flood risk.

Chapter 5 of the Level 2 SFRA covers the flooding from surface water and sewers and how Critical Drainage Areas have been defined.

The Main River information shown in the SFRA is provided by the Environment Agency; the centreline data may deviate from that shown on basemapping due to inherent differences in data resolution. Further information on Main Rivers is provided on the Environment Agency's website. The mapping of culverted sections of watercourse is a strategic screening only based upon Ordnance Survey 1:10,000 mapping and should be confirmed for more detailed studies such as site specific Flood Risk Assessment. The canals layer does not necessarily cover all the canal arms, but the modelled overtopping/breaching and hydraulic interactions with rivers and other waterbodies is complete and accurate as appropriate for a Strategic Flood Risk Assessment.

The River Irwell between Victoria Station and Pomona Island is not shown as a Main River on the Environment Agency's Flood Map although Flood Zones related to the river are. The same approach has been taken in this SFRA.



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Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

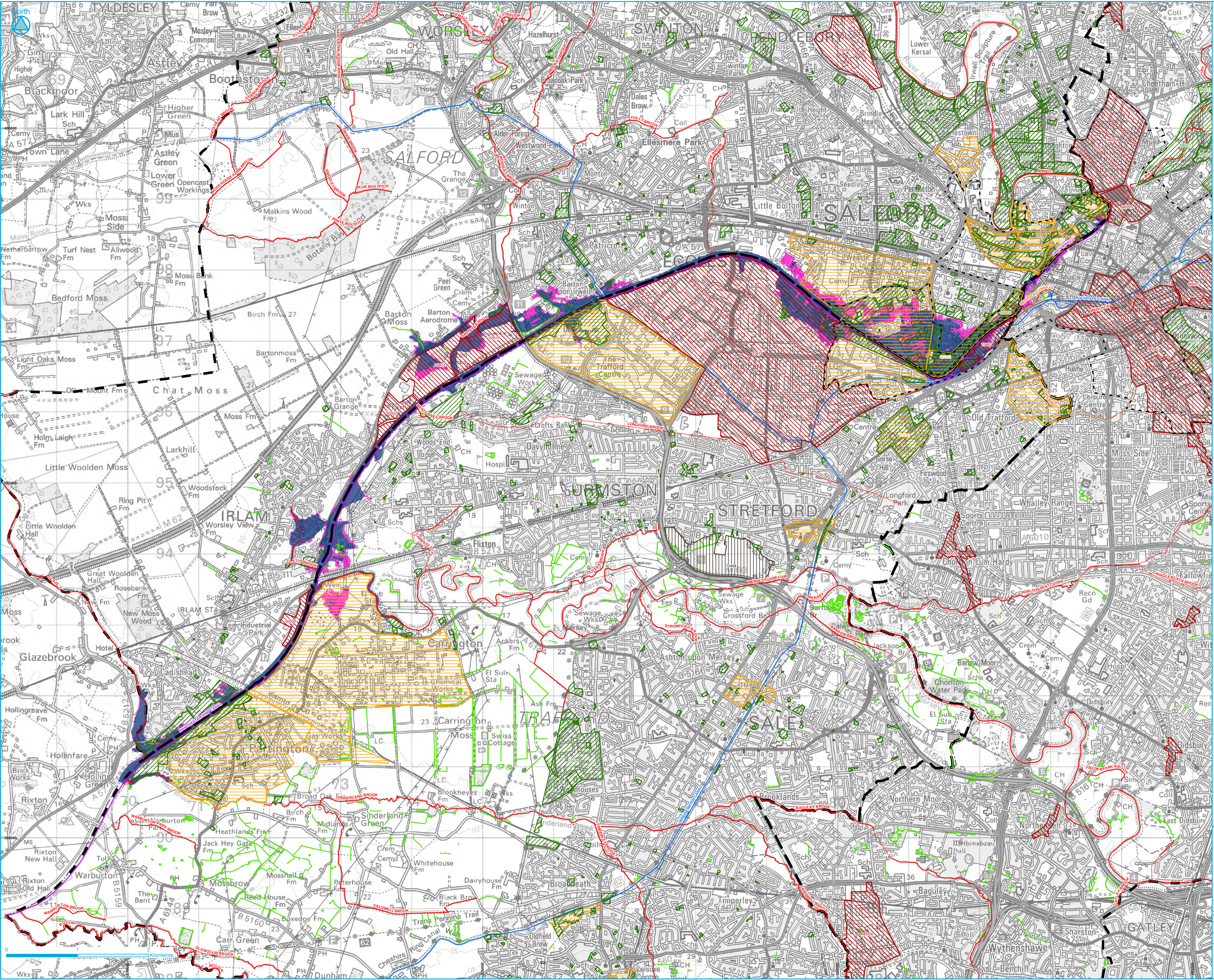
Critical Drainage Areas

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Checked by: J Dimelow	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcViewMapping\Level2\MST_CDA_Current_V1.2.mxd		
Drawing Number: SS_4.5	Status: FINAL	Scale: 1:45,000

Original @ A

Appendix E

Manchester, Salford, Trafford SFRA Canal and Urban Zoning Map



- Council Boundary
- Urban Design Thresholds For Resistance & Resilience**
 - <0.6 m
 - >0.6 m
- Potential Development Sites / Locations**
 - Employment
 - Housing
 - Mixed Use
 - Other
- Regional Centre Boundary
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Inwell
- Other Waterbodies
- Main Rivers (V8.0)**
 - Culverted
 - Open
- Digitised River Lines**
 - Culverted
 - Open

This map has been produced in accordance with PPS25: Development and Flood Risk and its Practice Guide.

Areas at risk from the Manchester Ship Canal and Grey Inwell are currently subject to a wide variation in model results resulting from model uncertainties. Hence urban design response needs to adopt a mix of non-structural resilience measures and/or floor level raising to account for the high degree of uncertainty associated with a residual risk.

The Main River information shown in the SFRA is provided by the Environment Agency; the centreline data may deviate from that shown on basemapping due to inherent differences in data resolution. Further information on Main Rivers is provided on the Environment Agency's website. The mapping of culverted sections of watercourse is a strategic screening only based upon Ordnance Survey 1:10,000 mapping and should be confirmed for more detailed studies such as site specific Flood Risk Assessment. The canals layer does not necessarily cover all the canal arms, but the modelled overtopping/breaching and hydraulic interactions with rivers and other waterbodies is complete and accurate as appropriate for a Strategic Flood Risk Assessment.

This map shows typical urban design approaches that would be applicable to areas of residual flood risk. The design thresholds used to identify where resistance and resilience are potentially applicable are based on flood depths expected in a 1 in 100 yr event with an allowance for climate change and the adopted flood risk scenario for operation of the Manchester Ship Canal. This map should be used in conjunction with the advice given in Chapter 9 of the Level 2 SFRA.

The River Inwell between Victoria Station and Pomona Island is not shown as a Main River on the Environment Agency's Flood Map although Flood Zones related to the river are. The same approach has been taken in this SFRA.

Other offices at Althorne, Doncaster, Edinburgh, Haywards Heath, Limerick, Newcastle upon Tyne, Newport, Northampton, Salford, Skipton, Tadcaster & Wellingford

Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

Urban Design Zoning for the Manchester Ship Canal and Grey Inwell

Drawn by: J Cheetham	Date: 16/03/2011	<small>This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Licence number: 100016688 2011</small>
Checked by: J Dimelew	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcView/Mapping/Level2/MST_MSC_UrbanDesignZoning_V1.3.mxd		
Drawing Number: FL_1.15	Status: FINAL	Scale: 1:25,000

Appendix F

Greenfield Runoff Calculations

Price & Myers		Page 1
37 Alfred Place London WC1E 7DP	Room2, Hometel Manchester	
Date 23/03/2023 File	Designed by JH Checked by JH	
Innovyze Source Control 2018.1		
<p style="text-align: center;"><u>ICP SUDS Mean Annual Flood</u></p> <p style="text-align: center;">Input</p> <p>Return Period (years) 100 Soil 0.450 Area (ha) 0.070 Urban 0.000 SAAR (mm) 868 Region Number Region 10</p> <p style="text-align: center;">Results 1/s</p> <p>QBAR Rural 0.4 QBAR Urban 0.4</p> <p>Q100 years 0.8</p> <p>Q1 year 0.3 Q30 years 0.7 Q100 years 0.8</p>		
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Appendix G

United Utilities Pre-Development Capacity Check

RE: Pre Development Enquiry for: 12-16 Piccadilly, Manchester, M1 3AQ

UU Reference Number : 03819...

File

Message

Help

BLUEBEAM

Delete

Respond

File in Project

Share to Teams

Quick Steps

Move

Tags

Editing

Immersive

Translate

Zoom

Reply with Scheduling Poll

Create PDF

Change Settings

Select Folders

Viva Insights

Add-in

Language

Zoom

Find Time

Bluebeam

RE: Pre Development Enquiry for: 12-16 Piccadilly, Manchester, M1 3AQ

UU Reference Number : 03819855

S

seweradoptions@uuplc.co.uk

To

Joshua Haddow

Reply

Reply All

Forward

Wed 03/05/2023 15:35

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: Tuesday, April 25, 2023 8:34 AM

To: Joshua Haddow <jhaddow@pricemyers.com>

Subject: RE: Pre Development Enquiry for: 12-16 Piccadilly, Manchester, M1 3AQ UU Reference Number : 03819855

Hi Joshua,

Thank you for your email.

Just had a look into this for you and we have no issue with you connecting to the public network on Gore Street.

I hope this helps, if you need anything else, please do let me know.

Kind regards,



United Utilities

Water for the North West

Jordan Houghton

Developer Engineer

Developer Services & Metering

Customer Services

T: 07500671544

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If you have received a great service today why not tell us?

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RE: Pre Development Enquiry for: 12-16 Piccadilly, Manchester, M1 3AQ

UU Reference Number : 03819...

File

Message

Help

BLUEBEAM

Delete

Respond

File in Project

Share to Teams

Quick Steps

Move

Tags

Editing

Immersive

Translate

Zoom

Reply with Scheduling Poll

Create PDF

Change Settings

Viva Insights

Newforma

Teams

Quick Ste...

Language

Zoom

Find Time

Bluebeam

Add-in

RE: Pre Development Enquiry for: 12-16 Piccadilly, Manchester, M1 3AQ

UU Reference Number : 03819855

S

seweradoptions@uuplc.co.uk

To

Joshua Haddow

Reply

Reply All

Forward

Wed 03/05/2023 15:35

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Hi Joshua,

United Utilities do not have any current known capacity issues on this network.

I can confirm that we have no current record of sewer flooding on our DG5 register within the vicinity of the proposed development. The DG5 register is a register of properties that have flooded as a result of hydraulic inadequacy of the public sewer network.

Please note that United Utilities Water Limited (UUV) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the register.

Our response does not include:

- any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which UUV has no control and not a facet of sewer capacity; or
- any historical sewer flooding events that have been removed from the register as a result of investment in our infrastructure.

If you need anything else, please do let me know.

Kind regards,



Water for the North West

Jordan Houghton

Developer Engineer

Developer Services & Metering

Customer Services

T: 07500671544

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Appendix H

Surface Water Storage Calculations

Price & Myers		Page 1
37 Alfred Place London WC1E 7DP	30578 Room2 Hometel, Manchester Tank Sizing - 100yr + 40%	
Date 09/06/2023 File 30578.SRCX	Designed by JH Checked by BB	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 35 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.230	0.730	0.0	2.5	2.5	6.2	O K
30 min Summer	8.406	0.906	0.0	2.5	2.5	7.7	O K
60 min Summer	8.451	0.951	0.0	2.5	2.5	8.1	O K
120 min Summer	8.321	0.821	0.0	2.5	2.5	7.0	O K
180 min Summer	8.204	0.704	0.0	2.5	2.5	6.0	O K
240 min Summer	8.069	0.569	0.0	2.5	2.5	4.9	O K
360 min Summer	7.867	0.367	0.0	2.5	2.5	3.1	O K
480 min Summer	7.748	0.248	0.0	2.5	2.5	2.1	O K
600 min Summer	7.678	0.178	0.0	2.4	2.4	1.5	O K
720 min Summer	7.636	0.136	0.0	2.2	2.2	1.2	O K
960 min Summer	7.595	0.095	0.0	2.0	2.0	0.8	O K
1440 min Summer	7.571	0.071	0.0	1.5	1.5	0.6	O K
2160 min Summer	7.557	0.057	0.0	1.1	1.1	0.5	O K
2880 min Summer	7.549	0.049	0.0	0.9	0.9	0.4	O K
15 min Winter	8.338	0.838	0.0	2.5	2.5	7.2	O K
30 min Winter	8.543	1.043	0.0	2.5	2.5	8.9	O K
60 min Winter	8.596	1.096	0.0	2.6	2.6	9.4	O K
120 min Winter	8.409	0.909	0.0	2.5	2.5	7.8	O K
180 min Winter	8.227	0.727	0.0	2.5	2.5	6.2	O K
240 min Winter	8.006	0.506	0.0	2.5	2.5	4.3	O K
360 min Winter	7.745	0.245	0.0	2.5	2.5	2.1	O K
480 min Winter	7.638	0.138	0.0	2.3	2.3	1.2	O K
600 min Winter	7.597	0.097	0.0	2.0	2.0	0.8	O K
720 min Winter	7.584	0.084	0.0	1.8	1.8	0.7	O K
960 min Winter	7.569	0.069	0.0	1.5	1.5	0.6	O K
1440 min Winter	7.555	0.055	0.0	1.1	1.1	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	130.648	0.0	8.6	22
30 min Summer	87.164	0.0	11.4	32
60 min Summer	55.538	0.0	14.6	50
120 min Summer	32.508	0.0	17.1	84
180 min Summer	23.861	0.0	18.8	118
240 min Summer	19.215	0.0	20.2	150
360 min Summer	14.238	0.0	22.4	208
480 min Summer	11.576	0.0	24.3	264
600 min Summer	9.881	0.0	25.9	320
720 min Summer	8.694	0.0	27.4	378
960 min Summer	7.114	0.0	29.9	492
1440 min Summer	5.342	0.0	33.7	734
2160 min Summer	3.966	0.0	37.5	1096
2880 min Summer	3.189	0.0	40.2	1452
15 min Winter	130.648	0.0	9.6	22
30 min Winter	87.164	0.0	12.8	33
60 min Winter	55.538	0.0	16.3	54
120 min Winter	32.508	0.0	19.1	90
180 min Winter	23.861	0.0	21.0	128
240 min Winter	19.215	0.0	22.6	158
360 min Winter	14.238	0.0	25.1	210
480 min Winter	11.576	0.0	27.2	264
600 min Winter	9.881	0.0	29.0	312
720 min Winter	8.694	0.0	30.7	372
960 min Winter	7.114	0.0	33.5	494
1440 min Winter	5.342	0.0	37.7	738

Price & Myers		Page 2
37 Alfred Place London WC1E 7DP	30578 Room2 Hometel, Manchester Tank Sizing - 100yr + 40%	
Date 09/06/2023 File 30578.SRCX	Designed by JH Checked by BB	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
2160 min Winter	7.546	0.046	0.0	0.8	0.8	0.4	O K
2880 min Winter	7.540	0.040	0.0	0.7	0.7	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
2160 min Winter	3.966	0.0	42.0	1068
2880 min Winter	3.189	0.0	45.0	1440

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 384572 398245 SJ 84572 98245	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	2880
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.035

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.012	4 8	0.012	8 12	0.012

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m)

7.500

Safety Factor

2.0

Infiltration Coefficient Base (m/hr)

0.00000

Porosity

0.95

Infiltration Coefficient Side (m/hr)

0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	9.0	50.0	1.200	9.0	83.9	1.201	0.0	84.0

Hydro-Brake® Optimum Outflow Control

Unit Reference

MD-SHE-0075-2500-1000-2500

Design Head (m)

1.000

Design Flow (l/s)

2.5

Flush-Flo™

Calculated

Objective

Minimise upstream storage

Application

Surface

Sump Available

Yes

Diameter (mm)

75

Invert Level (m)

7.500

Minimum Outlet Pipe Diameter (mm)

100

Suggested Manhole Diameter (mm)

1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.5	Kick-Flo®	0.627	2.0
Flush-Flo™	0.307	2.5	Mean Flow over Head Range	-	2.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	0.800	2.3	2.000	3.4	4.000	4.7	7.000	6.2
0.200	2.4	1.000	2.5	2.200	3.6	4.500	5.0	7.500	6.4
0.300	2.5	1.200	2.7	2.400	3.7	5.000	5.3	8.000	6.6
0.400	2.5	1.400	2.9	2.600	3.9	5.500	5.5	8.500	6.8
0.500	2.4	1.600	3.1	3.000	4.1	6.000	5.7	9.000	7.0
0.600	2.1	1.800	3.3	3.500	4.5	6.500	6.0	9.500	7.1

Appendix I

Estimated Total Foul Flows Calculations

Foul Flows l/d

Rooms - 251 rooms x 2 guests = 502 guests x 80 l/d/p = 40,160 l/d

Staff - 60 staff x 90 l/d/p = 5,400 l/d

Restaurant - 200 guests x 30 l/d/p = 6,000 l/d

Cafe - 40 guests x 15 l/d/p = 600 l/d

Bar - 200 guests x 12 l/d/p = 2,400 l/d

Peak Hours

Rooms - 7-9am & 6-8pm = 4 hours

Staff - 12-1pm = 1 hour

Restaurant - 6-9pm = 3 hours

Cafe - 12-2pm = 2 hours

Bar - 8-11pm = 3 hours

Foul Flows l/s

Rooms - 40,160l/d / 4hrs / 60mins / 60secs = 2.78 l/s

Staff - 5,400l/d / 1hr / 60mins / 60secs = 1.5 l/s

Restaurant - 6,000l/d / 3hrs / 60mins / 60secs = 0.5 l/s

Cafe - 600l/d / 2hrs / 60mins / 60secs = 0.083 l/s

Bar - 2,400l/d / 3hrs / 60mins / 60secs = 0.2 l/s

Total Flow l/s = 5.063 l/s = 5.0 l/s

Note:

Foul flow rates taken from
British Water Flows and Loads 4