



D100A - FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

HILTON MOTTO

ANCOATS, LAYSTALL STREET, MANCHESTER, M4 6DE

16 November 2022

21031.D100A

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Issue	Prepared by	Checked by	NOTES	Date
-	EB	DKK	First Issue	06/10/2022
A	EB	BH	Updated to Comments from Deloitte	16/11/2022

1.0 INTRODUCTION

This report has been prepared by Shear Design Ltd on behalf of their client, Ancoats Manchester Ltd, for the site at Laystall Street, Manchester M4 6DE. The proposed development is a brownfield site in Greater Manchester. The site lies within Flood Zone 1 and covers an area of approximately 320m² (0.032ha). The site is also within the Conurbation Core Critical Drainage Area; therefore, a Flood Risk Assessment is required.

The Flood Risk Assessment has been prepared to assess the risk of flooding throughout the site and the included drainage strategy has been prepared detailing the drainage measures proposed for this development. The drainage strategy proposes to restrict runoff rates and will consider allowances for climate change at a level of 40% (Manchester City Council Preliminary Flood Risk Assessment, May 2011). Enquiries have been made to the Lead Local Flood Authority for Greater Manchester to confirm the allowable site discharge rate.

This report intends to provide advice regarding the nature and potential significance of flood hazards which may be present at the site. In addition, this report will also describe the existing site and associated drainage infrastructure and identify a sustainable solution for the proposed surface water drainage.

The main objectives of this report (as recommended in the National Planning Policy Framework, July 2021) are to:

- Identify the probability of flooding at the proposed site under existing and proposed conditions
- Identify the proposed site use and the possible effects of flooding to its users
- Consider the site's future flood risk due to climate changes and extreme flooding events
- Ensure no increase of flooding to third parties as a result of the proposed development
- Carry out a sequential and, if necessary, an exception test for the proposed site.

The overall aim of the precautionary framework is, in order of preference, to;

- Direct new development away from those areas which are at high risk of flooding
- Where development has to be considered in high-risk areas (zone 3) only those developments which can be justified are located within such areas.

The site occupies 0.032ha and a site location plan is included in [Appendix A](#), the National Grid Reference is SJ 85043 98312.

Shear Design Ltd have prepared this report in accordance with the instructions of its client, Ancoats Manchester Ltd for its Client's sole and specific use. This report is not assignable without the prior written permission of Shear Design Ltd. This report should not be relied upon exclusively for decision making purposes and should be read in conjunction with other Engineer's reports, specifications and drawings in addition to all other relevant reports, drawings and specifications.

2.0 PLANNING POLICY

The National Planning Policy Framework (revised, July 2021) details the strategy for “meeting the challenge of Climate Change, flooding and coastal change” (Ministry of Housing, Communities & Local Government: National Planning Policy Framework. Crown Copyright 2021).

The objectives of design include: *“ensuring that flood risk is not increased elsewhere and that applications are supported by a site-specific flood risk assessment where appropriate (NPPF, Section 14, Point 161). The main objectives of this report (as recommended in the NPPF Document) are to: plan for climate change, flood risk and coastal change.*

- 161.** *All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change– so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:*
- a. applying the sequential test and then, if necessary, the exception test as set out below;*
 - b. safeguarding land from development that is required, or likely to be required, for current or future flood management;*
 - c. using opportunities provided by new development to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques); and*
 - d. where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.*
- 167.** *When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*
- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
 - b) the development is appropriately flood resistant and resilient;*
 - c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
 - d) any residual risk can be safely managed; and*
 - e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

169. *Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

- a) take account of advice from the lead local flood authority*
- b) have appropriate proposed minimum operational standards*
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
- d) where possible, provide multifunctional benefits.”*

FLOOD AND WATER MANAGEMENT ACT (2010) AND FLOOD RISK REGULATIONS (2009)

The Flood and Water Management Act of 2010 sets out what should be included in the National Flood and Coastal Erosion Risk Management strategies for England and Wales as well as local flood risk management strategies. It responds to recent pressure to introduce legislation to address the threat of flooding and water scarcity, both of which are predicted to increase with climate change. The Flood Risk Regulations of 2009 set out the duties regarding producing preliminary flood risk assessments, flood hazard maps and flood risk maps and flood risk management plans. Both Act and Regulation place responsibility on the local authority as Lead Local Flood Authority (LLFA) to manage and lead local flooding issues. In the case of this site, the LLFA is Manchester City Council.

Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA (May 2011)

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) is intended to provide a detailed understanding of flood risk across Manchester, Salford and Trafford from all sources. The document considers flood risk from all sources, including, rivers, canals, surface water and sewers; as well as the interactions between different sources of flood risk. Groundwater flooding was considered in the Level 1 report but reservoir flooding was not considered due to national security concerns as noted within the report. The Level 2 SFRA identifies the Conurbation Core critical drainage area, in which the proposed site is located.

3.0 TOPOGRAPHY AND SITE DESCRIPTION

The site is located in Greater Manchester, and is currently used as a compound for construction. The total site area is 0.032ha which is a combination of macadam areas, soft landscaping (ie: grass) and gravel.

The site is relatively flat with a slight overall fall from north-west to south-east with levels across the site ranging from 47.00m AOD to 46.60m AOD. These levels have been derived from the topographical survey provided by ASES (refer to [Appendix B](#)). The site is bounded by Laystall Street to the north-west, Great Ancoats street the north-east and there is a small strip of land that offers an exit onto Lomax Street to the south-east. The site is bounded on the south-eastern edge by another plot of land that appears to be mostly vegetation (based on the topographical survey) that is surrounded by Heras Fencing. There is a building at the south-west boundary of the site. The site is accessible by pedestrians and vehicles to the north-west via Laystall Street and via Lomax Street to the south-east. The proposed site is approximately 150m from Rochdale Canal to the north-west and over 200m from Ashton Canal to the south-east.

The topographical survey and sewer records show that there is existing adopted drainage under the three roads that bound this site. The sewer records from United Utilities (see [Appendix D](#)) indicate that the drainage is a combined sewer. The cover level of the existing manholes closest to the site are known from the topographical survey. However, United Utilities sewer records do not indicate cover or invert levels on the drainage plans included in. Additional surveying will be required before any design can be finalised and it is recommended that a CCTV survey is commissioned to confirm the condition of the existing drainage connection prior to any flows from the development discharging into the existing sewer.

4.0 DEVELOPMENT DESCRIPTION

This report has been authored to support the planning application for the construction of a 154-bedroom hotel on the land at the end of Laystall Street, bordering Great Ancoats Street in Manchester. The development lifespan is assumed to be 75 years.

There is no new vehicle or pedestrian access proposed to or from the public highway. There are no new public roads proposed within the site; nor will there be any new public rights of way in or around the site provided as a result of this development. There are no proposed diversions or extinguishments of existing public rights of way as a result of this development. There are two proposed options for the drainage strategy which are detailed below, the proposed drainage layouts can be found in [Appendix C](#).

A desktop site investigation has been provided by TEC, (report reference 2104003.002.02). The report outlines preliminary contamination risks to the site as a result of made ground coverage. However, the proposed drainage works do not include an infiltration solution and are therefore unlikely to be affected by these risks. It is expected that an intrusive site investigation, provided at a later stage, will refine the description of the contamination risks and how they should be appropriately mitigated.

The first option for the surface water drainage strategy (refer to drawing 21031-SK101) is to use permeable paving as treatment and for all surface water flows to be conveyed into an attenuation tank in the hotel basement. This would then discharge via a flow control device to the combined public sewer to the north. This option would utilise internal rainwater pipes from the roof that would discharge into the attenuation tank in the basement. There is not enough space available at roof level for any blue/green roofs due to the requirement for PV generation. Therefore, it is not possible to provide any form of treatment for the runoff from the roof.

The second option for the surface water drainage strategy (refer to drawing 21031-SK102) is to use permeable paving with a lined permeable subbase for attenuation with restricted discharge into a combined public sewer to the south. The permeable paving will be a lined system that will also provide treatment. Under this option, rainwater falling on the roof would discharge via rainwater pipes to diffuser boxes within the permeable paving, this means that under this option, all of the surface water falling on the site would receive treatment. Due to the site layout, this option is proposed to connect into the combined sewer in Lomax Street to the south.

The current architectural layouts allow for the possibility of each drainage option described herein to be implemented into the detailed design if required. Both options achieve the site drainage criteria described in earlier sections of this report. Therefore, the preferred option will be determined during the detailed design phase, taking into account the preferences of the Local Authority and the Contractor.

5.0 EXISTING DRAINAGE AND SITE INVESTIGATIONS

The United Utilities map indicates the presence of adopted sewers to the north of the site (Laystall Street) and south of the proposed site (Lomax Street), (refer to [Appendix D](#)). No CCTV survey or drainage connectivity survey has currently been commissioned but this will be required to determine the invert level of connection for the proposed drainage and the positions and condition of existing drainage.

The British Geological Survey (BGS) indicates that the bedrock geology is formed of;

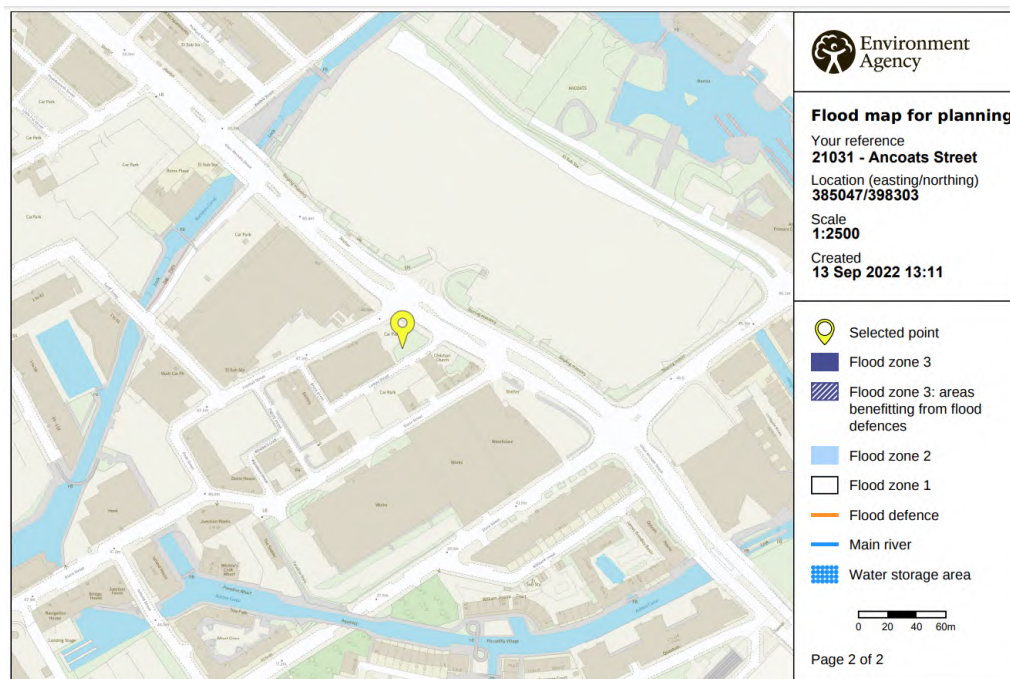
- *Chester Formation, sandstone, sedimentary bedrock formed between 250 and 247.1 million years ago during the Triassic period*

The BGS also notes superficial deposits of;

- *Till, Devensian, Diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.*

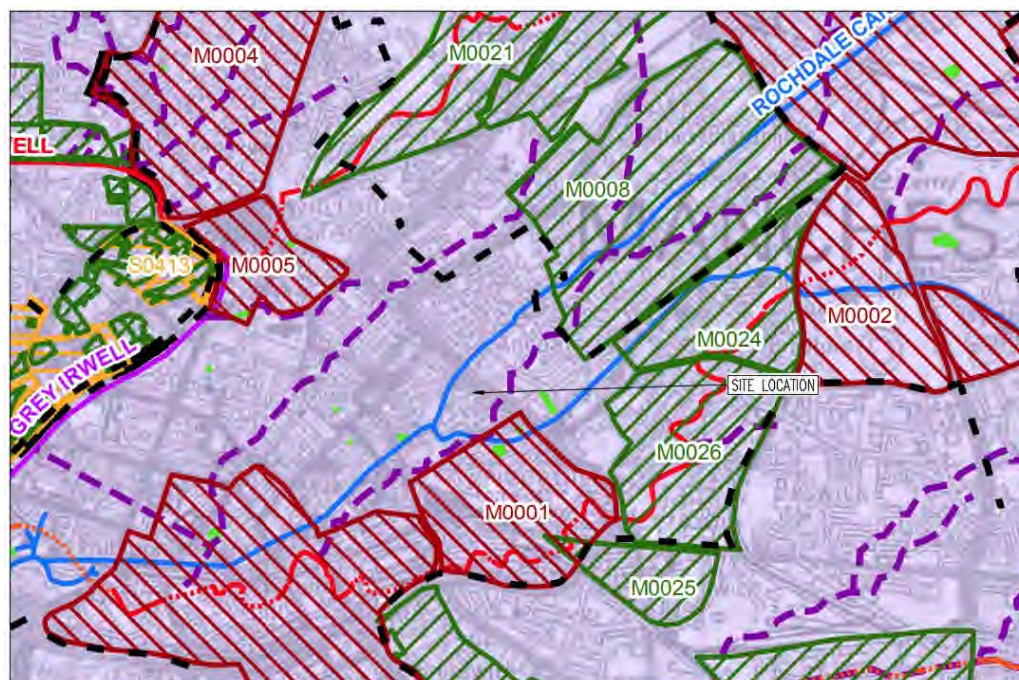
6.0 FLOOD RISK ASSESSMENT

Environment Agency flood mapping shows that the site is located within Flood Zone 1; therefore the site is in an area with a low probability of flooding (see extract below).



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The site is in the Conurbation Core Critical Drainage Area (see map extract below) and therefore a Flood Risk Assessment is required for this site. Refer to Appendix E for the full map of the critical drainage areas in and around Manchester.



Fluvial & Tidal Flooding

The flood map below shows that the risk of flooding from fluvial and tidal sources for the proposed site is very low with the probability of flooding at less than 0.1% each year.



Extent of flooding from rivers or the sea

High Medium Low Very Low Location you selected

Groundwater

The proposed site is not in an area at risk of groundwater flooding, as indicated in the Groundwater Flooding Map produced for the Manchester City, Salford City and Trafford Councils for the Level 2 Hybrid SFRA, see extract below, refer to [Appendix F](#) for full map.*



Pluvial

Pluvial, or surface water flooding occurs when heavy rainfall cannot drain away. This source of flooding can be difficult to predict and is more likely to happen in areas with larger areas of hard surface such as concrete. Pluvial flooding can still occur when there is no nearby watercourse that presents a flood risk.

The proposed site is at low risk of flooding from pluvial sources. The flood map below is taken from the government flood map service and shows that there is a chance of flooding of between 0.1% and 1% each year from pluvial sources.



Artificial Sources

The Manchester, Salford, Trafford Level 1 Strategic Flood Risk Assessment indicates that information relating to reservoirs was not provided by the Environment Agency due to “*implications for national security*”. As such it is more difficult to gain a clear picture of the implications of reservoir flooding in this area.

Despite this, it is known that there are many reservoirs in and around Manchester, including but not limited to: Audenshaw, Godley, and Gorton Reservoirs. The Environment Agency reservoir flooding maps indicate that should a failure occur, there is no extent of flooding indicated within the proposed site.



Maximum extent of flooding from reservoirs:

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

Flood Mitigation

Flood mitigation measures should be implemented in case of a flood event. Due to the proposed building being a hotel, the owner should enact a flood evacuation plan for the safety of the staff and guests/visitors. It is not currently planned to place any bedrooms on the ground floor. Examples/templates of flood evacuation plans can be found in [Appendix H](#).

A possible flood evacuation route is to exit the site from the south, heading north-east towards Great Ancoats Street. This should be a well walked and known mean of safe access and egress from the site by all occupiers.

Flood exceedance routes have been modelled based upon the existing and proposed levels. The drawings showing the existing (21031-SK111) and proposed (21031-SK112) flood exceedance routes are in [Appendix C](#).

The existing flood exceedance routes are for the surface water runoff to run approximately north to south down the site and then towards Lomax Street. The proposed flood exceedance route is to follow the edge of the hotel from the north-east corner of the site and around to the south and exiting on Lomax Street.

7.0 PROPOSED DRAINAGE STRATEGY

Surface Water Drainage

A SuDS Strategy for surface water drainage works is required and to be designed in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) to ensure proper drainage and manage the risk of flooding and pollution. Best current practice has been used to determine suitable Sustainable Drainage Systems (SuDS) selection where possible. Surface water runoff generated from the proposed impermeable areas seeks to meet the following design objectives:

- Infiltration to ground as close as possible to source to recharge the groundwater and watercourse base flows (depending on ground condition and existing site uses),
- Attenuate and control surface water runoff from proposed impermeable areas to the equivalent of the Greenfield runoff rate or to an agreed betterment of the Brownfield runoff rate.
- Manage surface water runoff from the site so that it does not increase and where possible, reduces flood risk to third parties.
- Improve the quality of surface water discharge.

Several SuDS features should be ideally used throughout a site, linked together to form a SuDS train providing treatment, control and attenuation processes.

The SuDS hierarchy gives guidance as to the priority or preference of different solutions:

- Rainwater re-use (rainwater harvesting/greywater recycling)
- Into the ground (infiltration).
- To a surface water body (e.g., an ordinary watercourse)
- To a surface water sewer, highway drain, or other drainage system
- To a combined sewer

These options have been considered as follows:

- Rainwater re-use has been discounted due to the associated cost with maintaining such a system while also expecting the benefit of such a system to be minimal to the development.
- An infiltration drainage solution has been discounted for this site. This is because it would not be possible to locate a soakaway or other infiltration system, more than 5m from the site boundary and any proposed building, as required by building regulations.

- A hybrid solution involving infiltration has therefore also been discounted.
- There is no surface water body located close enough to the site to allow for discharge. The closest such body is the Rochdale canal, over 100m away.
- There is no dedicated surface water sewer that can receive surface water runoff.
- There is a combined sewer in each of the streets adjacent to the proposed site that can be used to discharge surface water.

Attenuation in the form of an above-ground pond or a below-ground tank has been discounted due to lack of space onsite. There is no practical location for a pond and any tank would not be able to be situated far enough away from nearby buildings or the site boundary, to allow for ease of construction and prevent surcharging. However, it would be possible to place an attenuation tank in the basement of the proposed hotel. The current architectural proposals include space for this tank should this option be preferred.

This drainage strategy proposes to use attenuation with restricted discharge. There are two separate options for the attenuation of surface water which are detailed below. The proposed attenuation has been designed to attenuate peak flows from all storm events, up to and including the critical 1 in 100-year storm with a 40% allowance for climate change and a coefficient of runoff (C_v) value of 1.0 (100%).

Developments should aim to reach greenfield runoff rates where possible. The greenfield runoff rate for this site has been estimated as 0.5 L/s and the brownfield runoff rate as 1.11 L/s (see [Appendix I](#)). A discharge rate of 0.5 or 1.11 L/s would be considered too low from a maintenance standpoint as any flow control device such as an orifice plate or vortex flow control may be subject to blockages when designed for such a low flow rate.

Similar schemes in Manchester have been granted permission to use a discharge rate of 5 L/s and contact has been made with the Manchester LLFA to discuss this. While there is not currently a final agreement in place, the Manchester LLFA have agreed, in principle, to a proposal to discharge surface water at 5 L/s, subject to approval from United Utilities, with whom initial contact has been made.

The first option for dealing with surface water runoff is to have an attenuation tank in the basement and permeable paving outside. The permeable paving will treat surface water runoff before it is conveyed to the tank in the basement. With this first option, surface water from the roof would discharge directly to the attenuation tank in the basement but would not be treated due to the lack of available roof space for a green roof, due to the requirement for PV generation. The permeable paving would provide treatment only to the external ground floor areas and would not have any storage capacity. Refer to the illustrative drainage plan, drawing 21031-SK111 in [Appendix C](#).

An attenuation tank can store surface water runoff in the basement of the proposed building with restricted discharge into the combined sewer to the north in Laystall Street. It is known that the building next door has an attenuation tank in the basement that discharges via gravity into the adopted sewer to the north. Therefore, for proposed option one, the development will utilise the same strategy, subject to confirmation of the invert levels of the adopted sewer. In this proposed option, a 6m³ attenuation tank would be required.

The second option for surface water runoff is to utilise a lined permeable paving system with a permeable sub-base and a flow control device restricting discharge. With this second option, surface water runoff from the roof would discharge into the permeable paving system via diffuser units. Therefore, proposed option two would provide treatment for surface water runoff to the entire site. Refer to the illustrative drainage plan, drawing 21031-SK102 in [Appendix C](#).

A permeable paving system will treat surface water runoff at source and can also attenuate flows within the permeable sub-base. Furthermore, the paving can be flush to the edge of the building due to the use of a lined system with an impermeable “apron” to prevent water ingress into the ground around the foundations, thereby maximising space. The available courtyard/external area within the legal ownership boundary is approximately 50m² and the permeable sub-base would have a 30% voids ratio.

A permeable sub-base would be need to provide 5.7m³ of storage (see [Appendix G](#)), to achieve this volume of storage, a sub-base depth of 400mm would be required. This would give a depth of construction of approximately 600mm when including the block paving, stone layer and dense bitumen macadam.

The site levels currently fall from the north-east of the proposed location of permeable paving, down to the south of the site to the entrance on Lomax Street. This would create a suitable low point for a flow control device. Under option two, the most suitable discharge point would be to the combined sewer in Lomax Street to the south, as the site levels naturally fall this way already.

The strategy to discharge surface water at 5 L/s into the combined sewer has been agreed in principle with the Manchester Lead Local Flood Authority (see [Appendix J](#)) and a pre-planning enquiry has been submitted to United Utilities to confirm that there is sufficient capacity to discharge to their network. Further confirmation will be required to confirm the viability of the proposed connections and a determination can be made after a site CCTV survey has been completed. A Section 106 Agreement will be required to connect to the combined sewer.

For Source Control calculations showing the required storage volumes for each of the two options, refer to [Appendix G](#).

Pollution Control

In keeping with best practice consideration must be given to pollution control of surface water runoff. Permeable paving and is to be used to treat surface water runoff at source and in line with the Simple Index Approach within CIRIA Report C753, *The SuDS Manual*.

Proposed Development				
Other roofs (typically commercial/industrial roofs):	Pollution Hazard Indices (minimum)	Mitigation indices		Total Index $= x_1 + 0.5(x_2)$
		Permeable Paving	N/A	
Total suspended solids (TSS)	0.5	0.7	0.0	0.70
Metals	0.4	0.6	0.0	0.60
Hydrocarbons	0.4	0.7	0.0	0.70
Individual property driveways, cul de sacs & general access roads:				$= x_1 + 0.5(x_2)$
Total suspended solids (TSS)	0.3	0.7	0.0	0.70
Metals	0.2	0.6	0.0	0.60
Hydrocarbons	0.05	0.7	0.0	0.70

As all of the total index values above exceed the minimum pollution hazard indices, it is deemed that the development has sufficient treatment.

Foul Water Drainage

The site is not currently known to be discharging any foul loads into the combined sewer. The proposed foul drainage strategy will be to discharge all foul loads into the combined sewer, either in Laystall Street or Lomax Street.

The total foul flow can be estimated using the “Flows and Loads 4” document from British Water:
An initial estimate of the foul water flows from the proposed hotel has been undertaken and has been based upon the following assumptions:

- Hotel Guests: 250 Litres per person per day. (3* & 4* Hotels with restaurant facilities)
 - 154 rooms and assuming 2 people per room = 308 People.
- Full time staff: 90 Litres per person per day.
 - Assuming 10 staff at all times.
- Dry Weather Flow = Factor of 6.

Therefore, the total foul flow can be estimated as follows:

$$Q_{Foul} = \frac{(Flow\ Per\ Guest \times Number\ of\ Guests) + (Flow\ Per\ Staff \times Number\ of\ Staff)}{Seconds\ per\ Day} \times DWF$$

Therefore:

$$Q_{Foul} = \frac{(250 \times 308) + (90 \times 10)}{86,400} \times 6 = 5.41\ L/s$$

Therefore, the approximate foul flow is 5.4 L/s into the combined sewer.

It should be noted that any foul or surface water discharge rates provided herein are preliminary only and should be agreed with United Utilities and are subject to detailed design. Any discharge into an adopted sewer is subject to a Section 106 agreement with the relevant drainage authority. A section 104 agreement may also be required.

8.0 CONCLUSION

This Flood Risk Assessment and Drainage Strategy has been prepared by Shear Design on behalf of their client, Ancoats Manchester Ltd for the site at Laystall Street, Manchester, M4 6DE.

The proposed site is located within Flood Zone 1 and is within the Conurbation Core Critical drainage area. Sites within Flood Zone 1 are considered to have a low probability of flooding (Environment Agency Flood Map for Planning, 2022). The proposed site is at very low probability of flooding from fluvial and tidal flooding, not at risk from groundwater flooding, low risk from surface water flooding and has no extent of flooding from reservoirs as per the Environment Agency flood maps.

The state of any existing drainage onsite will only be fully understood once a drainage CCTV survey has been completed.

The first option for dealing with surface water runoff is to have an attenuation tank in the basement. With this first option, surface water from the roof would discharge directly to the attenuation tank in the basement but the roof runoff would not be treated due to the lack of available roof space for a green roof. Permeable paving will be used for external surfaces and will also discharge to the attenuation tank.

The second option for surface water runoff is to utilise a lined permeable paving system with a permeable sub-base and a flow control device restricting discharge. With this second option, surface water runoff from the roof would discharge into the permeable paving system via diffuser units. Therefore, proposed option two would provide treatment for surface water runoff to the entire site.

The required storage volume for surface water runoff for both drainage strategy options is approximately 6m³. The estimated surface water discharge rate for the site has been taken as 5 L/s based upon communication with the Lead Local Flood Authority.

The proposed foul water drainage strategy is to discharge foul water flows into a combined sewer, either in Laystall Street or Lomax Street. The estimated peak foul water flow is 5.41 L/s for the whole hotel, this value is subject to detailed design and agreement with United Utilities.

Report prepared by: -



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GRADUATE CIVIL ENGINEER

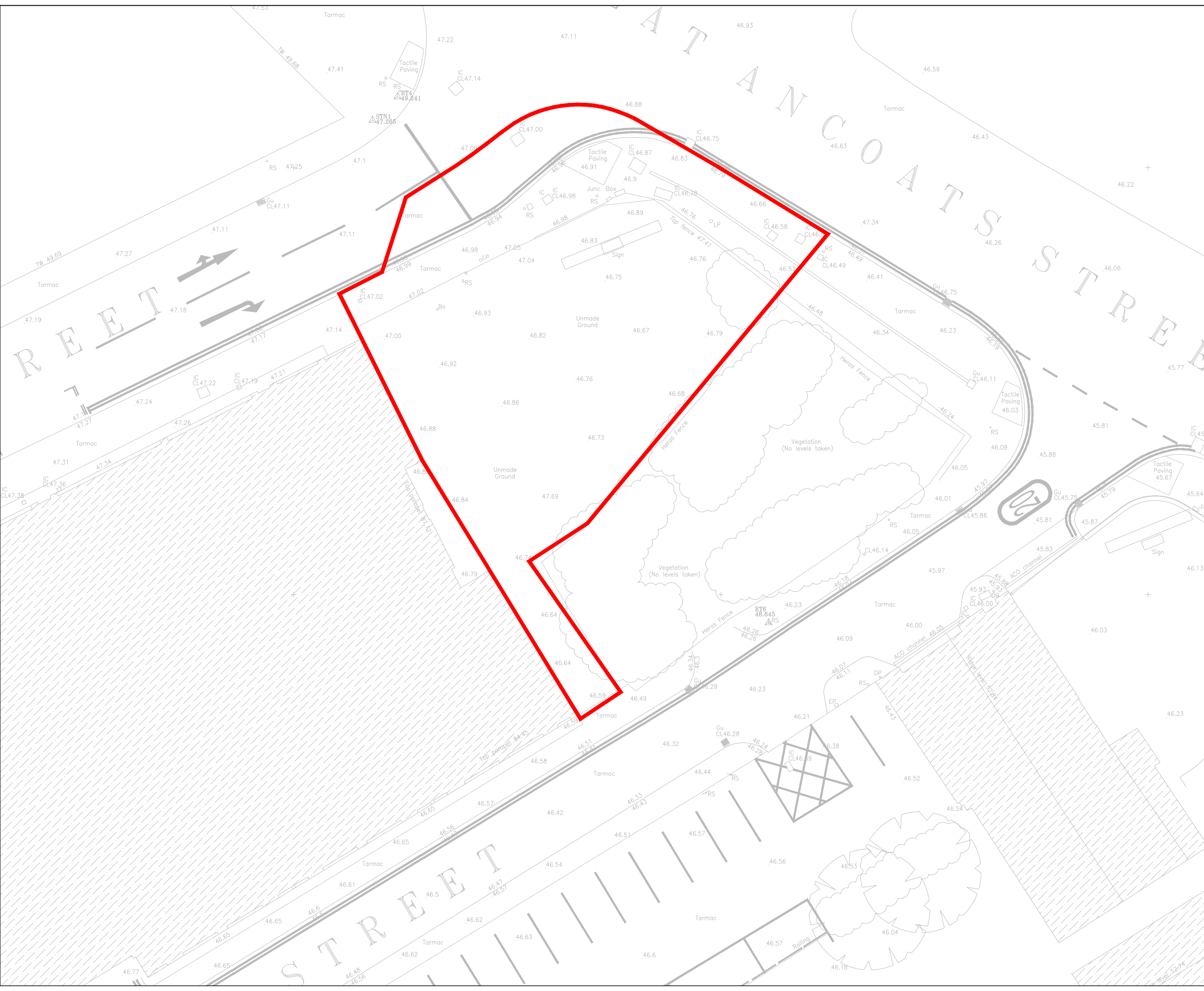
Approved by: -



ON BEHALF OF SHEAR DESIGN LTD
DAMEON KILGOUR
ASSOCIATE,
CIVIL ENGINEER

APPENDIX A

SITE LOCATION PLAN



NOTES

GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
4. ANY DISCREPANCIES TO BE REPORTED IMMEDIATELY TO THE ENGINEER.
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SUBCONTRACTORS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
6. THIS DRAWING IS COPYRIGHT © PROPERTY OF SHEAR DESIGN LIMITED.

KEY

PROPOSED SITE BOUNDARY

REV	DATE	DESCRIPTION	BY	CHK
A	16.11.22	UPDATED RED LINE BOUNDARY (RECEIVED 16.11.22)	EB	BH

CLIENT: ANCOATS MANCHESTER LTD

PROJECT: BANKSIDE HILTON MOTO,
ANCOATS, LAYSTALL STREET

TITLE: SITE LOCATION PLAN



Consulting Civil and Structural Engineers

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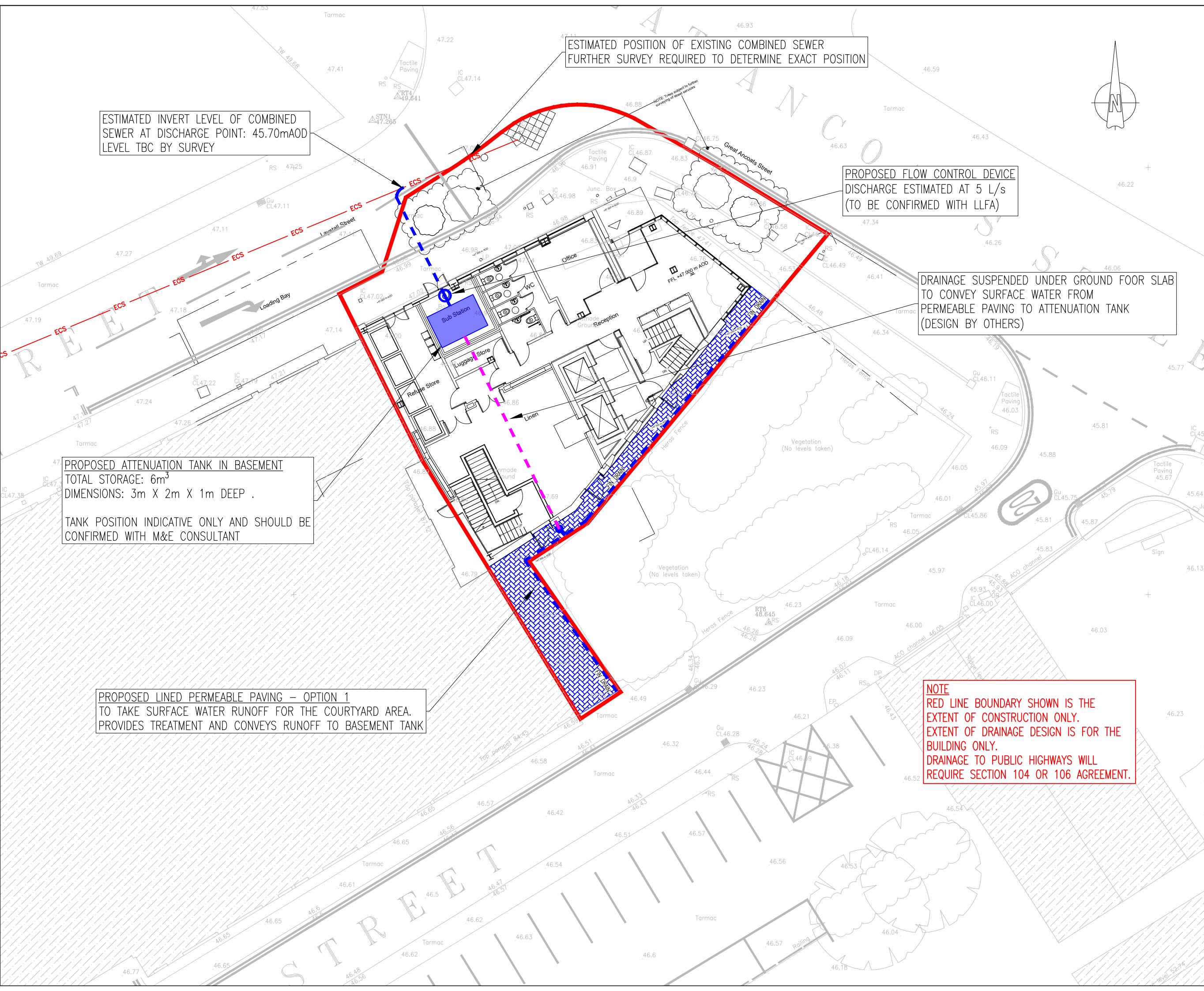
DRAWN: EB	CHECKED: EB	DATE: SEPTEMBER 2022	SCALE: 1:100 @ A1
SHEAR DESIGN REF: 21031	DRAWING NUMBER: 21031-100	REVISION: .	STATUS: I

APPENDIX B

TOPOGRAPHICAL SURVEY

APPENDIX C

PROPOSED DRAINAGE LAYOUTS & FLOOD EXCEEDANCE ROUTES



NOTES

GENERAL

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KEY

- PROPOSED SITE BOUNDARY
- ECS EXISTING COMBINED SEWER
- PROPOSED SURFACE WATER DRAINAGE
- FIN DRAIN PROPOSED FIN DRAIN
- PROPOSED PERMEABLE PAVING (OPTION 1)
- PROPOSED ATTENUATION TANK (OPTION 1)
- INDICATIVE ROUTE OF SUSPENDED DRAINAGE (DESIGN BY OTHERS)

NOTE

RUNOFF FROM ROOF AREAS TO DISCHARGE IN TO TANK IN BASEMENT (DRAINAGE FROM ROOF TO BE DESIGNED BY OTHERS)

A	16.11.22	UPDATED ARCHITECT'S LAYOUT (RECEIVED 16.11.22) AND AMENDED DRAINAGE	EB	BH
REV	DATE	DESCRIPTION	BY	CHK
AMENDMENTS				

CLIENT: ANCOATS MANCHESTER LTD

PROJECT: BANKSIDE HILTON MOTTO, ANCOATS, LAYSTALL STREET

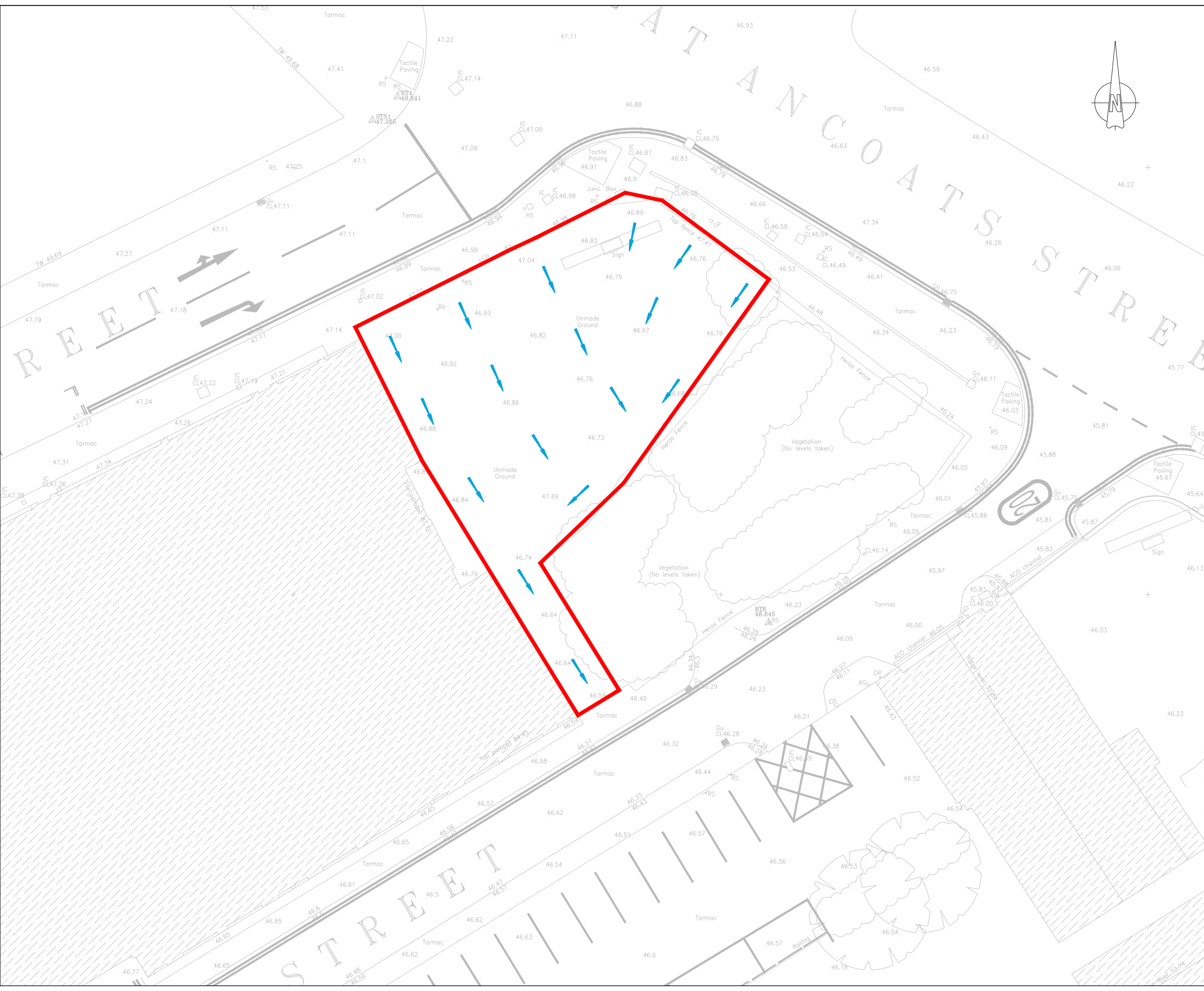
TITLE: PROPOSED DRAINAGE LAYOUT OPTION 1 - ATTENUATION TANK

SHEARdesign

Consulting Civil and Structural Engineers

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DRAWN:	EB	CHECKED:	DK	DATE:	SEPTEMBER 2022	SCALE:	1:100 @ A1
SHEAR DESIGN REF:	21031	DRAWING NUMBER:	21031-SK101	REVISION:	A	STATUS:	I



NOTES

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KEY

- PROPOSED SITE BOUNDARY
- EXISTING FLOOD EXCEEDANCE ROUTES

REV	DATE	DESCRIPTION	BY	CHK
AMENDMENTS				

CLIENT: ANCOATS MANCHESTER LTD

PROJECT: BANKSIDE HILTON MOTTO,
ANCOATS, LAYSTALL STREET

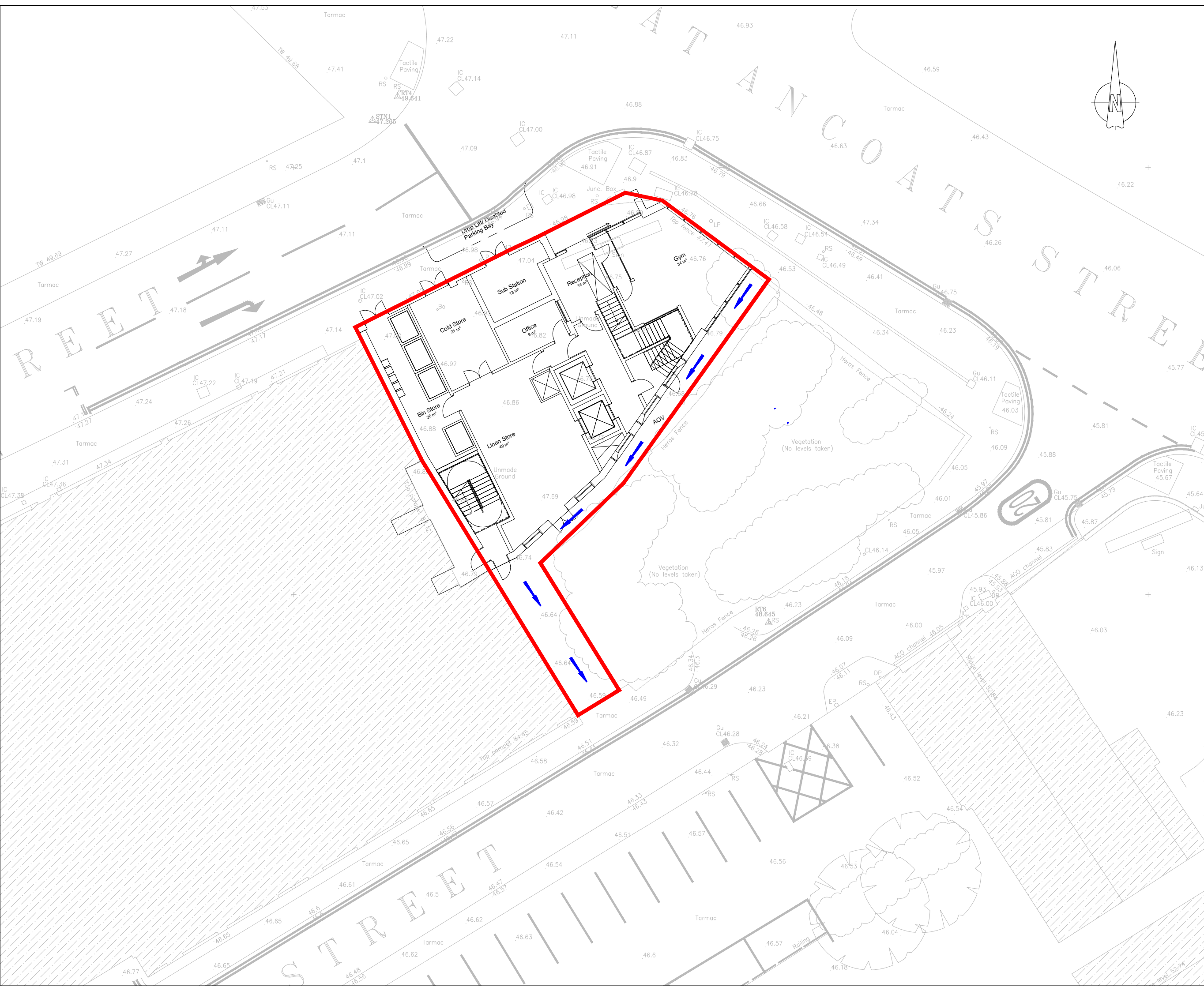
TITLE: EXISTING FLOOD EXCEEDANCE ROUTES

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DRAWN:	EB	CHECKED:	DK	DATE:	SEPTEMBER 2022	SCALE:	1:100 @ A1	REVISION:	
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SHEAR DESIGN REF:	21031	DRAWING NUMBER:	21031-SK111	STATUS:	I
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NOTES

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KEY

- PROPOSED SITE BOUNDARY
- PROPOSED FLOOD EXCEEDANCE ROUTE

REV	DATE	DESCRIPTION	BY	CHK
AMENDMENTS				

CLIENT: ANCOATS MANCHESTER LTD

PROJECT: BANKSIDE HILTON MOTTO,
ANCOATS, LAYSTALL STREET

TITLE: PROPOSED FLOOD EXCEEDANCE ROUTES

SHEARdesign
Consulting Civil and Structural Engineers
7 Ashtree Court - Woodsey Close - Cardiff Gate Business Park - Cardiff - CF23 8RW
Tel: 029 2054 7000 - Fax: 029 2054 7001 - www.shear-design.com - enquiries@shear-design.com

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SHEAR DESIGN REF:	21031	DRAWING NUMBER:	21031-SK112	STATUS:	I				

APPENDIX D

UNITED UTILITIES MAPS AND SERVICES PLAN

Shear Design

7
7 Ashtree Court, Woodsy Close, Cardiff Gate Business
Park
CARDIFF, South Glamorgan
CF23 8RW

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: 21031 Laystall Street
Our Ref: UUPS-ORD-425158
Date: 24/08/2022**

Dear Sirs**Location: 21031 Ancoates**

I acknowledge with thanks your request dated 23/08/2022 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

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

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

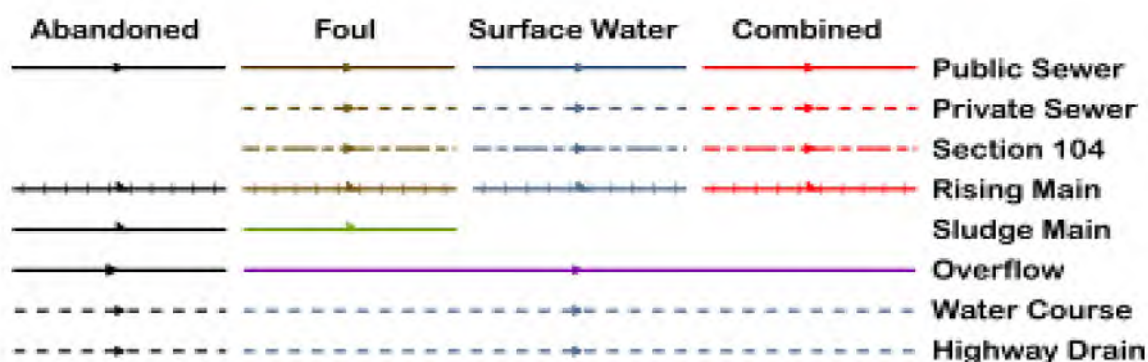
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

Wastewater Symbolology



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

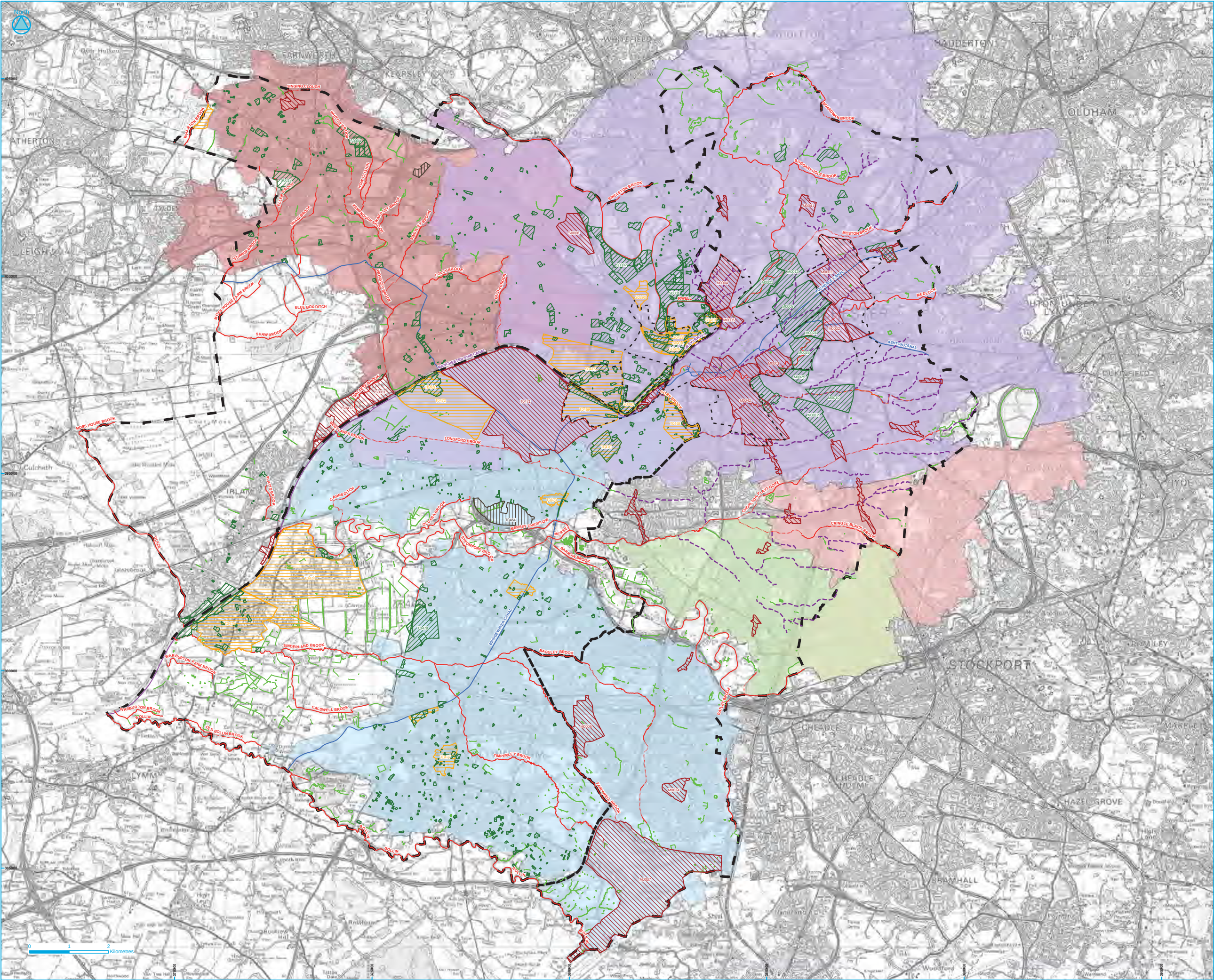
Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock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



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APPENDIX E

MAP OF CRITICAL DRAINAGE AREAS



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

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 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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WA1 1NN
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Other offices at Atherstone, Doncaster, Edinburgh, Haywards Heath, Limerick, Newcastle upon Tyne, Newport, Northallerton, Saltair, Skipton, Tadcaster & Wallingford

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

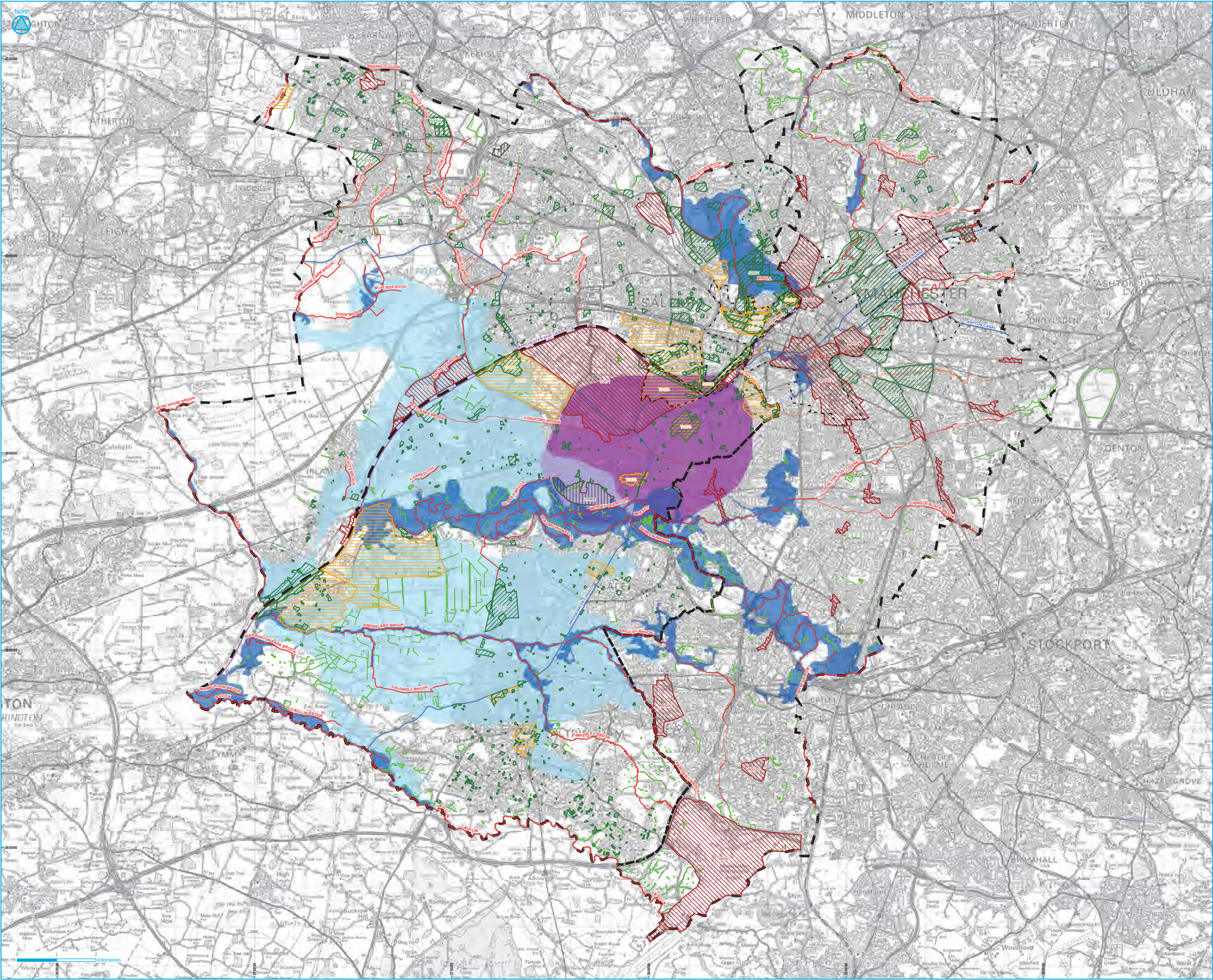
Critical Drainage Areas

Drawn by: J Cheetham	Date: 16/03/2011	This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Licence number: 100019568 2011.
Checked by: J Dimelew	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcViewMappingLevel2MST_CDA_Current_V1.2.mxd		
Drawing Number: SS_4.5	Status: FINAL	Scale: 1:45,000

Original @ A1

APPENDIX F

GROUNDWATER FLOOD RISK MAP



- Council Boundary
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Irwell
- Other Waterbodies
- Main Rivers (V8.0)**
 - Culverted
 - Open
- Digitised River Lines**
 - Culverted
 - Open
- Potential Development Sites / Locations**
 - Employment
 - Housing
 - Mixed Use
 - Other
- 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 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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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 Stationery Office. Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Licence number: 10001568 2011.
Checked by: J Dimelow	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: _ArcViewMappingLevel1MST_GroundwaterFlooding_V1.3.mxd		
Drawing Number: GW_2.1	Status: FINAL	Scale: 1:45,000
Original @ A1		

APPENDIX G

SOURCE CONTROL CALCULATIONS

Shear Design Ltd							Page 1
7 Ashtree Court Woodsy Close Cardiff Gate Business Park				BANKSIDE HILTON MOTO PERMEABLE PAVING CALCULATION DISCHARGE RATE 5 L/s			
Date 15/09/2022 File 21031 - POROUS CAR PARK...				Designed by EB Checked by EB			
Innovyze				Source Control 2020.1			
Summary of Results for 100 year Return Period (+40%)							
Half Drain Time : 11 minutes.							
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
15 min Summer	46.293	0.373	0.0	4.8	4.8	4.7	O K
30 min Summer	46.354	0.434	0.0	4.9	4.9	5.6	Flood Risk
60 min Summer	46.339	0.419	0.0	4.9	4.9	5.3	Flood Risk
120 min Summer	46.256	0.336	0.0	4.8	4.8	4.1	O K
180 min Summer	46.167	0.247	0.0	4.6	4.6	2.8	O K
240 min Summer	46.093	0.173	0.0	4.5	4.5	1.7	O K
360 min Summer	45.988	0.068	0.0	4.3	4.3	0.3	O K
480 min Summer	45.920	0.000	0.0	3.8	3.8	0.0	O K
600 min Summer	45.920	0.000	0.0	3.3	3.3	0.0	O K
720 min Summer	45.920	0.000	0.0	2.8	2.8	0.0	O K
960 min Summer	45.920	0.000	0.0	2.3	2.3	0.0	O K
1440 min Summer	45.920	0.000	0.0	1.7	1.7	0.0	O K
2160 min Summer	45.920	0.000	0.0	1.2	1.2	0.0	O K
2880 min Summer	45.920	0.000	0.0	1.0	1.0	0.0	O K
4320 min Summer	45.920	0.000	0.0	0.7	0.7	0.0	O K
5760 min Summer	45.920	0.000	0.0	0.6	0.6	0.0	O K
7200 min Summer	45.920	0.000	0.0	0.5	0.5	0.0	O K
8640 min Summer	45.920	0.000	0.0	0.4	0.4	0.0	O K
10080 min Summer	45.920	0.000	0.0	0.4	0.4	0.0	O K
15 min Winter	46.286	0.366	0.0	4.8	4.8	4.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	118.382	0.0	9.3	20			
30 min Summer	79.333	0.0	12.4	29			
60 min Summer	50.812	0.0	16.0	46			
120 min Summer	31.498	0.0	20.1	78			
180 min Summer	23.499	0.0	22.3	108			
240 min Summer	18.972	0.0	24.1	138			
360 min Summer	13.913	0.0	26.4	194			
480 min Summer	11.171	0.0	28.3	0			
600 min Summer	9.415	0.0	29.8	0			
720 min Summer	8.183	0.0	31.1	0			
960 min Summer	6.552	0.0	33.2	0			
1440 min Summer	4.782	0.0	36.3	0			
2160 min Summer	3.483	0.0	39.6	0			
2880 min Summer	2.778	0.0	42.1	0			
4320 min Summer	2.016	0.0	45.8	0			
5760 min Summer	1.604	0.0	48.4	0			
7200 min Summer	1.343	0.0	50.6	0			
8640 min Summer	1.160	0.0	52.3	0			
10080 min Summer	1.025	0.0	53.8	0			
15 min Winter	118.382	0.0	9.3	20			
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Shear Design Ltd							Page 2
7 Ashtree Court Woodsy Close Cardiff Gate Business Park			BANKSIDE HILTON MOTO PERMEABLE PAVING CALCULATION DISCHARGE RATE 5 L/s				
Date 15/09/2022 File 21031 - POROUS CAR PARK...			Designed by EB Checked by EB				
Innovyze			Source Control 2020.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
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
30 min Winter	46.344	0.424	0.0	4.9	4.9	5.4	Flood Risk
60 min Winter	46.300	0.380	0.0	4.8	4.8	4.8	O K
120 min Winter	46.161	0.241	0.0	4.6	4.6	2.7	O K
180 min Winter	46.045	0.125	0.0	4.4	4.4	0.9	O K
240 min Winter	45.940	0.020	0.0	4.2	4.2	0.0	O K
360 min Winter	45.920	0.000	0.0	3.1	3.1	0.0	O K
480 min Winter	45.920	0.000	0.0	2.5	2.5	0.0	O K
600 min Winter	45.920	0.000	0.0	2.1	2.1	0.0	O K
720 min Winter	45.920	0.000	0.0	1.8	1.8	0.0	O K
960 min Winter	45.920	0.000	0.0	1.5	1.5	0.0	O K
1440 min Winter	45.920	0.000	0.0	1.1	1.1	0.0	O K
2160 min Winter	45.920	0.000	0.0	0.8	0.8	0.0	O K
2880 min Winter	45.920	0.000	0.0	0.6	0.6	0.0	O K
4320 min Winter	45.920	0.000	0.0	0.5	0.5	0.0	O K
5760 min Winter	45.920	0.000	0.0	0.4	0.4	0.0	O K
7200 min Winter	45.920	0.000	0.0	0.3	0.3	0.0	O K
8640 min Winter	45.920	0.000	0.0	0.3	0.3	0.0	O K
10080 min Winter	45.920	0.000	0.0	0.2	0.2	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	79.333	0.0	12.4	30			
60 min Winter	50.812	0.0	16.2	48			
120 min Winter	31.498	0.0	19.8	80			
180 min Winter	23.499	0.0	22.4	108			
240 min Winter	18.972	0.0	24.0	130			
360 min Winter	13.913	0.0	26.4	0			
480 min Winter	11.171	0.0	28.3	0			
600 min Winter	9.415	0.0	29.8	0			
720 min Winter	8.183	0.0	31.1	0			
960 min Winter	6.552	0.0	33.2	0			
1440 min Winter	4.782	0.0	36.3	0			
2160 min Winter	3.483	0.0	39.6	0			
2880 min Winter	2.778	0.0	42.1	0			
4320 min Winter	2.016	0.0	45.8	0			
5760 min Winter	1.604	0.0	48.4	0			
7200 min Winter	1.343	0.0	50.6	0			
8640 min Winter	1.160	0.0	52.3	0			
10080 min Winter	1.025	0.0	53.8	0			
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Shear Design Ltd		Page 3
7 Ashtree Court Woodsy Close Cardiff Gate Business Park	BANKSIDE HILTON MOTO PERMEABLE PAVING CALCULATION DISCHARGE RATE 5 L/s	
Date 15/09/2022 File 21031 - POROUS CAR PARK...	Designed by EB Checked by EB	
Innovyze Source Control 2020.1		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.358	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.032

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.011	4 8	0.011	8 12	0.010

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7 Ashtree Court Woodsy Close Cardiff Gate Business Park	BANKSIDE HILTON MOTO PERMEABLE PAVING CALCULATION DISCHARGE RATE 5 L/s	
Date 15/09/2022 File 21031 - POROUS CAR PARK...	Designed by EB Checked by EB	
Innovyze	Source Control 2020.1	

Model Details

Storage is Online Cover Level (m) 46.600

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	13.9	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	45.920	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0100-5000-1400-5000
Design Head (m)	1.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	45.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	5.0
Flush-Flo™	0.416	5.0
Kick-Flo®	0.855	4.0
Mean Flow over Head Range	-	4.4

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)
0.100	3.3	1.200	4.7	3.000	7.1	7.000	10.7
0.200	4.6	1.400	5.0	3.500	7.7	7.500	11.0
0.300	4.9	1.600	5.3	4.000	8.2	8.000	11.4
0.400	5.0	1.800	5.6	4.500	8.6	8.500	11.7
0.500	5.0	2.000	5.9	5.000	9.1	9.000	12.0
0.600	4.9	2.200	6.2	5.500	9.5	9.500	12.3
0.800	4.3	2.400	6.4	6.000	9.9		
1.000	4.3	2.600	6.7	6.500	10.3		

Shear Design Ltd					Page 1	
7 Ashtree Court Woodsy Close Cardiff Gate Business Park			BANKSIDE HILTON MOTO ATTENUATION CALCULATION DISCHARGE RATE 5 L/s			
Date 15/09/2022			Designed by EB			
File 21031 - TANK - 5 LPS.SRCX			Checked by EB			
Innovyze			Source Control 2020.1			
Summary of Results for 100 year Return Period (+40%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	
15 min Summer	45.876	0.776	5.0	4.7	O K	
30 min Summer	46.031	0.931	5.0	5.6	O K	
60 min Summer	45.996	0.896	5.0	5.4	O K	
120 min Summer	45.781	0.681	5.0	4.1	O K	
180 min Summer	45.481	0.381	5.0	2.3	O K	
240 min Summer	45.296	0.196	5.0	1.2	O K	
360 min Summer	45.142	0.042	4.5	0.2	O K	
480 min Summer	45.108	0.008	3.8	0.0	O K	
600 min Summer	45.100	0.000	3.3	0.0	O K	
720 min Summer	45.100	0.000	2.9	0.0	O K	
960 min Summer	45.100	0.000	2.3	0.0	O K	
1440 min Summer	45.100	0.000	1.7	0.0	O K	
2160 min Summer	45.100	0.000	1.2	0.0	O K	
2880 min Summer	45.100	0.000	1.0	0.0	O K	
4320 min Summer	45.100	0.000	0.7	0.0	O K	
5760 min Summer	45.100	0.000	0.6	0.0	O K	
7200 min Summer	45.100	0.000	0.5	0.0	O K	
8640 min Summer	45.100	0.000	0.4	0.0	O K	
10080 min Summer	45.100	0.000	0.4	0.0	O K	
15 min Winter	45.858	0.758	5.0	4.5	O K	
30 min Winter	46.004	0.904	5.0	5.4	O K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
15 min Summer	118.382	0.0	9.5	20		
30 min Summer	79.333	0.0	12.6	29		
60 min Summer	50.812	0.0	16.2	46		
120 min Summer	31.498	0.0	20.3	78		
180 min Summer	23.499	0.0	22.5	108		
240 min Summer	18.972	0.0	24.3	134		
360 min Summer	13.913	0.0	26.7	190		
480 min Summer	11.171	0.0	28.6	248		
600 min Summer	9.415	0.0	30.1	0		
720 min Summer	8.183	0.0	31.4	0		
960 min Summer	6.552	0.0	33.5	0		
1440 min Summer	4.782	0.0	36.7	0		
2160 min Summer	3.483	0.0	40.1	0		
2880 min Summer	2.778	0.0	42.7	0		
4320 min Summer	2.016	0.0	46.5	0		
5760 min Summer	1.604	0.0	49.3	0		
7200 min Summer	1.343	0.0	51.6	0		
8640 min Summer	1.160	0.0	53.5	0		
10080 min Summer	1.025	0.0	55.1	0		
15 min Winter	118.382	0.0	9.5	20		
30 min Winter	79.333	0.0	12.6	30		
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Shear Design Ltd					Page 2
7 Ashtree Court Woodsy Close Cardiff Gate Business Park		BANKSIDE HILTON MOTO ATTENUATION CALCULATION DISCHARGE RATE 5 L/s			
Date 15/09/2022 File 21031 - TANK - 5 LPS.SRCX		Designed by EB Checked by EB			
Innovyze		Source Control 2020.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	45.898	0.798	5.0	4.8	O K
120 min Winter	45.450	0.350	5.0	2.1	O K
180 min Winter	45.198	0.098	4.8	0.6	O K
240 min Winter	45.120	0.020	4.2	0.1	O K
360 min Winter	45.100	0.000	3.1	0.0	O K
480 min Winter	45.100	0.000	2.5	0.0	O K
600 min Winter	45.100	0.000	2.1	0.0	O K
720 min Winter	45.100	0.000	1.8	0.0	O K
960 min Winter	45.100	0.000	1.5	0.0	O K
1440 min Winter	45.100	0.000	1.1	0.0	O K
2160 min Winter	45.100	0.000	0.8	0.0	O K
2880 min Winter	45.100	0.000	0.6	0.0	O K
4320 min Winter	45.100	0.000	0.5	0.0	O K
5760 min Winter	45.100	0.000	0.4	0.0	O K
7200 min Winter	45.100	0.000	0.3	0.0	O K
8640 min Winter	45.100	0.000	0.3	0.0	O K
10080 min Winter	45.100	0.000	0.2	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	50.812	0.0	16.3	48	
120 min Winter	31.498	0.0	20.3	78	
180 min Winter	23.499	0.0	22.5	104	
240 min Winter	18.972	0.0	24.3	128	
360 min Winter	13.913	0.0	26.7	0	
480 min Winter	11.171	0.0	28.6	0	
600 min Winter	9.415	0.0	30.1	0	
720 min Winter	8.183	0.0	31.4	0	
960 min Winter	6.552	0.0	33.5	0	
1440 min Winter	4.782	0.0	36.7	0	
2160 min Winter	3.483	0.0	40.1	0	
2880 min Winter	2.778	0.0	42.7	0	
4320 min Winter	2.016	0.0	46.5	0	
5760 min Winter	1.604	0.0	49.3	0	
7200 min Winter	1.343	0.0	51.6	0	
8640 min Winter	1.160	0.0	53.5	0	
10080 min Winter	1.025	0.0	55.1	0	
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Shear Design Ltd		Page 3																																																
7 Ashtree Court Woodsy Close Cardiff Gate Business Park	BANKSIDE HILTON MOTO ATTENUATION CALCULATION DISCHARGE RATE 5 L/s																																																	
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<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>1.000</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>1.000</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.000</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.358</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.032 <table> <thead> <tr> <th>Time (mins)</th> <th>Area</th> <th>Time (mins)</th> <th>Area</th> <th>Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>From:</th> <th>To:</th> <th>From:</th> <th>To:</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4</td> <td>4</td> <td>8</td> <td>8</td> <td>12</td> </tr> <tr> <td></td> <td>0.011</td> <td></td> <td>0.011</td> <td></td> <td>0.010</td> </tr> </tbody> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	1.000	Region	England and Wales	Cv (Winter)	1.000	M5-60 (mm)	18.000	Shortest Storm (mins)	15	Ratio R	0.358	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	From:	To:	From:	To:	From:	To:	0	4	4	8	8	12		0.011		0.011		0.010
Rainfall Model	FSR	Winter Storms	Yes																																															
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7 Ashtree Court Woodsy Close Cardiff Gate Business Park	BANKSIDE HILTON MOTO ATTENUATION CALCULATION DISCHARGE RATE 5 L/s	
Date 15/09/2022 File 21031 - TANK - 5 LPS.SRCX	Designed by EB Checked by EB	
Innovyze Source Control 2020.1		

Model Details

Storage is Online Cover Level (m) 46.600

Tank or Pond Structure

Invert Level (m) 45.100

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	6.0	1.000	6.0	1.001	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0104-5000-1100-5000
Design Head (m)	1.100
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	104
Invert Level (m)	45.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	5.0
Flush-Flo™	0.323	5.0
Kick-Flo®	0.690	4.0
Mean Flow over Head Range	-	4.4

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)
0.100	3.5	1.200	5.2	3.000	8.0	7.000	12.0
0.200	4.8	1.400	5.6	3.500	8.6	7.500	12.4
0.300	5.0	1.600	6.0	4.000	9.2	8.000	12.7
0.400	5.0	1.800	6.3	4.500	9.7	8.500	13.1
0.500	4.8	2.000	6.6	5.000	10.2	9.000	13.5
0.600	4.6	2.200	6.9	5.500	10.7	9.500	13.8
0.800	4.3	2.400	7.2	6.000	11.1		
1.000	4.8	2.600	7.5	6.500	11.5		

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APPENDIX H

PERSONAL FLOOD PLAN AND BUSINESS FLOOD PLAN TEMPLATES

Personal flood plan

Name



Are you signed up to receive flood warnings?

If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

☐

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188**. This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?



Put important documents out of flood risk and protect in polythene

☐

Look at the best way of stopping floodwater entering your property

☐

Find out where you can get sandbags

☐

Identify what you would need to take with you if you had to leave your home

☐

Check your insurance covers you for flooding

☐

Make a flood plan and prepare a flood kit

☐

Identify who can help you/ who you can help

☐

Understand the flood warning codes

☐

What can you do if a flood is expected in your area?

Actions	Location
Home	
• Move furniture and electrical items to safety	
• Put flood boards, polythene and sandbags in place	
• Make a list now of what you can move away from the risk	
• Turn off electricity, water and gas supplies	
• Roll up carpets and rugs	
• Unless you have time to remove them hang curtains over rods	
• Move sentimental items to safety	
• Put important documents in polythene bags and move to safety	
Garden and outside	
• Move your car out of the flood risk area	
• Move any large or loose items or weigh them down	
Business	
• Move important documents, computers and stock	
• Alert staff and request their help	
• Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance	
• Inform your family or friends that you may need to leave your home	
• Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at www.bluepages.org.uk

Be prepared for flooding. Act now



Environment
Agency

would your business stay afloat?

A guide to preparing your
business for flooding



Flooding is the most common and widespread natural disaster in the UK. Since 1998 there has been at least one serious flood every year. Businesses like yours are more likely to be flooded than destroyed by fire. As our climate changes we can expect to see more extreme weather – and more floods.

We aim to reduce the likelihood of flooding by managing land, rivers, coastal systems and flood defences. While we do everything we can to reduce the chance of flooding, it is a natural process and can never be completely eliminated.

By taking action to prepare in advance for flooding, most businesses can save between 20 and 90 per cent on the cost of lost stock and movable equipment, as well as some of the trouble and stress that goes with such an event.

This is a simple guide to some of the easy actions that you can take to make sure that your business is as well prepared as possible.

It tells you about how to find out if your business is at risk, our flood warning service and what our flood warning codes mean. It also has a simple template to use to design a flood plan for your company.

For more information about flooding, visit our website at **www.gov.uk/flood** or call Floodline on **0345 988 1188**.

Make sure that your business is prepared for flooding.

How do I find out if my business is at risk from flooding?

There are two quick and easy ways for you to find out if you're at risk.

call us on
0345 988 1188

Our Floodline service is open 24 hours, calls are charged at local rate. By taking your postcode, our operators will check and see if your business is in a flood risk area.

Look at our website
www.gov.uk/flood

You need to be aware of flooding and keep an eye on the water levels and weather situation at all times. You can do this by checking the flood forecasts and the river and sea levels on our website.

Our online flood map uses the latest technology and data gathered over many years to give the most accurate view of flooding in your area.

By entering your postcode you can find out if your business is at risk. Areas at risk from flooding are shown in dark blue and areas at risk from extreme flooding in light blue.

My business is at risk from flooding. What should I do now?

Start preparing now. If the weather conditions are right, flooding can happen at any time.

Remember, floods can happen at any time and any day – make sure you provide a number that can be contacted at all times – even out of working hours.

Sign up for flood warnings.

The first thing you should do is find out if you can receive flood warnings. In areas of high flood risk, we offer a service called Floodline Warnings Direct. This is a free, 24 hour service that sends automated flood warnings by telephone, SMS text, email, fax or pager.

To find out if you can receive this service, call Floodline on 0345 988 1188.

If your business isn't in an area covered by our warnings you can still check the latest flood warnings in force on our website.

When the situation is serious, flood warnings will also be broadcast on local television and radio news.

What practical steps can I take to protect my business?

Now that you've checked your risk and found out about flood warnings, it's time to start thinking about preparing a flood plan specifically for your business.

Taking simple steps can go a long way to protecting your business from flooding. Preparing a flood plan could:

- Significantly reduce financial losses, damage to property and business interruption;
- Help compliance with regulatory requirements (for example, Occupier's Liability Act 1984);
- Reduce exposure to civil or criminal liability;
- Enhance your company's image and credibility with employees, customers, suppliers and the community;
- Help fulfil your moral responsibility to protect employees, the community and the environment;
- Help you to obtain insurance cover.

What is a flood plan?

Just as many businesses have health and safety policies and contingency plans for an emergency, they should also have flood plans.

A flood plan is a written document that outlines how your business will respond to a flood.

This might include a list of steps you will take in case of a flood and the order you will take them in. It could also include the purchase of flood products and insurance.

A written plan can make information **easy** to access during a flood, **easy** to communicate to staff, and **easy** to remember.

Small businesses should make sure there is a plan of action in case of flooding. As the business owner, this may be your responsibility.

If your business is **medium sized**, flood preparation might be the responsibility of a team of people from different areas of the business.

If your business decides to have a flood planning team, this could be led by the business owner or Managing Director.

The leader of the flood planning team will need to let staff know about the plan once it is finished.

All members of the team should also keep a copy of important flood contacts at home for easy access.

Key areas to consider in your flood plan are:

- human resources;
- maintenance/facilities;
- finance and purchasing.

Once you have completed your plan don't forget about it. Look at it regularly and make sure it is up to date and in the event of a flood **use it**.



business flood plan



A written flood plan is recommended for businesses.

It should include:

- A list of important contacts, including Floodline, building services, suppliers and evacuation contacts for staff;
- A description or map showing locations of key property, protective materials and service shut-off points;
- Basic strategies for protecting property, preventing business disruption and assisting recovery;
- Checklists of procedures that can be quickly accessed by staff during a flood.

If a flood is imminent, your main priority is to make sure that your staff are safe. However there may be other actions that you can take to prepare your building and it's contents to minimise damage and post-flood repair and restoration costs.

Business flood plan

Flood plan for _____ dated _____

Registered address _____

Postcode _____

Staff contact list

Name	Address	Telephone/mobile	Emergency contact	Emergency telephone and address

Note staff who may require assistance in the event of a flood.

Name	Office location

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Answer the following if applicable

	Description of location	How to protect from a flood (for example, move, cover, tie down)
First Aid Kit		
Oil based products (gasoline, oil, cooking oil etc.)		
Chemicals (including cleaning products)		

Protective actions

Identify stock, equipment and possessions that may need special protective measures, and describe the actions you will take to prevent damage in the event of a flood. We have suggested items and ways to protect them, but make sure you follow through on your plans.

think about:

- Computers;
- Tables / heavy furniture;
- Vehicles;
- Paper files;
- Electrical items;
- Chairs / stools;
- Databases;
- Soft furnishings;
- Computer files;
- Staff files.

ways to protect items

- Make a copy of important documentation and store in safe location;
- Raise items above ground level;
- Buy flood protection products;
- Buy new flood-resistant items;
- Move items to a safer location if possible – to an upper level of the building or off site.

Valuable item	Protective action	New location (if applicable)	Done
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐

Suggested basic building materials to help protect your property

If materials are not needed, leave the relevant section blank

Materials	Used for	Items to protect / where to use	Storage location	Done
Sand and sand bags (unfilled), shovel	Creating flood barriers (used with plastic sheeting)			☐
Tools – hammer, nails, saw	Boarding up doors, windows and openings, creating shelves			☐
Wood – plywood, blocks of wood	Boarding up doors, windows and openings, creating shelves			☐
Sturdy plastic sheeting	Sandbag barriers, pulling up around furniture and appliances			☐
Strong plastic bags	Putting around legs of tables and chairs			☐
Pallets	Raising stored stock above flood level			☐
Emergency power generator	Maintaining function of air conditioning units (can help dry out a building), running fridges and freezers, medical equipment if appropriate			☐

Identify people who can help you before, during and after a flood, and what they can do.

We have suggested ways they might be able to help, but you'll need to discuss this with them.

Name	Address	Telephone day	Telephone evening	Mobile

Ways people can help

- assistance with installing flood products;
- assistance with transporting stock/materials to new location if possible;
- provision of emergency storage;
- provision of emergency supplies or medical support if required.

discussion guide

This discussion guide sums up the key areas of flood planning. Some of this information can be found in this pack to help get you started.



Research

- Look at your existing business policies, and think about whether they are appropriate in the event of a flood.

Staff

- Make a list of **employees' contact details in the event of an evacuation**. This might include mobile telephone numbers, or numbers for their home or the home of a friend or relative;
- Think about staff who **may need special assistance** in the event of a flood (for example, elderly, deaf, blind etc.)

Security procedures

- **Locking windows, doors and setting the alarm**. You might need more than one person to help do this;
- Insurance policies – **Are you insured for flood damage**, business interruption and lost revenue?
- Employee manuals – You might **add flood safety to staff information packs**, or adapt job descriptions to include flood warden duties;
- Hazardous materials plan – You must ensure that **chemicals, oils and other substances in your possession are kept safe** and do not contaminate flood water;
- Health and safety assessment – Plan to **check the functioning of flood products and flood warning systems regularly**, just as you do for fire safety equipment.

Check codes and regulations that might apply to your business in the event of a flood. The following could provide guidance on the right actions to take:

- Occupational health and safety regulations;
- Environmental regulations.



Important contacts

Make a list of important telephone numbers, including contacts for gas, electricity, water and telephone providers.

Key locations

- **Know the location** of cut-off points for gas, electricity and water. Ideally, these should be marked on a map that is stored with your flood plan;
- Know the location of chemicals, oils or other materials that could be dangerous or contaminate flood water. These should be stored safe from floods and other damage.

Protective actions

- Note key stock, equipment and possessions that may need special protection from flood water;
- Consider things you may need during or after a flood (for example, sandbags, plastic sheeting, loudspeaker);
- See if it's **possible to move key operations**, such as shipping or customer services, to another building.

Suppliers and external links

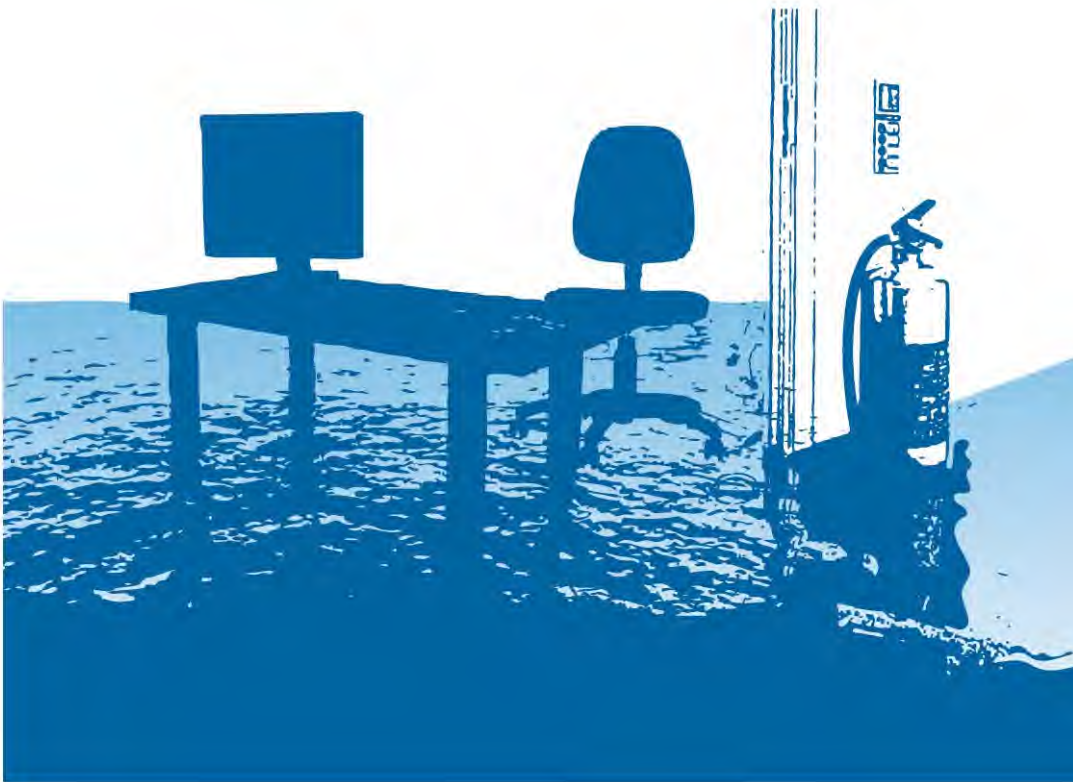
- Identify products and services you won't need in the event of a flood, or which suppliers may not be able to provide. **Make back-up plans** or arrangements for short-notice cancellation of deliveries;
- Consider contracting in advance with companies whose help you may need after a flood.

business checklist

Are you prepared for flooding?

If you answer no to any of the questions overleaf, there may be more you can do to protect your business.

The individual sections will give you valuable information on effective actions you can take to prepare for a flood.



If you can answer yes, please ☒, otherwise leave blank for no.

Know if you're at risk

- ☐ Do you know if you're at risk of flooding?
- ☐ Are flood warnings available in your area?
- ☐ Do you know how you can receive flood warnings?

Preparing a flood plan

- ☐ Do you know how your business will respond to a flood?
- ☐ Do you have a list of useful numbers including Floodline, local authority and insurance company?
- ☐ Do you know how to shut off your gas/electric/water supplies?
- ☐ Are your stock, fittings and valuable equipment stored above flood level?
- ☐ Have you developed flood contingency plans with suppliers and/or clients?
- ☐ Can you call someone to help you in the event of a flood?

Staff training and evacuation

- ☐ Are you aware of correct flood safety procedures for you and your staff?
- ☐ Have you trained your staff on flood safety procedures?
- ☐ Can your staff work quickly and efficiently to protect your business in the event of a flood?

Protecting your property

- ☐ Have you installed flood protection products?
- ☐ Do you have a stockpile of useful materials including plywood, plastic sheeting, sandbags (unfilled), sand, nails, hammer, shovel, blocks of wood and a saw?
- ☐ Have you installed non return valves in your toilets and drains?
- ☐ Do you and your staff have high ground where you can park your cars?
- ☐ Are your electrical sockets above flood level?
- ☐ Do you have computer equipment in the basement?

Flood insurance

- ☐ Do you have sufficient insurance cover in the event of a flood situation?
- ☐ Do you know what information your insurer will require to support a claim?

Evacuation

- ☐ Do you have an easy way to let your staff know about an evacuation?
- ☐ Do you know which roads will stay open in your area during a flood?
- ☐ Have you identified where staff can shelter in the event of a flood?
- ☐ Could you control staff panic during a flood?

understand your flood warning codes

Our warning service has three types of warnings - Flood Alert, Flood Warning and Severe Flood Warning - that will help you prepare for flooding and take necessary actions.

ONLINE FLOOD RISK FORECAST

What it means

Be aware.
Keep an eye on the weather situation.

When it's used

Forecasts of flooding on the Environment Agency website are updated at least once a day.

What to do

- Check weather conditions.
- Check for updated flood forecasts on our website.



FLOOD ALERT

What it means

Flooding is possible.
Be prepared.

When it's used

Two hours to two days in advance of flooding.

What to do

- Be prepared to act on your flood plan.
 - Prepare a flood kit of essential items.
 - Monitor local water levels and the flood forecast on our website.
-



FLOOD WARNING

What it means

Flooding is expected.
Immediate action required.

When it's used

Half an hour to one day
in advance of flooding.

What to do

- Move staff, stock and valuables to a safe place.
 - Turn off gas, electricity and water supplies if safe to do so.
 - Put flood protection equipment in place.
-



SEVERE FLOOD WARNING

What it means

Severe flooding.
Danger to life.

When it's used

When flooding poses a
significant risk to life.

What to do

- Stay in a safe place with means of escape.
 - Be ready should you need to evacuate.
 - Co-operate with the emergency services.
 - Call 999 if you are in immediate danger.
-

WARNING NO LONGER IN FORCE

What it means

No further flooding is
currently expected in
you area.

When it's used

When river or sea
conditions begin to
return to normal.

What to do

- Be careful. Flood water may still be around for several days.
 - If you've been flooded, ring your insurance company as soon as possible.
-

useful contacts

Fill in the contact details you may need if your business floods.
Keep it in a safe place, where you can hold of it quickly.

	Company name	Telephone number/s
Environment Agency Floodline		0345 988 1188
Electricity supplier and meter number		
Gas supplier and meter number		
Water supplier and meter number		
Telephone provider		
Local authority emergency services		
Insurance company 24-hour number and policy number		
Insurance agent		
Local radio station for news alerts and weather updates		
Companies that may be able to help you after a flood		
Electrician		
Plumber		
Builder		
Equipment repair/suppliers		
Security services		
Water pumping services		
Emergency power suppliers		

**Would you like to find out more about us,
or about your environment?**

Then call us on

08708 506 506* (Mon-Fri 8-6)

email

enquiries@environment-agency.gov.uk

or visit our website

www.gov.uk/environment-agency

incident hotline 0800 80 70 60 (24hrs)

floodline 0345 988 1188 (24hrs)

*** Weekday Daytime calls cost 8p plus up to 6p/min from BT Weekend Unlimited. Mobile and other providers' charges may vary.**



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APPENDIX I

GREENFIELD & BROWNFIELD RUNOFF RATE ESTIMATION

Shear Design Ltd		Page 1
7 Ashtree Court Woodsy Close Cardiff Gate Business Park		
Date 15/09/2022 10:50 File	Designed by Edward.Baczynski Checked by	
Innovyze		Source Control 2020.1
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.450 Area (ha) 0.035 Urban 0.200 SAAR (mm) 868 Region Number Region 10 Results l/s QBAR Rural 0.2 QBAR Urban 0.3 Q100 years 0.5 Q1 year 0.2 Q30 years 0.4 Q100 years 0.5		
©1982-2020 Innovyze		

COMMENTS:

UK Variable Runoff Model

This calculation is the Variable UK Runoff Model, to calculate the expected Brownfield runoff percentage for the proposed site at Ancoats Street, Manchester.

$$PR = IF \times PIMP + (100 - IF \times PIMP) \times \frac{NAPI}{PF}$$

Where:

- PR = Percentage runoff
- IF = Effective paved area factor
 - o (Taken as 0.60 – “Fair” surface condition as per table 24.3 CIRIA SuDS Manual p.522)
- PIMP = Percentage permeability
 - o $\frac{\text{Existing Impermeable Area}}{\text{Total Site Area}} = \frac{0.008}{0.032} = 25.00\%$
- PF = Soil moisture depth
 - o Taken as 200mm (p.522 CIRIA)
- NAPI = 30-day antecedent precipitation index (API) (depends on soil type).
 - o Soil types 3 & 4 – between 10-25mm (p.522 CIRIA SuDS Manual).
 - Taken as 15mm.

Therefore:

$$PR (\%) = (0.60 \times 25.00) + (100 - (0.75 \times 35.22)) \times \frac{15}{200}$$

$$PR = 21.09\%$$

Brownfield Runoff Rates

This calculation will use the Wallingford Rational method, combined with the UK Variable Runoff Model to calculate the existing Brownfield runoff rates.

$$Q = 2.78CiA$$

Where:

- Q = Brownfield runoff rate.
- C = Co-efficient of impermeability (taken from UK Variable Runoff Model)
 - o 21.09%
- i = Rainfall intensity
 - o 50 mm/hr
- A = Site Area
 - o 0.032 ha.

Therefore:

$$Q = 2.78 \times 21.09\% \times 50 \times 0.032$$

$$Q = 0.938 \text{ L/s}$$

This flow estimate is very low and any flow control device subject to such a small restriction would be liable to maintenance issues such as blockages. Therefore, it is proposed to use a proposed site discharge rate of 5 L/s.

APPENDIX J

CORRESPONDENCE WITH LEAD LOCAL FLOOD AUTHORITY

From: [Flood Risk Management](#)
To: [Edward Baczynski](#)
Subject: RE: 21031 - Ancoats Street
Date: 22 September 2022 10:45:11
Attachments: [Manchester City Council - SuDS Requirement for Developers 2019.pdf](#)

Good Morning,

Thanks for the email.

The below approach in principle appears to be appropriate, however as part of the planning submission we would expect to see a comparison between existing and proposed discharge rates (including calculations).

I have attached a copy of the MCC SuDS requirements for developers, which should be reviewed prior to producing a proposed drainage strategy for the site.

Kind Regards,

Oliver

Oliver Timmins

Highways
Growth and Neighbourhoods Directorate
Manchester City Council
PO Box 532 Town Hall
Manchester
M60 2LA

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

From: Edward Baczynski <Edward@shear-design.com>
Sent: 12 September 2022 11:37
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Cc: Tony Spencer <Tony@shear-design.com>; Darren Badham <Darren@shear-design.com>; Dameon Kilgour <Dameon@shear-design.com>
Subject: 21031 - Ancoats Street

You don't often get email from edward@shear-design.com. [Learn why this is important](#)

Good morning,

We would like to enquire about the policy on greenfield/brownfield runoff rates for our proposed site at Ancoats Street, Manchester. The site address is: Great Ancoats Street, Manchester, M4 6DE, the site is approximately 320m². I have attached a copy of the site location plan for your reference.

The site is within the Conurbation Core Critical Drainage Area. In the first instance, I would like to confirm an acceptable runoff rate for this development. Looking at the SFRA for Manchester, the aim is to deliver greenfield runoff rates up to the 1 in 100-year storm, which we currently

estimate at approximately 0.5 L/s. Or a reduction in Brownfield runoff rates of 50%. We feel that the 0.5 L/s could be too low and result in blockages; we have had other sites in Manchester where a rate of 5 L/s was agreed and I would like to know if this would be acceptable instead?

If you need any other information to make a determination in this matter or need to refer us to another department then please let us know as soon as possible.

Kind regards

Ed Baczynski
Graduate Civil Engineer
Shear Design Ltd
7 Ashtree Court | Woodsy Close
Cardiff Gate Business Park
Cardiff | CF23 8RW
T: +44 (0)29 2054 7000

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