

Knott Mill Townhouses, Manchester

Flood Risk Assessment



boothking

Doc. Ref.	15606-BKP-ZZ-XX-RP-C-0001	Client	Meadway Developments Ltd
Project Number	15606	Current Revision	P01

Rev.	Prepared by	Checked by	Approved by	Stage	Status	Date	Rev description
P01	EZ	RS	AM	2	S4	11.08.2025	First Issue

This document uses revision codes in accordance with ISO EN 19650:

P##: Preliminary (non-contractual) - review, comment or approval.

C##: Contractual - Approved for stage completion.

This document uses status codes in accordance with ISO EN 19650:

Work in progress

S0: WIP

Shared (non-contractual)

S1: Coordination

S2: Information

S3: Review

S4 & S5: Approval

Published (contractual)

A1, An, etc. (where "n" relates to the project stage)

This document uses project stages in accordance with the IStructE Structural Plan of Work 2020:

2: Concept

3: Coordination

4: Technical Design

4.5 Production Design

5: Construction

6: Handover

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1. Introduction & Scope

1.1. Introduction

Booth King Partnership Ltd. (BKP) were commissioned by Meadway Developments to carry out Flood Risk Assessment (FRA) complement the planning application for the erection of 8no. dwellings (Use Class C3) at Commercial St, Greater, Manchester M15 4PZ.

This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), Flood Risk and Coastal Change (www.gov.uk/guidance/flood-risk-and-coastal-change) and Planning Practice Guidance, as well as Environment Agency (EA) Guidance and the local Strategic Flood Risk Assessment (SFRA) Level 1. A full list of documents used to inform this report is shown in the Reference section.

Although the site has an area of less than 1 hectare, it lies within predominantly in Flood Zone 3 according to EA's "Product 4" and a small part of the overall site that includes lies within Flood Zone 2 according to the EA Flood Map therefore an FRA is compulsory in accordance with the NPPF. The proposed development should not increase the risk of flooding elsewhere and this FRA has therefore been prepared to demonstrate that this has been achieved. Consideration has also been given to BREEAM accreditation, including the requirements of Pol 03, the risk of pollution to controlled waters and the site conditions prior to, during and after development.

This report aims to identify and assess the risks of all forms of flooding to and from the site and demonstrate how these flood risks will be managed, taking climate change into account. The Flood Risk Assessment also considers the management of surface water run-off and outlines the proposed drainage strategy.

This report is based on information obtained from the recently undertaken site topographical and buried utilities survey, and drainage record plans.

1.2. Scope

Our client Meadway Developments has requested Booth-King Partnership Ltd. to undertake a flood risk assessment and a drainage design scheme for the purposes of planning permission from Manchester City Council for the erection of 8no. townhouses, shown in Figure 1.

2. Existing Site

2.1. Location

The site is located in the Deansgate area of central Manchester. It is bounded by Commercial Street to the southwest, by Constance Street to the east and by a commercial property to the north. It is situated 35m east to River Medlock, emphasising the need for a comprehensive flood risk and drainage strategy. The proposed development being 0.044ha and it is located at Ordnance Survey Grid Reference E: 383433, N: 397435.

A Site Location Plan can be found in Appendix A.

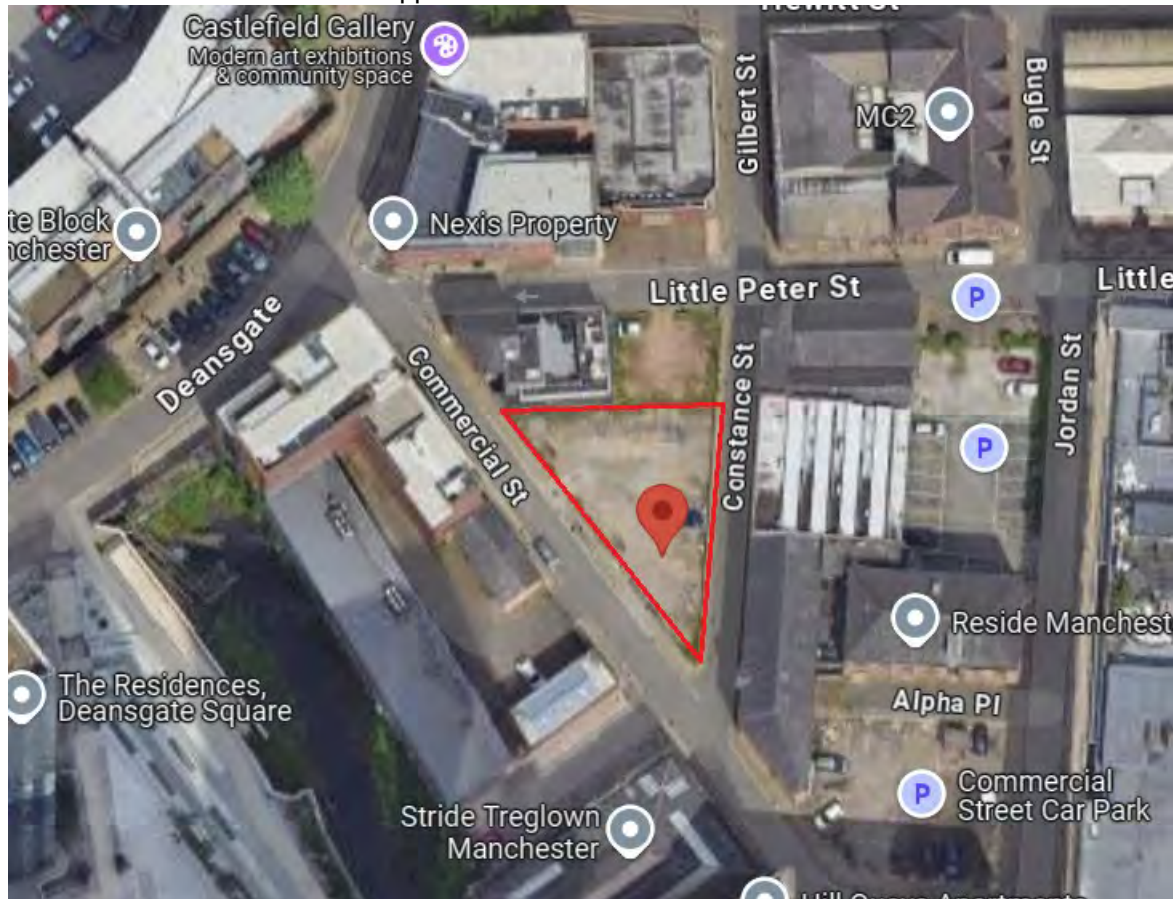


Figure 1. Existing Site

2.2. Site Levels

A topographic survey of the site Topographic levels across the site range between 28.31mAOD and 29.05mAOD, with the site sloping generally down from northeast to the south and southwest.

The topographical survey is presented Appendix B.

2.3. Existing Drainage

According to UU records, the nearest public combined sewer is located southeast of the site, at the junction of Commercial Street and Jordan Street. It begins as a 750mm vitrified clay (VC) pipe, which then reduces to 225mm VC.

Additionally, a 300mm VC combined sewer running east along Little Peter Street, north of the site, transitions into a 150mm VC pipe. This pipe terminates at UU Asset 6402, where it connects to a 2800mm brick (BR) combined sewer.

Further information is required to determine any points of discharge to the public sewer network.

Refer to Appendix B for United Utilities Asset Map.

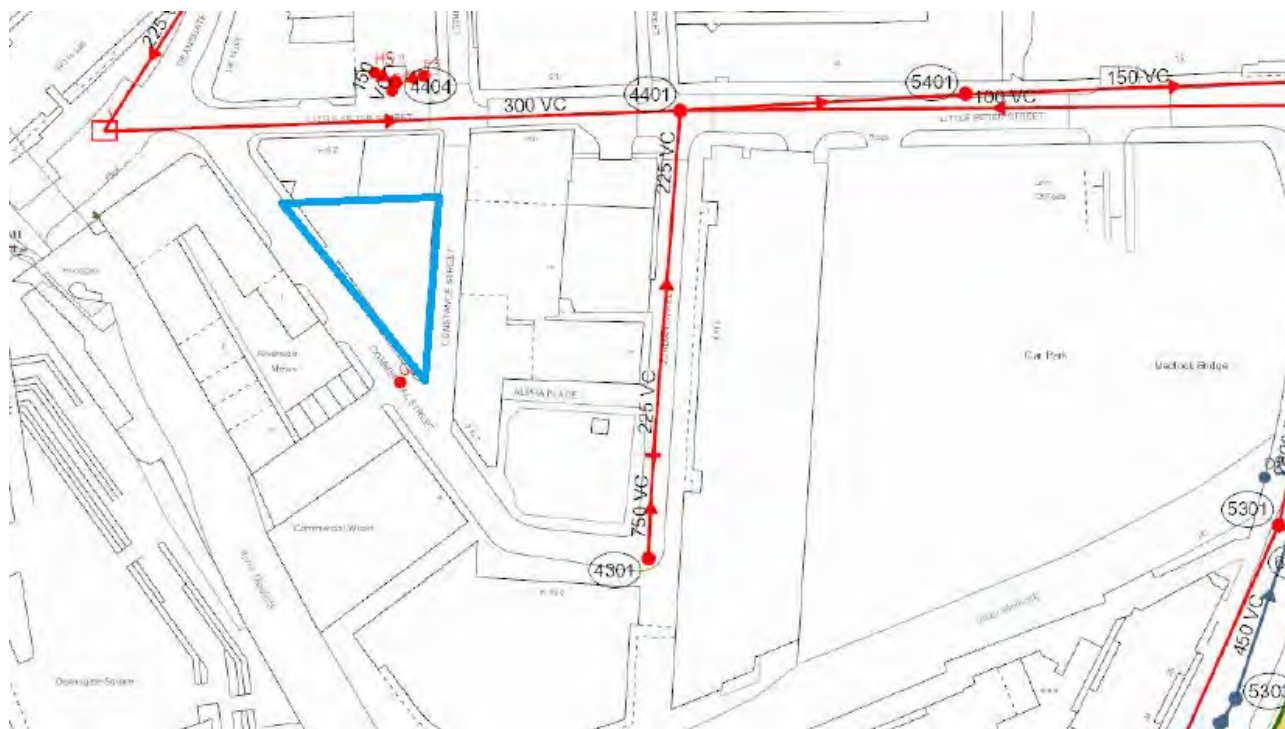


Figure 2. United Utilities Asset Maps Extract

2.4. Geology

Phase 2 Site Investigation was conducted in April 2021 by Land Consultancy Limited (TLC) (document reference No: TLC1143 issued June 2021) and states the following:

- **Made Ground:** Made Ground was encountered at depths of 0.50–0.60m in EMS boreholes, 1.60–>1.85m in TLC trial pits, and 1.60–2.00m in TLC windowless sample boreholes. It consisted of reworked gravelly sand or gravelly clay with inclusions such as ash, cinders, sandstone, coal, and occasional polythene, rusted metal, timber, slag, and pottery. Tarmac was present at the surface or shallow depths in all trial pits and WS3–WS5 boreholes.
- **Natural Superficial Strata:**
 1. Clay Layer: A soft to firm, sandy CLAY of very low to low strength was found beneath the Made Ground at depths between 1.60m and 2.00m bgl. The upper part of this layer, logged as clayey SAND in EMS records, was intermixed with Made Ground, suggesting it is reworked material. This explains discrepancies in Made Ground depths between EMS and TLC surveys. The CLAY was encountered at all locations with Made Ground, except TP4 (eastern boundary). The CLAY extended to depths of >1.80m to 2.70m.
 2. Granular Strata: SAND followed by SAND and GRAVEL: EMS boreholes: to depths of 4.00–4.2m. TLC logs: to > 3.55m–4.25m. A SILT layer was found only in WS" between 2.70–3.10m. Boreholes WS3 and WS4 refused in gravelly SAND at depths of 4.27m and 4.01m, respectively.
- **Sandstone Bedrock:** EMS boreholes encountered SANDSTONE bedrock beneath the superficial deposits, proven to depths of 4.50–4.95m bgl. TLC boreholes recorded weathered SANDSTONE in: WS1:

3.65→3.90m, WS2: 3.55→3.71m, WS5: 4.25→4.33m. The sandstone was described as dark reddish brown, slightly silty SAND. It is interpreted to belong to the Chester Pebble Bed Sandstone Formation.

Groundwater was not encountered within any of the sampling locations. However, as boring operations required the use of water, it is possible that small groundwater strikes/seepages may have been masked.

All boreholes were recorded as being dry during the gas and groundwater level monitoring visits which were carried out between 5th May 2021 and 18th June 2021.

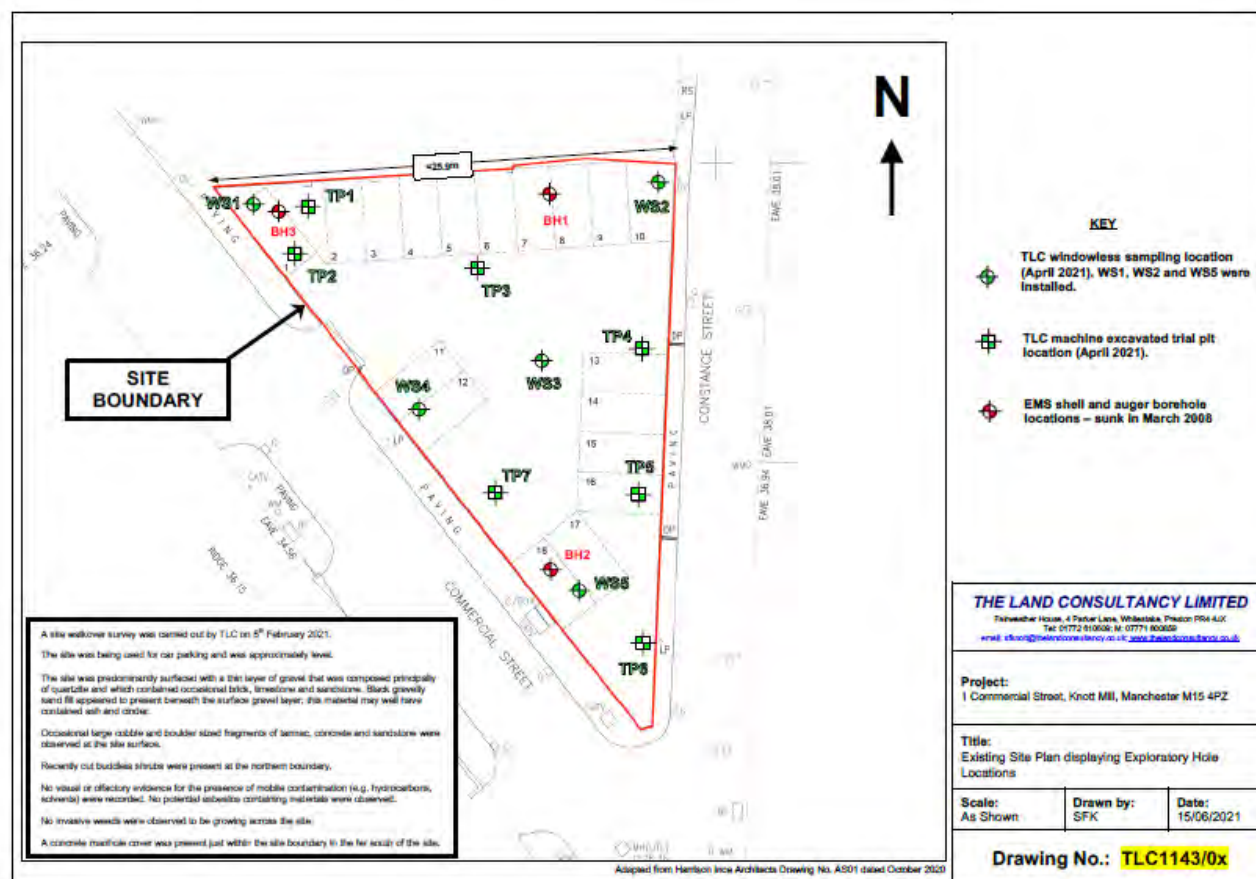


Figure 3. Extract from TLC1143 Phase 2 Site Investigation by TLC

Phase 2 Site Investigation was conducted in April 2021 by Land Consultancy Limited (TLC) (document reference No: TLC1143 issued June 2021) can be provided upon request. Extract of the report can be found in Appendix C.

2.5. Hydrology

The are 2no. surface water features are recorded within 250m of the surrounding area of the site, Rochdale Canal Tow Path & Liverpool Canal 115m N and River Medlock 35m W.

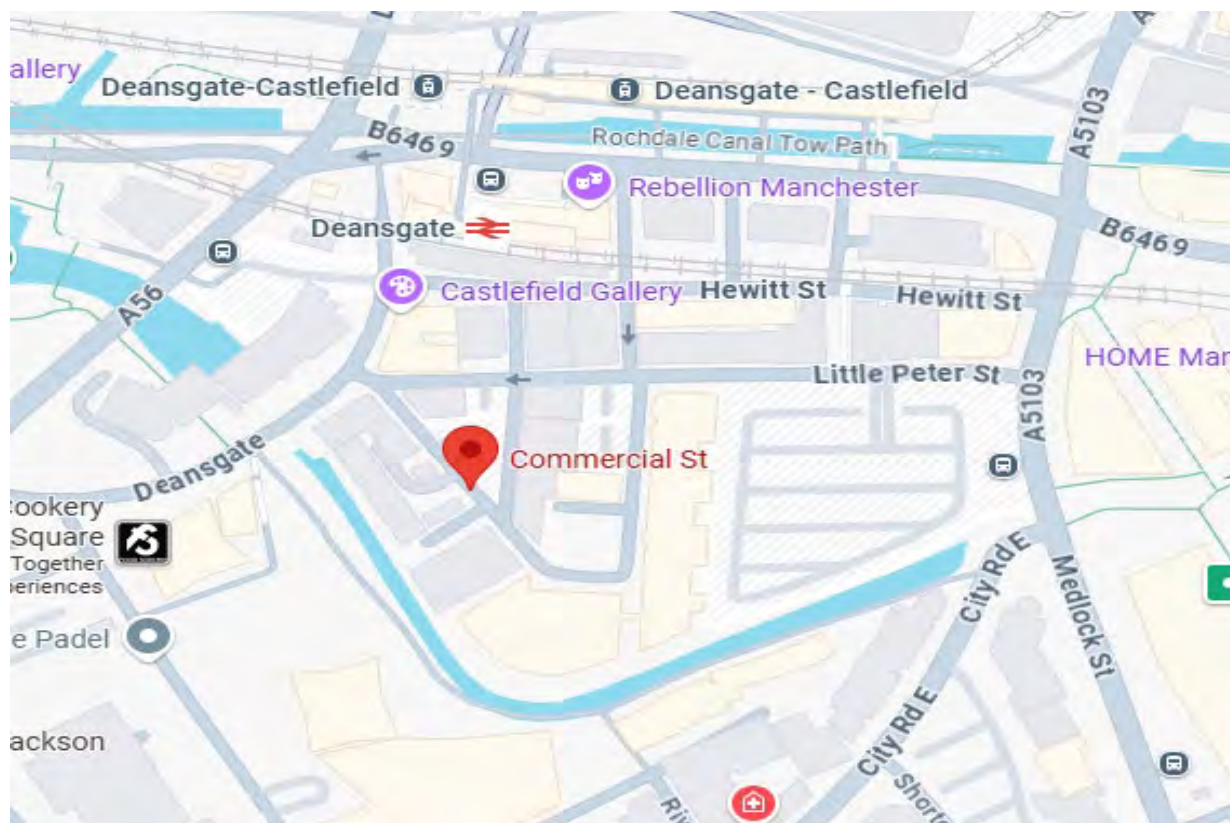


Figure 4. Google Map

2.6. Source Protection Zone

The site lies outside Source Protection Zones.



Figure 5. Magicmap Extract

The site is not located within a Special Area of Conservation (SAC) or Special Protection Area (SPA).

3. Flood risk

The Environment Agency Product 4 Maps indicate that the site lies within Flood Zone 3. The flooding is associated with flooding River Medlock.

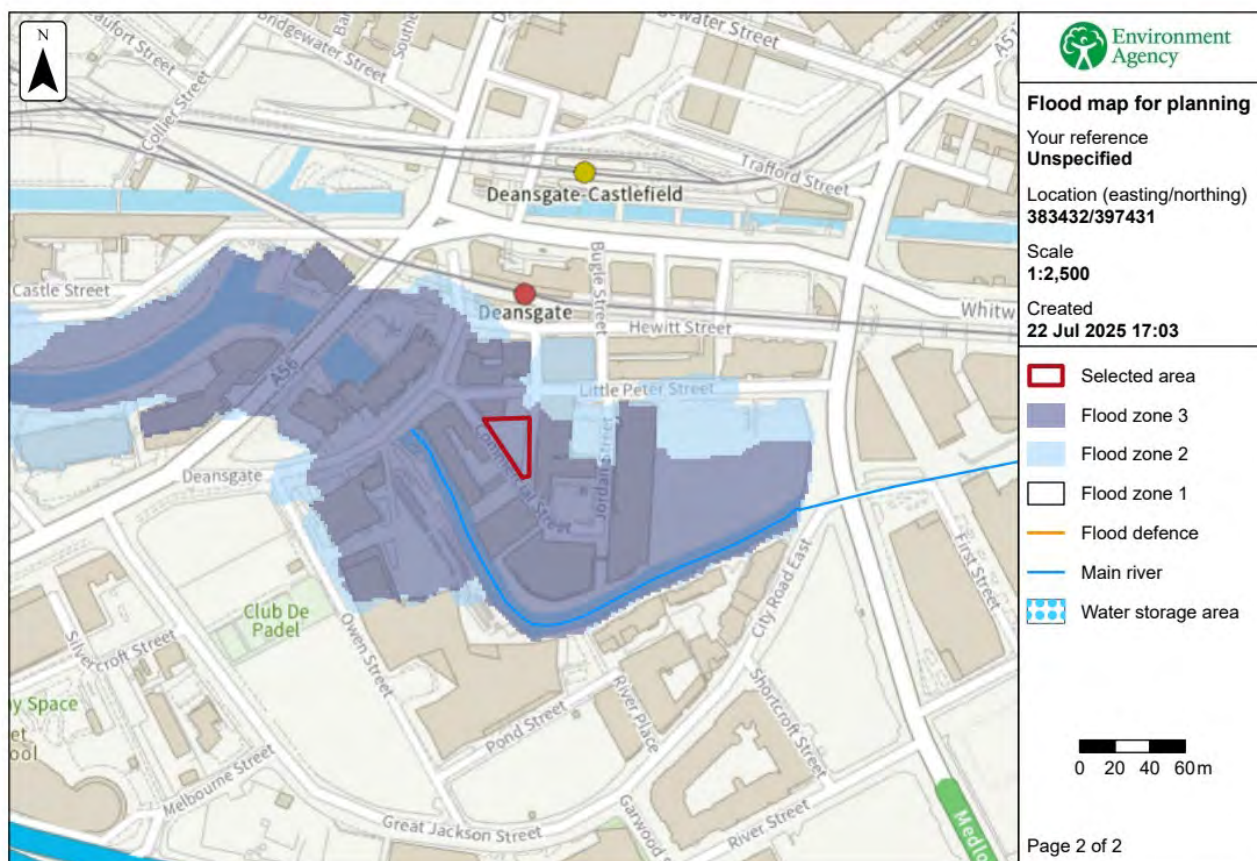


Figure 6. EA Flood Maps for Planning

JBA Consulting (JBA) was commissioned by Meadway Developments Ltd in May 2025 to produce a flood risk summary for a site on Commercial Street, Manchester. As part of this study the existing Environment Agency (EA) flood product data has been reviewed and updated to provide a site-specific assessment of flood risk for the site.

The current FMFP significantly over-estimates the flood risk at the site. The existing EA data suggest the site has a very high risk of flooding. The site-specific hydraulic modelling suggests the site is at low risk of flooding. This is in line with historic estimates of risk completed in support of earlier planning applications.

- Out of the design simulations completed in this study, only the 0.1% AEP encroaches onto the site. In terms of the stretch of Medlock adjacent to the site, both the 3.3% AEP and the 1% AEP remain in bank.
- In the climate change scenarios assessed, both encroach onto the site via Commercial Street. Maximum water levels for the 1% AEP + CC 35% should be initially used as a design flood level; this has been estimated as 28.62m AOD. This does not include any allowance for freeboard.
- In the sensitivity tests, the site is not shown to be sensitive to changes in roughness or downstream boundary. However increasing the flow by 20% allows for flood water to encroach onto the site via Commercial Street. This is not surprising given the general increase in flooding observed during the climate change simulations.
- A general increase in flood extents, when compared to the baseline equivalent, is observed for the building representation sensitivity. The removal of the building uplift allows for water stored within Little Peter Street carpark to move westwards towards the site.

- When assessing the sensitivity of the overtopping spill onto Deansgate, it is evident that flood risk on site reduces. The site remains free from flood water during a 1% AEP + CC 46% event.

3.1. Sequential and Exception Test

The vulnerability of the site to flooding from rivers and other sources has been considered and the local SFRA has been taken into account. Typical sources of flooding include fluvial, tidal, surface water, groundwater and anthropogenic sources such as sewer flooding and reservoir flooding. These are all considered in this Section.

The probability of flooding from rivers and the sea is modelled by the JBA for the whole of the UK and mapped as Flood Zones which categorise areas according to the likelihood of flooding occurring. The zones are defined by the predicted extent of flooding during annual exceedance probability (AEP) events.

The flood zones are defined In Table 3.1 of the NPPF and Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA Level 1 SFRA Final March 2010 and Level 2 SFRA Final March 2011 as follows:

Flood Zone	Definition
Zone 1 – Low Probability	Lowest risk of flooding (less than 1 in 1000 probability per year)
Zone 2 – Medium Probability	Medium risk of flooding (between 1 in 1000 and 1 in 100 probability per year).
Zone 3a – High Probability	High risk areas (usually between 1 in 100 and 1 in 200 probability of flooding in any year).
Zone 3ai – High Probability	Areas which are already developed but have the same risk as Flood Zone 3b (1 in 20 probability per year).
Zone 3b – The Functional Floodplain	The undeveloped functional floodplain where it is desirable for water to be stored in times of flooding (usually greater than 1 in 20 probability of flooding in any year but also including areas which are designed to flood).

Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA Level 1 SFRA Final March 2010 states the following regarding the Sequential Test: *“The Sequential Test is based on development allocations, their situation in regard to flood risk, that level of risk and also the development’s vulnerability to that risk. When allocating or approving land for development in flood risk areas, those responsible for making development decisions are expected to demonstrate that there are no suitable alternative development sites located in lower flood risk areas (i.e. the sequential approach). Exceptionally, proposed development sites can be taken forward, if the conditions of the Exception Test are fulfilled.”*

Paragraph 162. Within he NPPF states: *“The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.”*

A copy of the Knott Mill – Manchester “The Masterplan” issued June 2019 (Reference No: 10117-RP-MP01) by Knott Mill Association is included in Appendix D. This plan identifies potential development sites within the wider Deansgate area, and the development site is identified on this plan by site reference LA27964.

The planning history search reveals several planning permissions have been granted for development at sites and buildings within the Study Area. These either relate to gap sites or to vertical extensions to existing buildings. Whilst some of the permissions have not been implemented, the granting of permission indicates a general acceptance of the principle of a medium-rise height profile (typically four to seven storeys) and a general increase in density in the Knott Mill area.

In contrast to this, planning permission has been granted for a range of tall, predominantly residential, buildings in the Study Area's immediate surroundings, many of which have been implemented and are currently being constructed. Permissions for six towers, ranging in height from 27 storeys to 66 storeys have been granted on various sites. This further emphasises the existing lower-rise nature of Knott Mill when compared to its neighbouring areas.

In addition, the previous planning application (Ref. 128433/FP/2020), which has since lapsed, was approved with conditions for the development of 7No townhouses on a brownfield site.

It can be concluded that the development has satisfied the criteria of the Sequential Test.

Table 2 of the NPPF classifies the compatibility of different development end uses, based on their vulnerability to flooding, against the defined flood zones for rivers and sea, and an extract of the table is provided below.

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

Figure 7. Table 2 of the NPPF

The NPPF defines the Flood Risk Classifications within Annex 3, and the definitions are not repeated here.

The proposed development is a residential accommodation in the form of Townhouses (more vulnerable).

The Exception Test therefore the development is considered to be suitable with Flood Zone 2.

3.2. Flooding from Sea/ Tidal Flooding

The development is considered to be at risk from tidal flooding.

3.3. Groundwater Flooding

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property.

According to Phase 2 Site Investigation, groundwater was not encountered within any of the sampling locations. However, as boring operations required the use of water, it is possible that small groundwater strikes/seepages may have been masked.

All boreholes were recorded as being dry during the gas and groundwater level monitoring visits which were carried out between 5th May 2021 and 18th June 2021.

It was not possible to obtain samples of groundwater from installed boreholes as the groundwater table was below the installation depths.

No information has been provided to suggest that the site is susceptible to groundwater flooding.

No records have been provided to suggest that the site has flooded from this source previously.

3.4. Surface Water Flooding

The EA's surface water flood map shown in Figure 7 shows the flooding risk is low for most of the site.

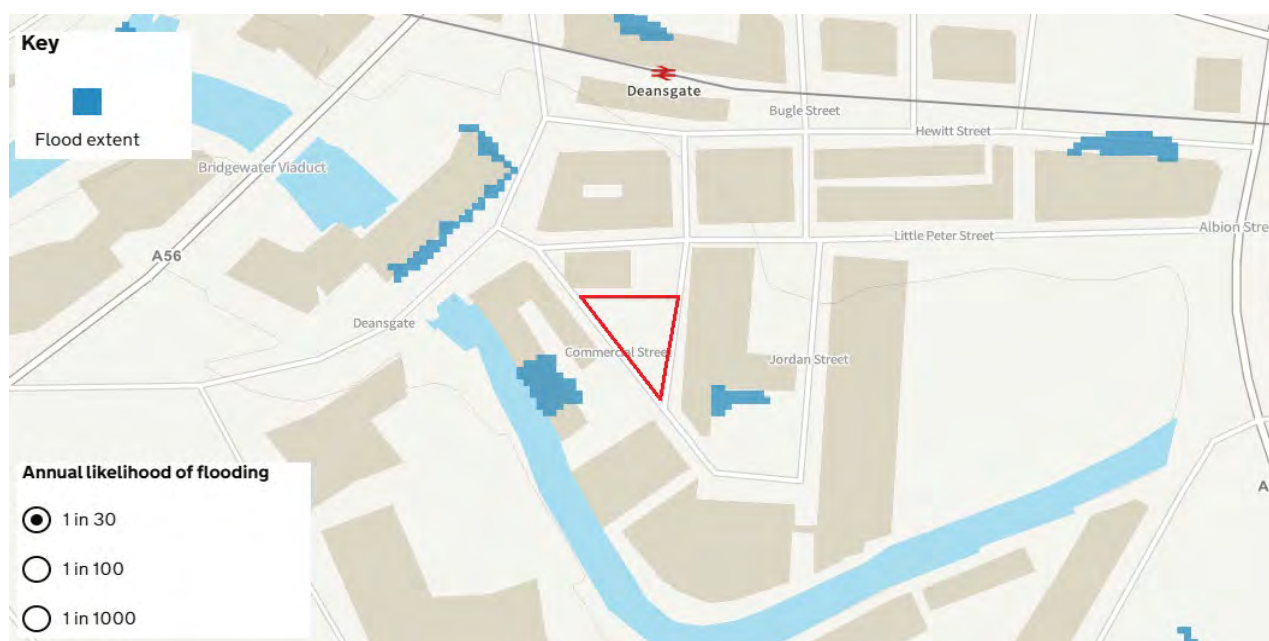


Figure 7. EA - Surface Water Flooding 1 in 30

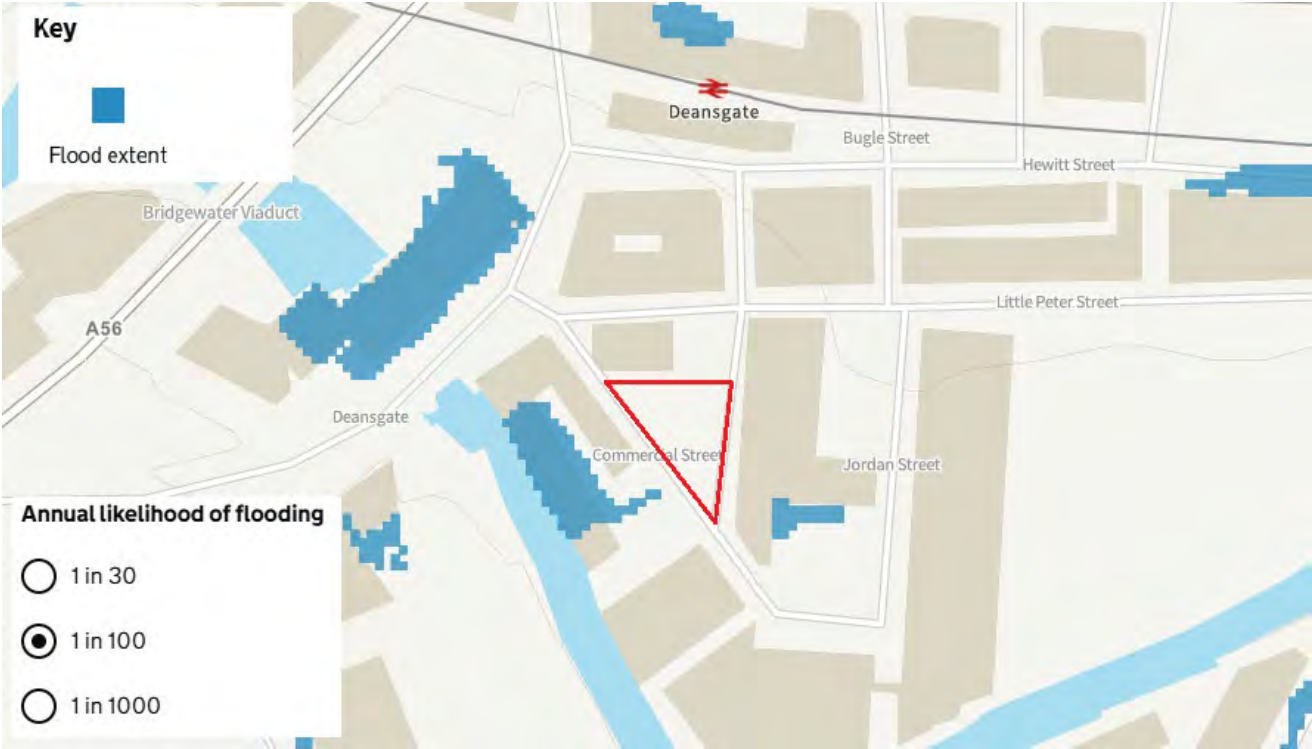


Figure 8. EA - Surface Water Flooding 1 in 100



Figure 9. EA - Surface Water Flooding 1 in 100

Surface water flood risks usually result from pooling of surface waters and overland flow during heavy rainfall that is not able to drain away quickly enough. The local sewer network may be at risk of surcharging during such extreme rainfall events with flooding happening from manholes and gullies. This may be caused by inadequate maintenance of the existing system or simply that the density of hard surfaces in the local area are creating an overload of a system designed to deal with smaller volumes of water.

The proposed development should be designed in such a way so that it does not increase the flood risk elsewhere. In addition, safe access and egress routes should be maintained. These factors are being considered within the preliminary drainage strategy within Section 5 of this report.

3.5. Flooding from Anthropogenic Sources

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.

The development will not experience flooding from a reservoir breach. The flooding shown above, as indicated in the key, refers to flooding from rivers as well.

3.6. Flooding from River/Fluvial Flooding

The EA's Flood Map for Planning (FMfP) and Product 4 data indicate that the site lies within Flood Zone 3, which is considered to have a high probability of flooding. A review of the supplied detailed EA Product Data suggests that the site would be located with the 3.3% Annual Exceedance Probability (AEP) flood extent, which is typically used to designate Flood Zone 3b (Functional Floodplain). The current EA FMfP does not include any data relating to defence representation.

The Product 4 data from the Environment Agency has been used for the following assessment and can be found in Appendix C.

The risk of flooding from rivers and sea data, which was updated on 28th January 2025 as part of the EA's National Flood Risk Assessment (NaFRA), considers the site to be at high risk of flooding both now and in the climate change scenario. This information can differ from that presented in the EA's Flood Zones maps as the longer-term risk data includes local flood defence infrastructure.

JBA Consulting also sought to compare the FMfP outlines to recorded flood outlines or historical flood outlines for this area. At present there are no outlines available for comparison.

Comparison Map

Figure 10 below shows a comparison between the EA FMfP 3.3% AEP extent to the 3.3% AEP extent which has been generated by this site-specific fluvial modelling study. The updated extents from this study show a significant reduction in flooding despite flows increasing. This reduction is primarily a result of the floodplain being formally represented in the current study as opposed to no floodplain in the model used to produce the existing Flood Zones.

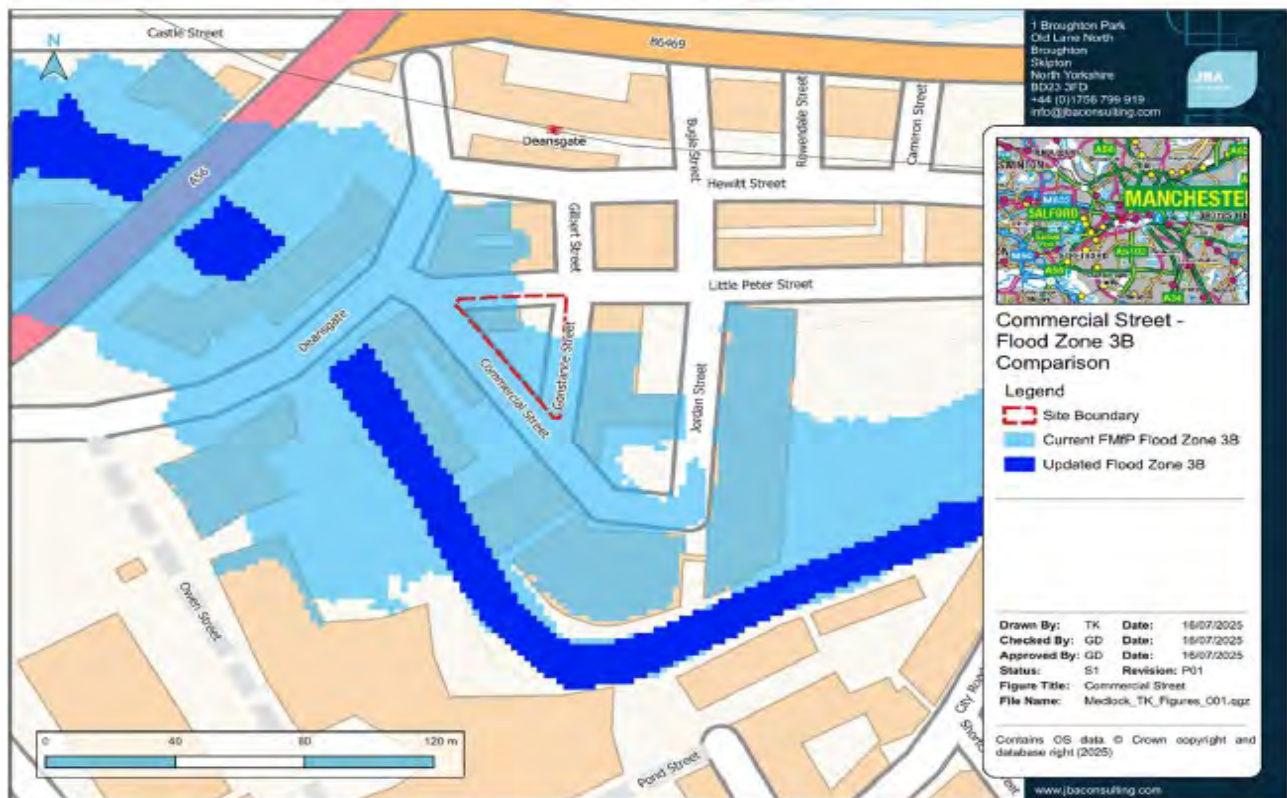


Figure 10. Current EA Flood Map – JBA Updated Flood Map

Figure 11 below shows the updated 3.3% AEP, 1% AEP and 0.1% AEP extents which have been generated in the current study. Out of the design event simulations completed in this study, only the 0.1% AEP encroaches onto the site. Adjacent to the site the River Medlock is in bank for both the 3.3% AEP and the 1% AEP events.



Figure 11. JBA Updated Flood Zone Map

Maximum flood levels for the 1% AEP + CC 35%, 1% AEP + CC 46%, and the 0.1% AEP are available in Table 3.6 below. For all other events simulated as part of this site-specific study, no encroachment onto the site and have therefore not been included within the table.

Return Period	Onsite Flood Level (m AOD)
1% AEP + CC 35%	28.62
1% AEP + CC 46%	28.86
0.1%	29.01

Overtopping Scenario

During the model review it was noted that there was no overtopping spill to allow water directly onto Deansgate. Whilst there are walls there currently there are gates that provide access to the river. Typically walls and gates are not formally represented in hydraulic model unless they are designated as flood defence assets as they may collapse in a flood event or allow water to leak through. In the initial model setup (as reported) the as supplied configuration (no overtopping allowed) was retained as it was felt this would provide a more conservative representation of flood risk on site.

As flooding in the urban environment is complex this was considered as a sensitivity test, again the 1% AEP + CC46% event was simulated. It is evident that this update reduces water levels upstream as there is a slight reduction in flood extents. This is to be expected as the model now allows water to move more freely downstream. As a result the site remains free from flood water during a 1% AEP + CC 46% event.

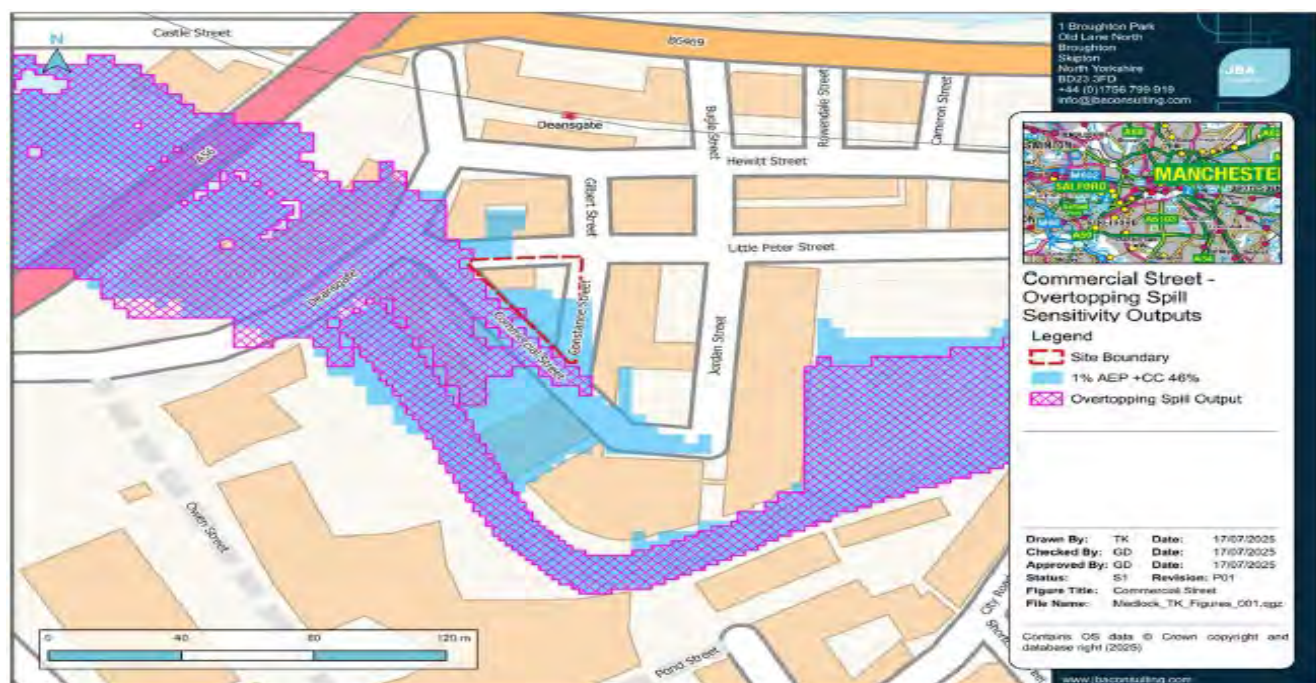


Figure 12. JBA Updated Overtopping Scenario

Fluvial Flooding Conclusion

- The current FMFP significantly over-estimates the flood risk at the site. The existing EA data suggest the site has a very high risk of flooding. The site-specific hydraulic modelling suggests the site is at low risk of flooding. This is in line with historic estimates of risk completed in support of earlier planning applications.
- Out of the design simulations completed in this study, only the 0.1% AEP encroaches onto the site. In terms of the stretch of Medlock adjacent to the site, both the 3.3% AEP and the 1% AEP remain in bank.
- In the climate change scenarios assessed, both encroach onto the site via Commercial Street. Maximum water levels for the 1% AEP + CC 46% should be initially used as a design flood level; this has been estimated as 28.86m AOD. This does not include any allowance for freeboard.
- When assessing the sensitivity of the overtopping spill onto Deansgate, it is evident that flood risk on site reduces. The site remains free from flood water during a 1% AEP + CC 46% event.

3.7. Historical Flood Events

The EA have no records of flooding affecting the site.

3.8. Fluvial Floodplain Storage

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

As such, any built footprint below the 1 in 100 year event plus 46% climate change - flood level 28.86m AOD will be rendered floodable.

The specification for the areas to be rendered floodable will involve having openings on all sides, extending from the existing ground level to 600mm above the design flood level. The specification for the openings is:

- The openings will be at least 1m wide at every opening.
- The minimum height of the openings will be from existing ground level to 300mm above the modelled 1:100 year flood level with 35% allowance for climate change (a level of 29.05m AOD).
- There will be an opening at least every 5m, on all sides of the building.
- Vertical bars can be installed at 100mm centres if required for security.

3.9. Proposed Mitigation

The NPPF requires new residential floor levels to be set at least 300mm above suitable modelled 1 in 100 year event plus allowance for climate change flood levels.

The site is shown to be entirely within Flood Zone 2 on the revised JBA Flood Map (Rivers and the Sea) and is identified to be largely at a “Low” to “Very Low” Risk of Flooding from Surface Water.

Based on the plans provided, all habitable residential uses will be located at first floor level (with only non-habitable uses such as garages, utility rooms, bathrooms and storage at ground floor level). This ensures that there is safe refuge above the flood levels. Internal access will be maintained from the ground floor to the above floors of the development.

It is recommended to help protect against flooding during extreme events, that flood resistant design measures are incorporated into the development as appropriate. These measures may include the following:

- Solid (concrete) ground floor.
- Waterproof screed used on floors.
- Closed-cell foam used in wall cavities.
- Waterproof ground floor internal render
- External walls renders resistant to flooding to first floor level.
- External ventilation outlets, utility points and air bricks fitted with removable waterproof covers.
- Ground floor electrical main ring run from first floor level on a separate switched circuit from the other floors.
- Boiler, control and water storage/immersion installed at first floor level or above.
- Electrical incomer and meter situated at first floor level or above.
- Gas meter installed at first floor level or above.
- Plumbing insulation of closed-cell design.
- Non-return valves fitted to all drain and sewer outlets.
- Manhole covers secured.
- Anti-siphon fitted to all toilets.
- New kitchen units of solid, water resistant material.
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level.
- Stairs of solid hardwood construction with wood faces treated to resist water penetration.

3.10. Evacuation Plan and Flood Action Plan

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 2. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm.

In the event of a flood warning, a safe escape route from the site can be provided by heading southeast along Commercial Street and then north along Constance Street and then east along Little Peter Street.

Flood depths along this route exceed 25cm along Commercial Street, however flood depths are less than 25cm along Constance Street and this route is shown to be completely dry approximately 80m along the route.

Safe escape will be provided by a flood warning and evacuation plan. The applicant has agreed to implement a flood warning and evacuation plan post development and subscribe to the EA's flood warning service.

Flood Warning

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Online flood risk forecast	 FLOOD ALERT	 FLOOD WARNING	 SEVERE FLOOD WARNING	Warning no longer in force
What it means Be aware. Keep an eye on the weather situation.	What it means Flooding is possible. Be prepared.	What it means Flooding is expected. Immediate action required.	What it means Severe flooding. Danger to life.	What it means No further flooding is currently expected in your area.
When it's used Forecasts of flooding on our website are updated at least once a day.	When it's used Two hours to two days in advance of flooding.	When it's used Half an hour to one day in advance of flooding.	When it's used When flooding poses a significant threat to life.	When it's used When river or sea conditions begin to return to normal.
What to do - Check weather conditions. - Check for updated flood forecasts on our website.	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.	What to do - Move family, pets and valuables to a safe place. - Turn off gas, electricity and water supplies if safe to do so. - Put flood protection equipment in place.	What to do - Stay in a safe place with a means of escape. - Be ready should you need to evacuate from your home. - Co-operate with the emergency services. - Call 999 if you are in immediate danger.	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.

Figure 13. EA 's 3 Categories of Warning

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.

- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

4. Surface Water

In accordance with the NPPF and SFRA, consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in Section 5.

4.1. Development Proposals

JH Architects have provided a proposed site layout, which outlines a development consisting of the construction of No. 8 townhouses.

4.2. Climate Change

There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for in FRA, with consideration of the EA flood maps and local authority SFRA.

Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. The Department for Environment Food & Rural Affairs have developed an interactive map and requires all new development to allow for a 45% increase in rainfall to allow for climate change for the Irwell Management Catchment peak rainfall allowances.

A 45% increase is therefore being allowed for within the new surface water drainage design to take account of climate change. Climate change may also lead to variations in groundwater level which will also be considered during the drainage design.

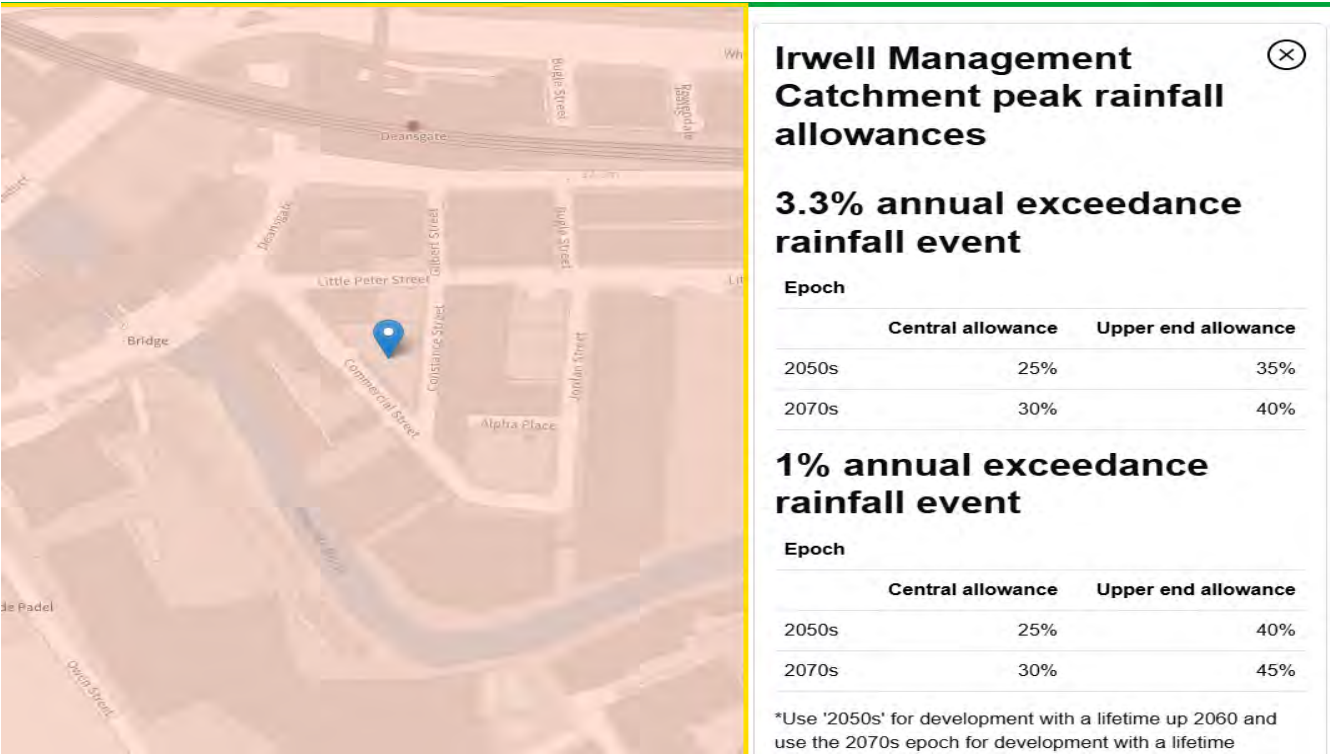


Figure 14. Climate Change Allowance Interactive Map

4.3. Sustainable Drainage Systems (SuDS)

SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the SUDS Manual.

The types of benefits that can be achieved by SUDS will be dependent on the site, but fit broadly into four categories: water quantity, water quality, amenity and biodiversity. These are also referred to as the four pillars of SUDS design (Figure 13):

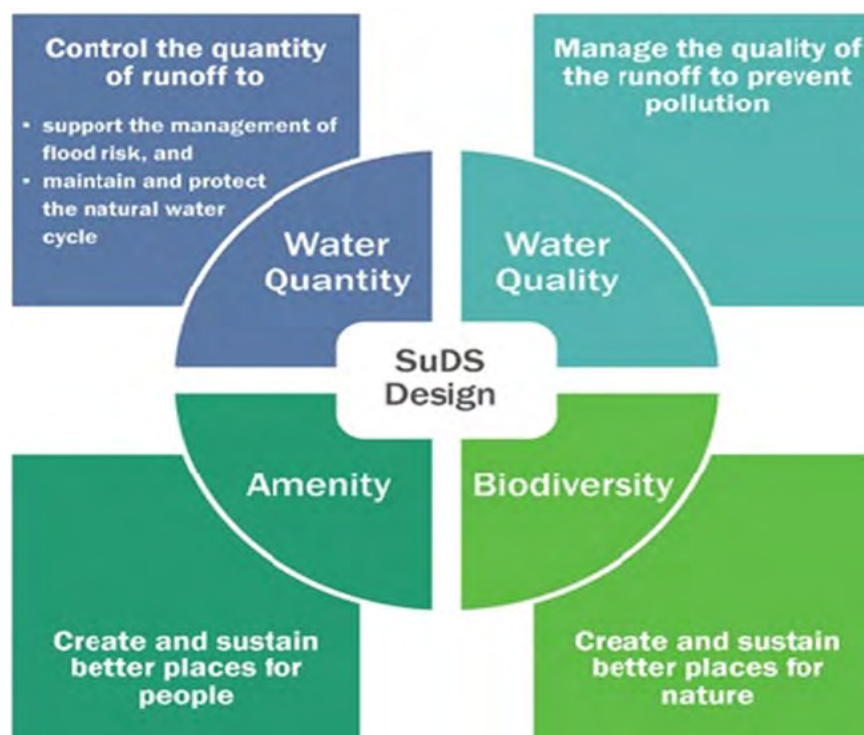


Figure 15. Four Pillars of SuDS

The proposed development will address the above 4 pillars of SuDS design criteria with the inclusion of a range of sustainable features through a comprehensive treatment train.

- **Water Quantity:** the quantity of run-off water from the site is not altered as the proposed development is the erection of 8No. Townhouse on brownfield site, as set out in more detail in the Drainage Strategy in Section 5.
- **Water Quality:** The quality of runoff from the site is enhanced by the inclusion of a small green/blue roof for each townhouse from the building roof is treated through a network of pipes. All runoff is collected on-site before being discharged into a combined manhole, located off the site boundary.
- **Biodiversity** will be addressed by the green/blue roofs, as well as by the inclusion of a significant planting regime creating a better environment for nature to thrive.
- **Amenity** is provided through the proposed green areas, which presents the opportunity to create visually attractive areas within the proposed site which have the ability to connect people to water. Such features have been shown to improve the well-being of people that live within the proposed development.

5. Drainage Strategy

The development proposal comprises the construction of 8 no. townhouses. Refer to the proposed Drainage General Arrangement and the detailed layout information provided in Appendix E for further reference.

5.1. Proposed Foul Water Network

It is proposed to install a new local gravity foul drainage network, with pipe runs maintained at depths to avoid the foundation and concrete encasement provided where necessary. Given the limited information available on the existing drainage system, a combined manhole is proposed within the site, as the nearest existing drainage network owned by United Utilities is classified as combined. Approval from United Utilities will be required for this connection and will be sought at a later stage.

To establish accurate connection points to the existing foul network, Ground Penetrating Radar (GPR) and CCTV surveys will be undertaken. Should these surveys identify connection points that differ from those currently proposed, a review and potential revision of the proposed foul drainage layout will be necessary.

Refer to Appendix E for foul drainage proposals.

With reference to British Water Flows and Loads 4, flows from the site will increase site foul discharge by 0.44 l/s total.

15606 Knott Mill Townhouse - Foul Flow Assessment			07.08.2025		Booth King Partnership	
Summary						
Method		Standard	Peak Flow (l/s)	24 Hr Storage Volume (m³)	Comments	
1	Flow rate assessment - l/head per day	BS EN 752 & Flows and Loads 4	0.44	5.76	Provides a reasonable estimate of the actual flows based on the anticipate occupancy of the development using tailored values of occupants daily water consumption	
2	Flow rate assessment - l/head per day	British Water CoP	0.31	4.03	Provides an estimate of flows based on the dwelling occupancy set out in the British Water Code of Practice. Could well be an overestimate of occupancy for a retirement complex	
3	Discharge Unit basis	Sewers for Adoption 8 th Edition	0.41	5.33	This is the method of flow assessment set out in sewers For adoption. This might be the basis on which United Utilities expect foul flows to be assessed when we make a Section 106 Application for a connection to the Adopted sewer	

Figure 16. Flows and loads – Estimate Proposed Site Foul Volume

Foul calculations can be found in Appendix F.

5.2. Proposed Surface Water Network

Hierarchy of Surface Water Disposal

When developing or redeveloping a site, the control and dispersion of surface water falling on the site's catchment must always be considered. Wherever possible, surface water run-off should be managed on the surface, i.e. blue/green roofs. This enables the SuDS performance to be more easily inspected and managed with pollution incidents and potential flood risk being visible.

Paragraph 080 of the PPG-FRCC advises a hierarchy which reflects the guidance of the Building

Regulations Approved Document H:

‘Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

- 1. Into the ground
- 2. To a surface water body
- 3. To a surface water sewer, highway drain, or another drainage system
- 4. To a combined sewer

As noted in Section 2.4, direct infiltration to the ground is deemed unsuitable as the primary method of surface water disposal at the site, owing to the low permeability of the underlying soils. The observed groundwater seepages, likely resulting from surface water or rainfall percolating slowly through made ground—together with the presence of land drainage pipes, provide further confirmation that a positive outfall is required to facilitate effective site drainage.

No surface water features are located within close proximity to the site; consequently, an outfall to the public sewer will be necessary.

It is understood that the site has historically been connected to this system.

A copy of United Utilities sewer records for the site and surrounding area has been obtained and can be found in Appendix B. A GPR and CCTV survey is recommended to confirm the location and condition of the existing connections.

It appears to be a combined surface water and foul water sewers serving the area to the south east of the proposed development. It is proposed that drainage from site will also be directed to this sewer, subject to formal connection agreement with the undertaker.

The site drainage network will be designed in accordance with current best practice to have sufficient capacity not to flood both during the critical 1 in 30-year storm (plus 40% allowance for climate change) and 1 in 100-year storm event (plus 45% allowance for climate change). In this way the risk of off-site flooding, which could result in damage to other buildings and essential services, will be minimised and the risk of flooding elsewhere should not be increased as a result of the development proposals.

The Non-Statutory Technical Standards for SuDS, published by Defra, stipulate that discharges from all development sites, whether previously developed or greenfield, should be restricted to greenfield runoff rates, insofar as is reasonably practicable. The LLFA similarly requires that flow rates from the development of greenfield land be limited to the equivalent greenfield runoff rate; however, it permits a minimum discharge rate of 5.0 l/s where the calculated greenfield runoff rate is lower than this threshold.

Results		
Method	FEH statistical	
Flow rate 1 year (l/s)	0.2	l/s
Flow rate 2 year (l/s)	0.3	l/s
Flow rate 10 years (l/s)	0.4	l/s
Flow rate 30 years (l/s)	0.5	l/s
Flow rate 100 years (l/s)	0.6	l/s
Flow rate 200 years (l/s)	0.7	l/s

Figure 17. Greenfield Run off Calculation

There are inherent technical challenges in attaining greenfield runoff rates for small-scale developments, where the design of the control aperture must be meticulously considered to minimize the risk of blockage.

Two hydro-brake optimum flow control have been included to restrict the surface water flow.

United Utilities presumably suggest a Pass Forward Flow into the drain in Commercial Street.

Further discussion with the appropriate approving bodies will be required to finalise the Drainage Strategy.

Surface Water calculations can be found in Appendix F.

6. Conclusions & Recommendations

6.1. Conclusions

Booth King Partnership Ltd. (BKP) has undertaken a Flood Risk Assessment (FRA) and Drainage Strategy for Meadway Developments Ltd. in support of a planning application for the erection of eight townhouses (Use Class C3) at Commercial Street, Manchester (M15 4PZ). The site covers approximately 0.044ha and lies predominantly within Environment Agency (EA) Flood Zone 3, with a small section within Flood Zone 2.

The FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), Planning Practice Guidance (Flood Risk and Coastal Change), Environment Agency guidance, and the local Strategic Flood Risk Assessment (SFRA). The assessment considers all potential sources of flooding, the impact of climate change, and the sustainable management of surface water.

Key Findings:

- Fluvial Flood Risk: EA mapping indicates a high probability of flooding from the adjacent River Medlock. Site-specific hydraulic modelling by JBA Consulting shows this is an overestimation, with only the 0.1% Annual Exceedance Probability (AEP) event affecting the site. Climate change scenarios (+35% and +46% flows) indicate potential access route flooding via Commercial Street but no direct flooding to the main site.
- Design Flood Level: For the 1% AEP + 46% climate change scenario, the modelled flood level is 28.86m AOD (no freeboard).
- Sequential and Exception Tests: The site passes the Sequential Test; as a “more vulnerable” residential use, the Exception Test applies and is satisfied.
- Surface Water and Groundwater Risk: Mostly low risk of surface water flooding; no evidence of groundwater flooding.
- Mitigation Measures:
 1. All habitable accommodation at first floor or above.
 2. Flood-resilient ground floor construction (e.g. solid floors, waterproof materials, raised electrics, non-return valves).
 3. Safe evacuation route identified to higher ground; commitment to EA flood warning registration.

Surface Water Management:

- Infiltration is unsuitable due to low-permeability soils.
- Surface water will be discharged to the public combined sewer via flow control devices (hydro-brakes), restricted to a minimum of 5.0 l/s in accordance with LLFA requirements.
- SuDS features include green/blue roofs, planting for biodiversity, and measures to enhance water quality.
- Climate change allowance of +45% rainfall applied to storage design.

Conclusion

The proposed development, with mitigation measures implemented, will be safe for its lifetime, will not increase flood risk elsewhere, and will provide sustainable surface water management in compliance with the NPPF and local policy. The drainage design accords with LLFA requirements and incorporates SuDS to deliver environmental and amenity benefits.

6.2. Recommendations

Based on the findings of this Flood Risk Assessment and Drainage Strategy, the following measures are recommended to ensure the proposed development remains safe, resilient, and compliant with planning policy:

- **Flood Risk Mitigation:**

1. Maintain all habitable floor levels at least 300 mm above the modelled 1% AEP + 46% climate change flood level (28.86 m AOD), i.e., minimum finished floor level: 29.16 m AOD.
2. **Proposed GFL: 29.50m** AOD (28.86m AOD plus 600mm freeboard is a standard recommendation for flood zone 2, providing a buffer against potential inaccuracies in flood modelling and unforeseen events).
3. Incorporate the flood-resistant and resilient construction measures listed in Section 3.9 (e.g. solid concrete ground floors, waterproof renders, raised electrics, non-return valves).
4. Ensure all ground floor uses remain non-habitable (garages, storage, utilities).

- **Evacuation & Flood Warning**

1. Prepare and implement a **site-specific Flood Warning and Evacuation Plan** prior to occupation.
2. Register with the **Environment Agency's Flood Warning Service** for advance notice of flood events.
3. Maintain clear and unobstructed safe access/egress routes via Constance Street and Little Peter Street.

- **Surface Water Management**

1. Construct the surface water drainage system in accordance with the proposed design, including:
2. Hydro-brake flow controls to limit discharge to a maximum of 5.0 l/s.
3. Provision for +45% climate change allowance in storage calculations.

Carry out **CCTV and Ground Penetrating Radar (GPR)** surveys to confirm condition, location, and capacity of the existing sewer connections before finalising design.

Secure **United Utilities connection approval** for both foul and surface water discharges.

- **SuDS Implementation**

1. Install proposed **green/blue roofs** and planting areas to deliver water quality, biodiversity, and amenity benefits.
2. Ensure SuDS features are designed for ease of inspection, maintenance, and long-term performance.

7. Maintenance Plan

The Drainage network has been designed with minimal maintenance in mind. The maintenance is generally of a 'common sense' approach and is to comprise:

- Regular day to day care: - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves a drainage feature.
- Occasional tasks: - managing vegetation in wet areas and removing any silt that builds up in the drainage features.
- Remedial work: - repairing damage when, and where, necessary.

Specific recommendations for each feature are provided in the following sections and should be referred to in the first instance if there are any issues. Please contact Booth King Partnership Ltd. if any further advice is required.

During the works the Contractor, subject to agreement from their client, will ensure that all drains on which the proposed drainage works rely will be jetted out and made good as required to ensure correct operation.

Maintenance Activity	Required Action	Frequency
Inspection	Inspect for sediment and debris in pre-treatment component such as gullies, sump units and catch pits.	Monthly for the first year and on a 6-monthly basis thereafter.
Gutters	Clear gutters and any leaf guards.	On a 6-monthly basis or as required following inspection regime.
Sump Units	Remove all obstructions and debris from all sump units (gullies, channels and catch pits).	On a 6-monthly basis or as required following inspection regime.
Pipe Work	Inspect all pipework for all silt accumulation and high pressure jet any pipe work which has silt accumulation. Care is to be taken that any silts within the pipework are not flushed using chamber bungs.	On a 6-monthly basis or as required following inspection regime.
Manholes	Covers should be lifted and inspected for litter and debris to ensure that the runs are free flowing.	On a 6-monthly basis or as required following inspection regime.
Green Roof	According to manufacturer's recommendation	6 monthly basis. After extreme events

8. References

1.	C753. The SuDS Manual. CIRIA. 2015.
2.	Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/
3.	National Planning Policy Framework. March 2012.
4.	Environment Agency Indicative Flood Mapping
5.	Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA LEVEL 2 SFRA Final March 2011
6.	Phase 1 Geoenvironmental Desk Study & Ground Stability Risk Assessment NX Consulting Limited No: NX593 – February 2025
7.	Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA LEVEL 1 SFRA Final March 2010
8.	Joint statement by Manchester City Council Salford City Council Trafford Council Environment Agency MANCHESTER SALFORD TRAFFORD STRATEGIC FLOOD RISK ASSESSMENT
9.	Manchester City Council Report for Resolution Report to: Executive – 26 June 2019 Subject: Knott Mill Masterplan Report of: Strategic Director – Strategic Development
10.	Manchester City Council Report for Resolution Report to: Executive – 16 October 2019 Subject: Knott Mill Masterplan Report of: Strategic Director (Growth & Develop
11.	Knott Mill – Manchester THE MASTERPLAN JUNE 2019 10117-RP-MP01 Knott Mill Association
12.	Commercial St, Manchester - Flood Risk Summary Draft Prepared for Meadway Developments by JBA Consulting Date July 2025
13.	ADDITIONAL PHASE 2 SITE INVESTIGATION REPORT FOR LAND AT 1 COMMERCIAL STREET, KNOTT MILL, MANCHESTER M15 4PZ Prepared for:- in-fill DEVELOPMENTS LTD Hartland 13 Mayfield Road Bramhall Cheshire SK7 1JU The Land Consultancy Limited T195 SFK (TLC1143) rep AI Infill 300621 June 2021
14.	EA: Accounting for residual uncertainty: updating the freeboard guide. Report – SC120014
15.	Code of Practice Flows and Loads – 4 Sizing Criteria, Treatment Capacity for Sewage Treatment Systems

APPENDIX A

LOCATION PLAN – ARCHITECT’S PROPOSED DEVELOPMENT



BUGLE STREET

GILBERT STREET

JORDAN STREET

DEANSGATE

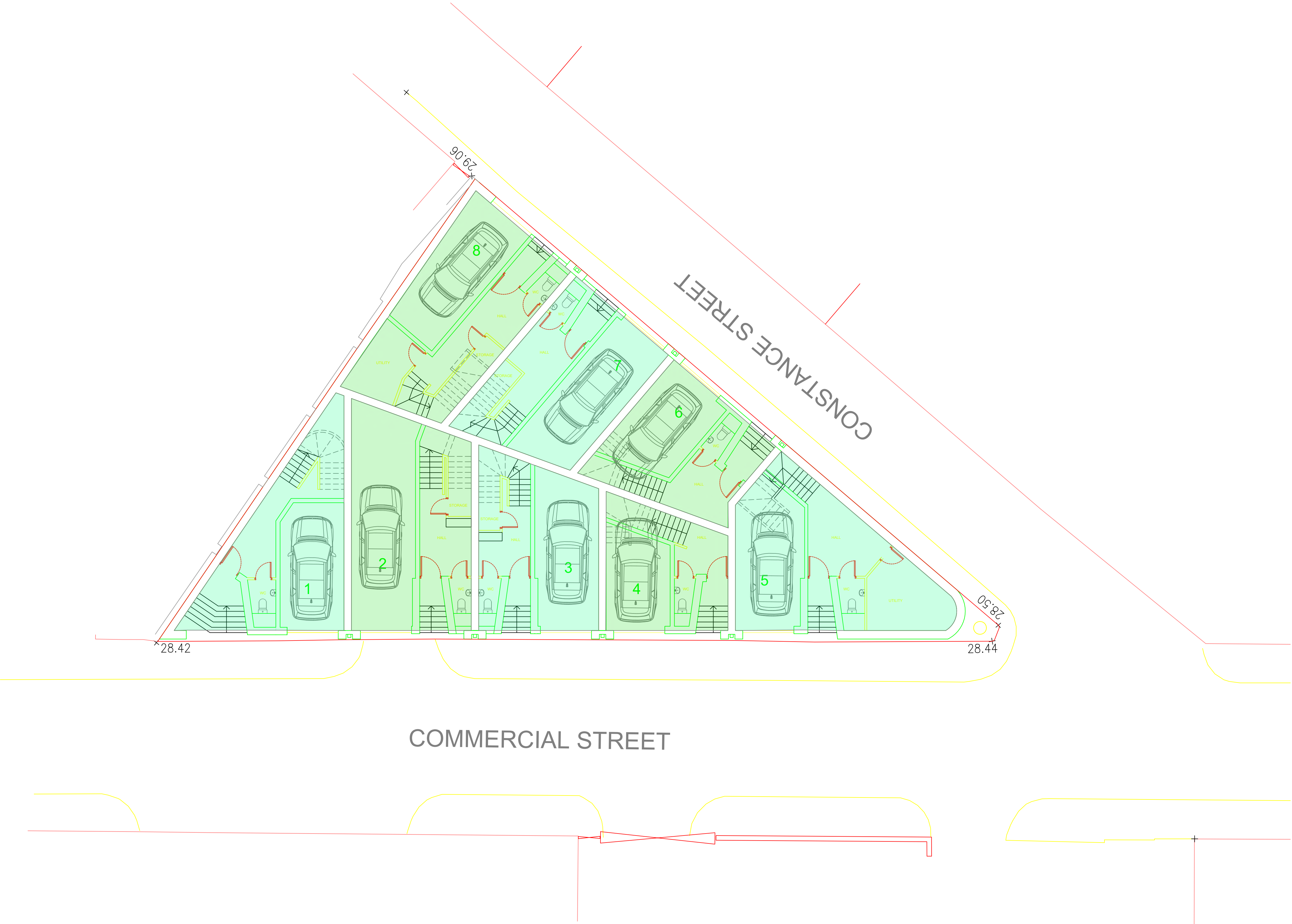
LITTLE PETER STREET

CONSTANCE STREET

ALPHA PLACE

COMMERCIAL STREET

NB	Do not scale off this drawing. All dimensions to be checked on site prior to manufacture and construction. This drawing is the property of JH. Architects and should not be reproduced without permission. All discrepancies to be brought to the attention of the architect immediately. This drawing to be read in conjunction with the specification / bill of quantities and related drawings.			
REVISION	-	FIRST ISSUE	13.09.24	SZ
	A	REVISED FOLLOWING FLOOD REPORT INFORMATION	26.06.25	SZ



CLIENT	MEADWAY DEVELOPMENTS LTD
PROJECT	KNOTT MILL TOWNHOUSES
TITLE	PROPOSED GROUND FLOOR PLAN
JOB NO.	X130
DWG NO.	AL1.01
SCALE	1:100 @ A1
DRAWN	SZ

46 MANCHESTER ROAD
CHORLTON
MANCHESTER
M21 9PH

info@justharchitects.co.uk
T +44(0)161 237 5500

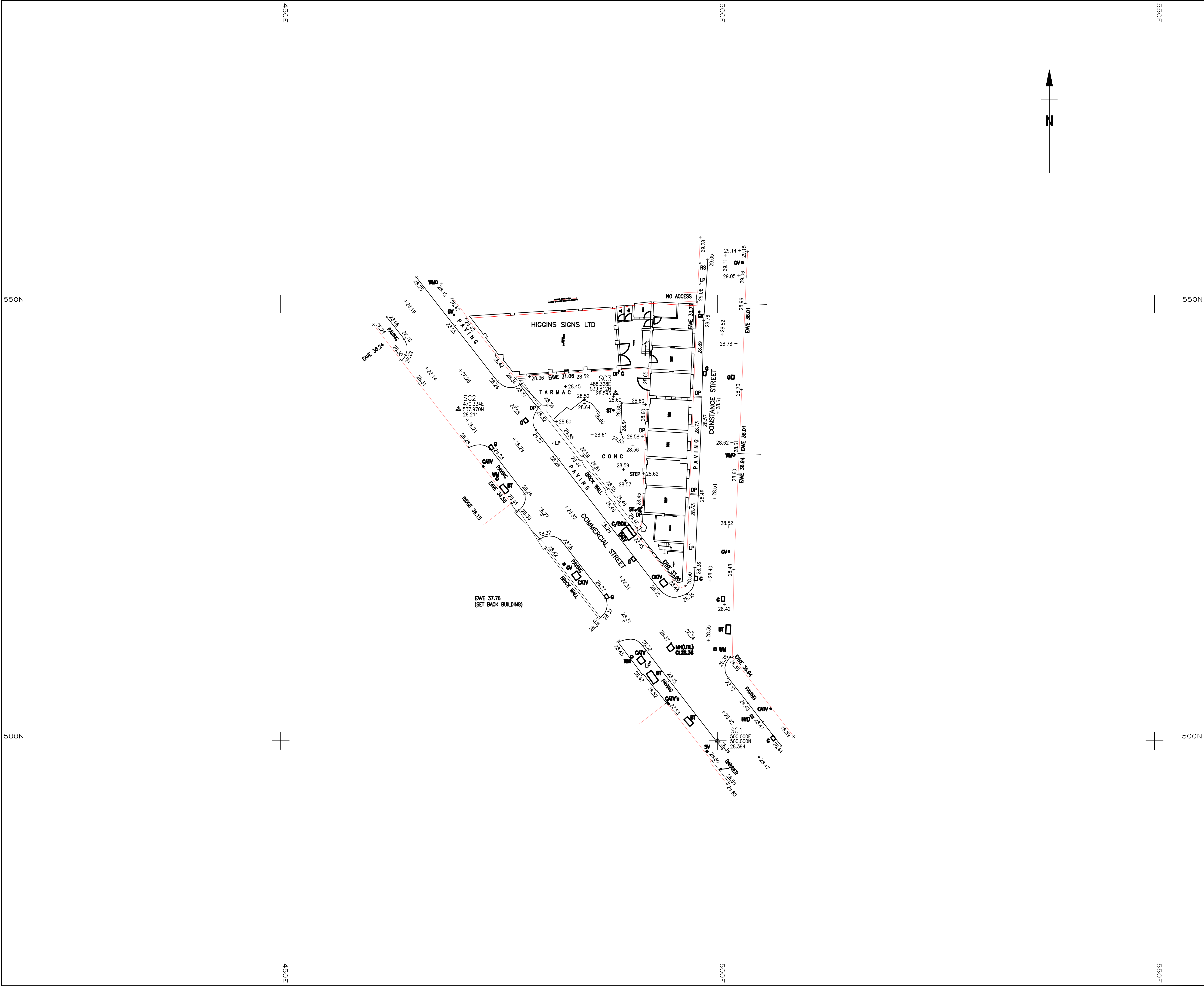
JH.A

RIBA 
Chartered Practice

arb 
Architects
Registration
Board

APPENDIX B

TOPO SURVEY & UU ASSET MAP



NOTES		
SURVEY NOTES.		
GRID	Local Plane Metric	
LEVELS	Related to OSBM 34.19m	
	Located on railway bridge	
	on Albion Street	



Water for the North West

Booth King

Calico
55 Mosley Street, Booth King
MANCHESTER,
M2 3HQ

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

Your Ref: Knott Mill
Our Ref: UUPS-ORD-657837
Date: 13/06/2025

Dear Sirs

Location: KAMANI PROPERTY GROUP 15 LITTLE PETER STREET, MANCHESTER, M15 4PS

I acknowledge with thanks your request dated 12/06/2025 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,

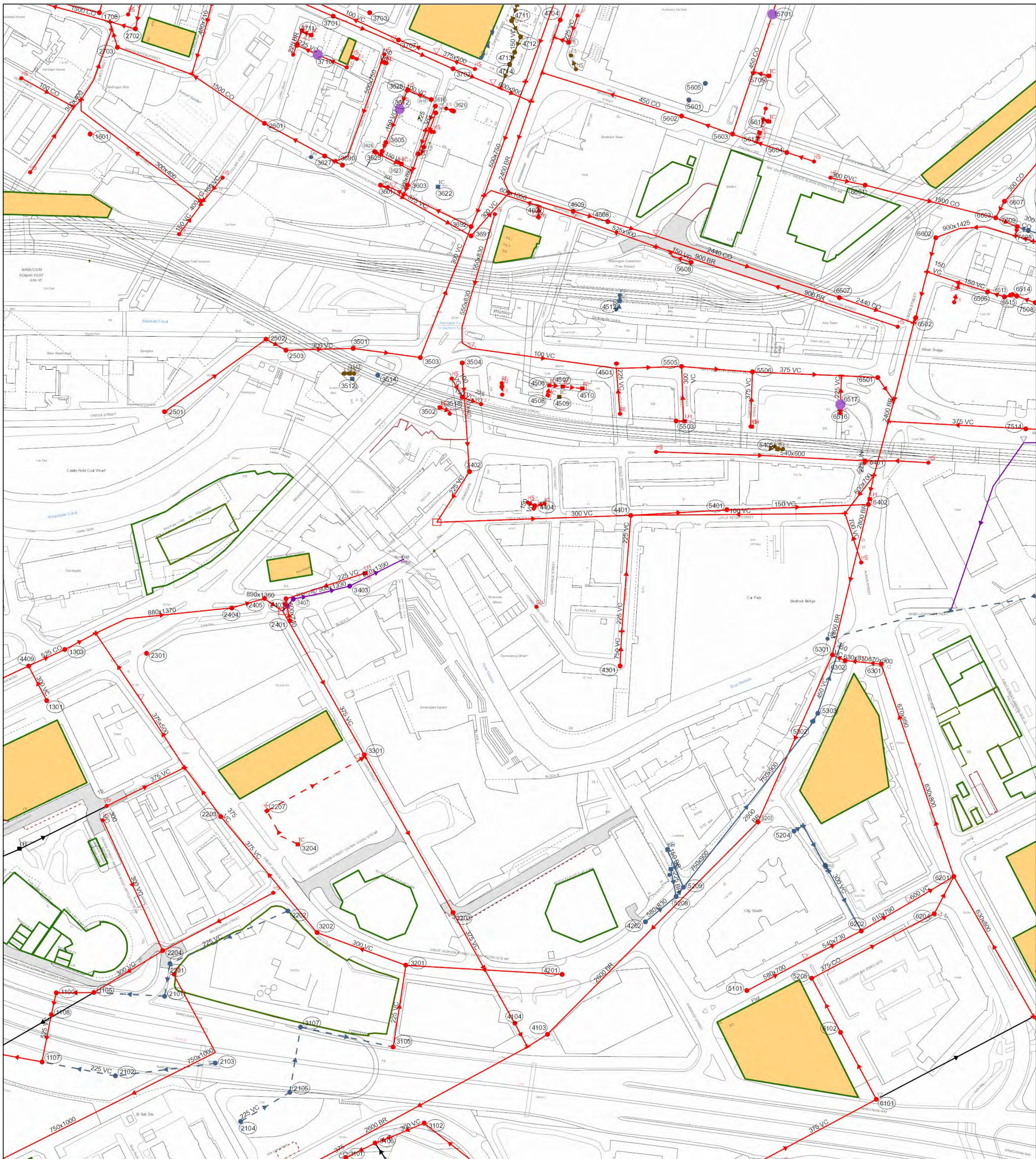
Karen McCormack
Property Searches Manager

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.



Reho	Cover	Func	Invert	Size x	Size y	Shape	Mat	Length	Grad
3615	35.59	CO	225	450	225	VC	22.7214	6.17599	
4401	30.31	CO	23.99	300	300	VC	53.05484		
6204	32.35	CO	27.91	375	375	CO	23.27731		1 in 332
6202	33.39	CO	28.44	610	150	BR	30.01666		1 in 94
4712		CO				VC	8.006633		
5701	35.76	CO	32.7	450		CO	69.57011		1 in 240
4301	28.73	VC	25.33	750		VC	19.0523		1 in 299
2501	31.09	CO	24.95	300		VC	68.8186		1 in 10
6603	37.02	CO	31.39	1500		CO	4.653915		
2503	32.16	CO	24.69	300		CO	37.01351		1 in 83
3604		VC		650		VC	18.12296		1 in 23
3518		BR		150		VC	2.171577		
4905		BR		2400		VC	19.89952		1 in 8
5506	34.08	CO	25.16	375		VC	69.06533		1 in 785
2104	32.11	SW	30.29	225		BR	164.7574		1 in 3
2703	33.04	CO	25.9	1500		CO	14.95341		1 in 332
3105	33.7	CO	28.29	225		VC	45.54119		1 in 108
2103	33.15	SW	31.29	225		VC	65.44366		1 in 277
6602	36.37	CO	22.74	900		BR	19.39703		1 in 129
6101	33.74	CO	26.74	375		VC	41.82306		1 in 199
3710		VC		225		VC	12.62427		
5503	33.4	CO	30.87	300		VC	34.01666		1 in 8
3503	32.24	CO	20.49	300		VC	77.25283		
7514		VC		375		VC	75.53414		
5203	32.79	CO	20.36	2800		BR	164.7574		1 in 785
6302	32.33	CO	25.48	450		VC	7.815773		1 in 3
1301	30.88	CO	27.92	300		VC	21.47051		1 in 332
3301	32.07	CO	22.29	375		VC	99.85258		1 in 434
6102	34.7	CO	26.53	375		CO	33.74291		1 in 178
5505	33.83	CO	26.55	375		VC	38.11522		
4104		VC		375		VC	14.76462		
4409	32.93	CO	21.88	325		CO	21.93171		
4608		CO	0	2400		BR	27.95049		
1108		CO	0	525		CO	26.49102		
6601	35.88	CO	32.13	1500		CO	74.2159		1 in 100
2101	32.72	SW	30.82	300		VC	30.05125		1 in 3
3602	33.74	CO	0	500		BR	41.14608		
5303		SW	0	450		VC	41.10961		
3203	32.14	CO	22.02	375		VC	69.83552		1 in 537
7609	37.12	CO	30.08	1500		CO	0.50602		
6607	38.01	CO	30.1	300		CO	10.29693		
2601	33.75	CO	26.77	1500		CO	91.91747		1 in 919
2102	33.24	SW	31.09	225		VC	41.31551		1 in 66
5401		CO	0	150		VC	78.05767		
4104	33.5	SW	30.06	300		VC	9.805551		
3701	34.12	CO	22.12	600		BR	35.9469		1 in 3586
5301	32.32	CO	21.17	2800		BR	100.7224		1 in 124
2204		CO	0	300		VC	44.41946		
2105	29.61	SW	28.84	225		VC	38.49557		1 in 76
5204		SW	0	150		VC	8.830552		
5602	35.48	CO	31.92	450		CO	80.65358		1 in 55
2201	33.8	SW	30.78	225		VC	18.24529		
4404		CO	0	150		VC	1.612009		
4704	35.36	BR	137.6433	2400		BR	137.6433		
6401	33.64	CO	21.81	2400		UN	1.098776		
2702	33.12	CO	25.87	1500		CO	14.90222		
1303		CO	0	525		CO	19.23338		
5101	34.1	CO	30.15	580		BR	36.25334		1 in 117
5205	34.42	CO	28.34	375		VC	76.28015		1 in 177
4711		FO	0	150		VC	10.19574		
2203		CO	0	375		VC	22.02771		
6513		CO	0	150		VC	33.60059		
3107	29.25	SW	28.37	150		VC	9.62293		1 in 1043
6402	33.36	CO	0	2800		BR	52.17279		
6502	36.02	CO	22.89	2400		BR	85.37564		
4714		FO	0	150		VC	3.162278		
3901	32.11	CO	29.33	300		VC	14.22342		1 in 4
7508		VC		150		VC	37.33631		
1100		VC		525		VC	10.76888		
6517		VC		225		VC	12.31105		
6519		VC		225		VC	15.95255		
6507	9.01	CO	0	2440		CO	43.32436		1 in 32
6301	32.03	CO	26.18	870		BR	10.04988		
3402	28.41	CO	25.86	225		VC	33.14766		1 in 104
3201	32.69	CO	27.81	300		VC	62.20153		1 in 71
6201	31.75	CO	27.54	630		BR	62.28767		1 in 92
4713		FO	0	150		VC	7.184736		
6515		VC		150		VC	2.511934		
6501	34.91	CO	0	375		VC	15.81139		
5302	32.45	SW	28.84	450		VC	8.802256		
4103	33.46	CO	20.15	2600		BR	162.0418		
3102	33.88	CO	30.03	300		VC	20.61553		
4501	33.52	CO	26.52	375		VC	38.01389		
3901	33.4	CO	0	300		VC	31.85244		1 in 84
4201	33.28	CO	31.45	225		VC	86.14523		
2502	29.53	CO	24.7	300		VC	12.52696		1 in 1
7608	37.08	SW	34.32	300		CO	6.324555		
6505	35.94	CO	28.94	150		VC	35.12899		
3202	33.27	CO	28.94	375		VC	83.09633		
3106	33.95	CO	28.96	300		VC	17.88854		1 in 119
1708	32.57	CO	26.15	600		CO	56.76385		
5604	35.71	CO	32.67	450		CO	31.62278		1 in 126
3603		BR		560		BR	5.385165		
3601	34.38	CO	28.9	375		VC	28.6531		
2202	33	SW	31.5	225		VC	71.17584		1 in 108
1106		CO	0	525		VC	20.79891		
2401	29.43	CO	26.45	600		BR	6.082763		1 in 4
3707	34.62	CO	30.88	100		VC	62.80151		
3702	34.7	CO	22.08	600		BR	23.76973		
3101	33.45	CO	28.79	375		VC	6.51404		
1107		CO	0	525		CO	28.17801		
3403	28.38	OV	24.25	870		BR	28.8922		
5608		CO	0	150		VC	33.54102		1 in 238
2403	29.24	CO	23.16	225		VC	13.54424		
5209		SW	0	750		BR	7.1457109		
3625		VC		150		VC	113.2299		
3626		CO	0	150		VC	2.135909		
3627		OV	0	300		BR	3.779219		
3618		CO		100		VC	12.8221		1 in 15
3616		VC		100		VC	13.86245		
3609	34.2	CO	27.14	1500		VC	14.49733		
6516		CO		225		CO	10.89523		
3628		VC		150		VC	2.670431		
5208		SW	0	150		BR	11.38782		
3605		CO	0	150		VC	6.403124		
3620		VC		150		VC	5.241848		
3627		CO		150		VC	4.310457		
3504		CO		300		CO	37.87158		
3617	31.9	CO	30	225		VC	30.06594		
2404	30.4	CO	23.08	890		BR	19.95536		
2405		BR		890		BR	18.67653		
				890		BR	12.44435		

LEGEND

Abandoned

Foul

Surface Water

Combined

Public Sewer

Private Sewer

Section 104

Rising Main

Sludge Main

Overflow

Water Course

Highway Drain

All point assets follow the standard colour convention:

red - combined

blue - surface water

brown - foul

purple - overflow

Manhole

Head of System

Extent of Survey

Rodding Eye

Inlet

Discharge Point

Vortex

Penstock

Non Return Valve

Washout Chamber

Valve

Air Valve

Oil Interceptor

Summit

Drop Shaft

Orifice Plate

Side Entry Manhole

Outfall

Screen Chamber

Inspection Chamber

Bifurcation Chamber

Lamp Hole

T Junction / Saddle

Catchpit

Valve Chamber

Vent Column

Vortex Chamber

Penstock Chamber

Network Storage Tank

Sewer Overflow

Ww Treatment Works

Ww Pumping Station

Septic Tank

Control Kiosk

DNM Network Monitoring Point

Change of Characteristic

MANHOLE FUNCTION

FO Foul

SW Surface Water

CO Combined

OV Overflow

SEWER SHAPE

CI Circular

EG Egg

OV Oval

FT Flat Top

RE Rectangular

SQ Square

TR Trapezoidal

AR Arch

BA Barrel

HO HorseShoe

UN Unspecified

SEWER MATERIAL

AC Asbestos Cement

BR Brick

PE Polyethylene

RP Reinforced Plastic Matrix

CO Concrete

CSB Concrete Segment Bolted

CSU Concrete Segment Unbolted

CC Concrete Box Culvert

PSC 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

MAR Masonry, Random

U Unspecified

Address or Site Reference:

KAMANI PROPERTY GROUP 15 LITTLE PETER STREET,
MANCHESTER,
M15 4PS

Scale: 1:1250

Date: 13/06/2025

Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS

United Utilities

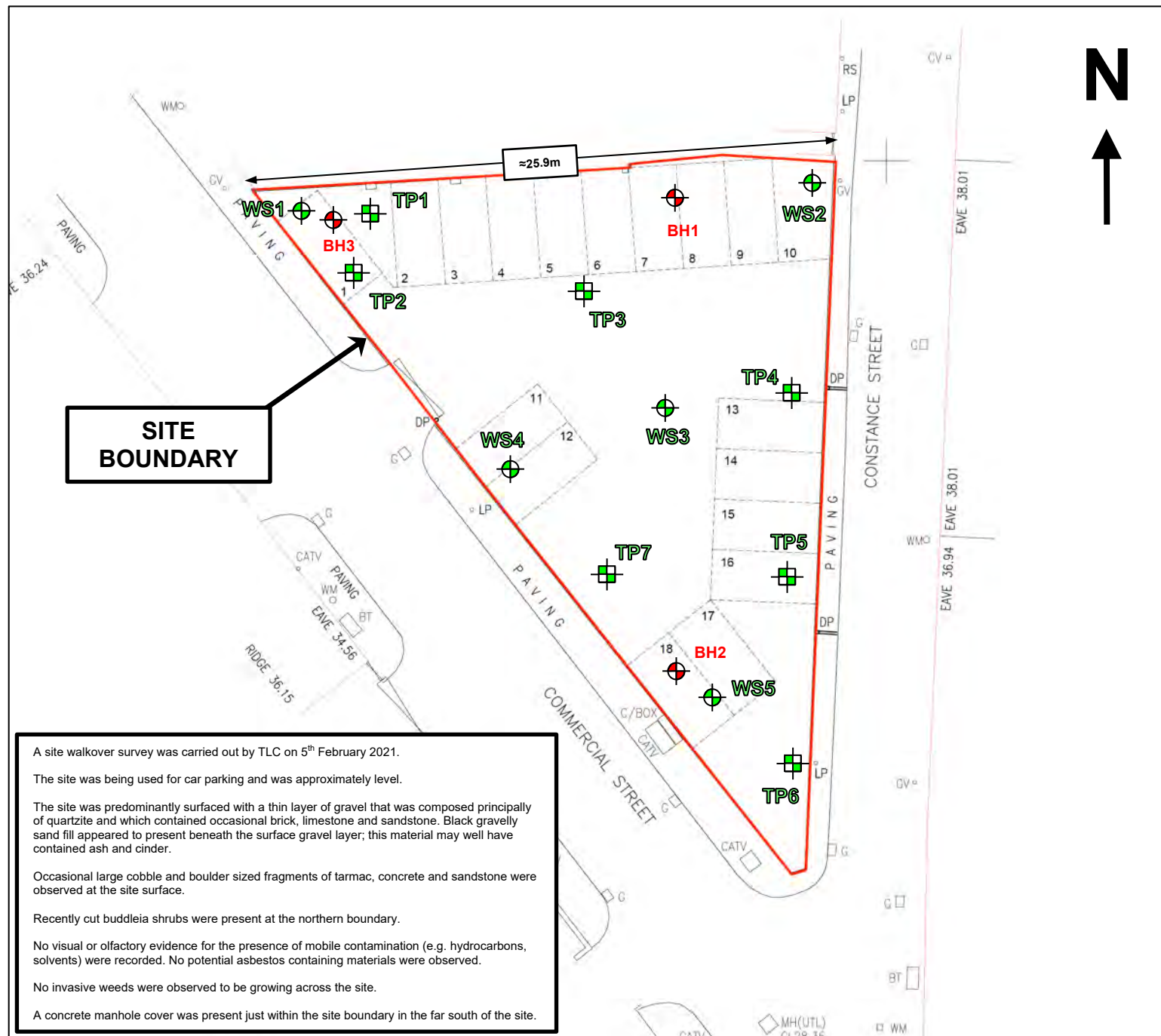
Water for the North West

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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APPENDIX C

BOREHOLE LOGS



Adapted from Harrison Ince Architects Drawing No. AS01 dated October 2020



KEY

-  TLC windowless sampling location (April 2021). WS1, WS2 and WS5 were installed.
-  TLC machine excavated trial pit location (April 2021).
-  EMS shell and auger borehole locations – sunk in March 2008

THE LAND CONSULTANCY LIMITED

Fairweather House, 4 Parker Lane, Whitestake, Preston PR4 4JX
Tel: 01772 610609; M: 07771 800859
email: sfknot@thelandconsultancy.co.uk; www.thelandconsultancy.co.uk

Project:

1 Commercial Street, Knott Mill, Manchester M15 4PZ

Title:

Existing Site Plan displaying Exploratory Hole Locations

Scale:

As Shown

Drawn by:

SFK

Date:

15/06/2021

Drawing No.: TLC1143/0x

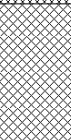
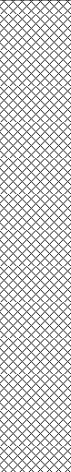
THE LAND CONSULTANCY LIMITED				The Land Consultancy Limited T: 01772 610609; M: 07771 800859 email: sfknott@thelandconsultancy.co.uk web: www.thelandconsultancy.co.uk		Trial Pit No TP1 Sheet 1 of 1			
Project Name Commercial Street, Manchester M15 4PZ			Project No. TLC1143		Coords: E: N: Level (m AOD):		Date 29/04/2021		
Location: Commercial Street, Manchester M15 4PZ					Dimensions (m) Depth 1.85 2.80 0.60			Scale 1:10	
Client: Infill Developments Ltd								Logged By S.F.Knott	
Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description			
Depth (m)	Type	Results (kPa)							
0.40	ES		0.08			3cm of quartzite gravel over rotten black TARMAC. (MADE GROUND)			
						Moderately compact black gravelly SAND with low to medium cobble content. Sand is ash rich. Gravel is fine to coarse angular of cinder, brick, sandstone with occasional coal, pottery and iron rich slag. Occasional fragments of polythene and rusted iron recovered. Cobbles are of brick and sandstone. (MADE GROUND)			
						0.40m - PID test carried out = 0.1ppm.			
0.90	ES		0.80			>0.70m - Deposit contains pockets of orangish brown and brown sandy clay.			
						Soft orangish brown and dark brown sandy gravelly CLAY with low cobble content. Gravel is fine to coarse angular of brick and occasional coal. Cobbles are of brick. (MADE GROUND) 0.90m - PID test carried out = 1.1ppm.			
1.25	ES		1.35			1.25m - PID test carried out = 1.0ppm.			
1.80	ES		1.85			Dark brown clayey gravelly SAND. Gravel is fine to coarse angular of brick and coal. (MADE GROUND) 1.80m - PID test carried out = 1.4ppm.			
						Trial Pit Complete at 1.850m			
Remarks: Good stability. Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015									
Groundwater: No groundwater encountered.									

THE LAND CONSULTANCY LIMITED				The Land Consultancy Limited T: 01772 610609; M: 07771 800859 email: sfknott@thelandconsultancy.co.uk web: www.thelandconsultancy.co.uk		Trial Pit No TP2 Sheet 1 of 1	
Project Name Commercial Street, Manchester M15 4PZ			Project No. TLC1143		Coords: E: N: Level (m AOD):		Date 29/04/2021
Location: Commercial Street, Manchester M15 4PZ				Dimensions (m) Depth 1.80 0.60		Scale 1:10	
Client: Infill Developments Ltd						Logged By S.F.Knott	
Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description	
Depth (m)	Type	Results (kPa)					
0.30	ES		0.05			Quartzite GRAVEL. (MADE GROUND)	
			0.10			TARMAC. (MADE GROUND)	
0.80	ES		0.90			Moderately compact black silty gravelly to very gravelly SAND with high cobble and boulder content. Sand contains some ash. Gravel is fine to coarse angular of sandstone, brick, cinder and occasional pottery. Occasional iron and rare timber fragments recovered. Cobbles and boulders are of sandstone and brick. (MADE GROUND)	
						0.30m - PID test carried out = 0.2ppm.	
1.45	ES		1.40			Soft to firm pale yellowish brown sandy gravelly CLAY with low cobble content. Gravel is fine to coarse angular of brick, coal and occasional sandstone. (MADE GROUND)	
						0.80m - PID test carried out = 1.3ppm	
						1.20m - PID test carried out = 1.7ppm.	
						Black clayey gravelly SAND with high cobble content. Sand is coal rich. Gravel is fine to coarse angular. Gravel and cobbles are of brick and sandstone. (MADE GROUND)	
1.80			1.50			1.45m - PID test carried out = 1.9ppm.	
			Dark brown clayey gravelly SAND. Gravel is fine to coarse angular of brick and occasional coal. (MADE GROUND)				
			1.80			Trial Pit Complete at 1.800m	
2							
Remarks: Good stability. Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015							
Groundwater: No groundwater encountered.							

THE LAND CONSULTANCY LIMITED				The Land Consultancy Limited T: 01772 610609; M: 07771 800859 email: sfknott@thelandconsultancy.co.uk web: www.thelandconsultancy.co.uk		Trial Pit No TP3 Sheet 1 of 1	
Project Name Commercial Street, Manchester M15 4PZ			Project No. TLC1143		Coords: E: N: Level (m AOD):		Date 29/04/2021
Location: Commercial Street, Manchester M15 4PZ				Dimensions (m) Depth 1.80 0.70		Scale 1:10	
Client: Infill Developments Ltd						Logged By S.F.Knott	
Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description	
Depth (m)	Type	Results (kPa)					
0.30	ES		0.07			2cm of quartzite gravel over TARMAC. (MADE GROUND)	
						Compact dark brownish grey and dark grey very gravelly SAND with high cobble and boulder content. Sand is locally ashy. Gravel is fine to coarse angular of sandstone, brick, pot drainage pipe, occasional cinder and pottery. Cobbles and boulders are of sandstone and brick. Deposit contains some clay pockets. (MADE GROUND)	
						0.30m - PID test carried out = 1.5ppm.	
0.70	ES		0.50			Firm to stiff brown, dark brown, yellow and yellowish brown sandy gravelly CLAY with low cobble content. Gravel is fine to coarse of brick and occasional sandstone. Cobbles are of sandstone. (MADE GROUND)	
						>0.70m - Soft. 0.70m - PID test carried out = 2.2ppm.	
1.30	ES						
						1.30m - PID test carried out = 1.7ppm.	
			1.50			Dark greyish brown clayey slightly gravelly SAND. Gravel is of sandstone, brick and occasional coal. (MADE GROUND)	
						1.70m - PID test carried out = 0.8ppm.	
			1.80			Trial Pit Complete at 1.800m	
1							
2							
Remarks: Good stability. Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015							
Groundwater: No groundwater encountered.							

Trial Pit No
TP4
Sheet 1 of 1

Project Name	Project No.	Coords: E:	N:	Date
Commercial Street, Manchester M15 4PZ	TLC1143	Level (m AOD):		29/04/2021
Location:	Commercial Street, Manchester M15 4PZ	Dimensions (m)		Scale
		Depth	2.75	1:10
Client:	Infill Developments Ltd	1.90	0.60	Logged By
				S.F.Knott

Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description	
Depth (m)	Type	Results (kPa)					
0.25	ES		0.10			1cm of quartzite gravel over TARMAC. (MADE GROUND)	
						Very compact black very gravelly SAND with high cobble and boulder content. Sand is contain some ash. Gravel is fine to coarse angular of cinder, brick, sandstone, occasional slate and pottery. Occasional fragments of polythene recovered. Cobbles and boulders are of sandstone and brick. Deposit becomes increasing ash and cinder rich towards base. (MADE GROUND) 0.25m - PID test carried out = 1.5ppm.	
0.70	ES		0.60			Firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded to angular off sandstone, coal and brick. Occasional brick cobble noted. (MADE GROUND) 0.70m - PID test carried out = 2.0ppm. >0.80m - Soft very sandy and slightly gravelly. 1.20m - PID test carried out = 1.7ppm.	1
1.80	ES		1.70			Brown very clayey slightly gravelly SAND. Gravel is fine and medium subangular of coal and sandstone. (Natural ?) 1.80m - PID test carried out = 1.1ppm.	
			1.90			Trial Pit Complete at 1.900m	2

Remarks:	Good stability. Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015
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Groundwater: No groundwater encountered.

THE LAND CONSULTANCY LIMITED				The Land Consultancy Limited T: 01772 610609; M: 07771 800859 email: sfknott@thelandconsultancy.co.uk web: www.thelandconsultancy.co.uk		Trial Pit No TP5 Sheet 1 of 2		
Project Name Commercial Street, Manchester M15 4PZ			Project No. TLC1143		Coords: E: N: Level (m AOD):		Date 29/04/2021	
Location: Commercial Street, Manchester M15 4PZ				Dimensions (m) Depth 2.20 0.60			Scale 1:10	
Client: Infill Developments Ltd							Logged By S.F.Knott	
Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description		
Depth (m)	Type	Results (kPa)						
0.40	ES		0.08			2cm layer of quartzite gravel over TARMAC. (MADE GROUND)		
			0.25			Compact dark grey/black very gravelly SAND with low cobble content. Sand is ash rich. Gravel is fine to coarse angular of cinder and occasional brick. Cobbles are of brick. (MADE GROUND)		
						Moderately compact brown and dark grey very gravelly SAND with high cobble and boulder content. Gravel is fine to coarse angular. Gravel, cobbles and boulders are of brick and sandstone. (MADE GROUND)		
0.75	ES		0.60			Soft to firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse of sandstone. (MADE GROUND)		
						0.90		Reddish brown slightly silty gravelly SAND. Gravel is fine to coarse angular of extremely weak reddish brown sandstone. (MADE GROUND - Reworked weathered Sherwood Sandstone)
								1.10
1.40	ES		1.35			Dark grey clayey gravelly SAND. Gravel is fine to coarse angular of sandstone, coal and rare brick. (MADE GROUND)		
			1.80			Soft brown very sandy slightly gravelly CLAY. Gravel is fine and medium angular of coal. (Natural Strata?)		
Remarks: Good stability. Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015								
Groundwater: No groundwater encountered								

Trial Pit No
TP5
Sheet 2 of 2

Date
29/04/2021

Scale

Logged By
S.F.Knott

Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description	
Depth (m)	Type	Results (kPa)					
			2.20			2.00m - PID test carried out - 2.0ppm.	3
						Trial Pit Complete at 2.200m	
							4

Groundwater: No groundwater encountered

THE LAND CONSULTANCY LIMITED					The Land Consultancy Limited T: 01772 610609; M: 07771 800859 email: sfknott@thelandconsultancy.co.uk web: www.thelandconsultancy.co.uk		Trial Pit No TP6 Sheet 1 of 1		
Project Name Commercial Street, Manchester M15 4PZ			Project No. TLC1143		Coords: E: N: Level (m AOD):		Date 29/04/2021		
Location: Commercial Street, Manchester M15 4PZ					Dimensions (m) Depth 1.80 0.60 2.70			Scale 1:10	
Client: Infill Developments Ltd								Logged By S.F.Knott	
Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description			
Depth (m)	Type	Results (kPa)							
0.20	ES		0.08			Quartzite gravel over TARMAC. (MADE GROUND)			
						Compact black very gravelly SAND with high cobble and boulder content. Sand is ash rich. Gravel is fine to coarse angular of cinder, sandstone, brick and occasional pottery. Cobbles and boulders are of brick and sandstone. Occasional rusted iron fragments recovered. Brick wall encountered in north face of pit - base not proven due to pit stability fears adjacent to road. (MADE GROUND) 0.20m - PID test carried out = 1.8ppm			
0.90	ES					>0.50m - Slightly ashy to ashy. Cinder gravel rare.			
						0.70m - 1m sized sandstone boulder recovered.			
						0.90m - PID test carried out = 1.3ppm.			
						>1.00m - Low cobble and boulder content.			
1.80	ES		1.80			1.30m - PID test carried out = 1.1ppm.			
						Trial Pit Complete at 1.800m			
Remarks: Good stability. Brick wall encountered to 1.80m (base not proven). Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015									
Groundwater: No groundwater encountered									

THE LAND CONSULTANCY LIMITED				The Land Consultancy Limited T: 01772 610609; M: 07771 800859 email: sfknott@thelandconsultancy.co.uk web: www.thelandconsultancy.co.uk		Trial Pit No TP7 Sheet 1 of 1	
Project Name Commercial Street, Manchester M15 4PZ			Project No. TLC1143		Coords: E: N: Level (m AOD):		Date 29/04/2021
Location: Commercial Street, Manchester M15 4PZ				Dimensions (m) Depth 1.80 0.60		Scale 1:10	
Client: Infill Developments Ltd						Logged By S.F.Knott	
Samples and In-Situ Tests			Depth (m)	Level (m OD)	Legend	Stratum Description	
Depth (m)	Type	Results (kPa)					
0.25	ES		0.05			Quartzite GRAVEL. (MADE GROUND)	
			0.15			TARMAC. (MADE GROUND)	
0.65	ES		0.45			Compact black gravelly SAND with low to medium cobble content. Sand is slightly ashy. Gravel is fine to coarse angular of brick, sandstone, occasional pot drain pipe, cinder and pottery. Cobbles are of brick. (MADE GROUND) 0.25m - PID test carried out = 3.3ppm.	
			0.65			Orangish brown clayey to very clayey gravelly SAND with low cobble content. Deposit sometimes grades into a very sandy clay. Gravel is fine to coarse subangular to angular of sandstone and occasional brick and pot drainage pipe. Cobbles are of brick. (MADE GROUND) 0.65m - PID test carried out = 2.5ppm.	
1.40	ES		1.30			Firm dark grey very sandy slightly gravelly CLAY. Slightly organic rich. Gravel is fine to coarse angular to subrounded of sandstone, coal and occasional brick. (MADE GROUND) 1.40m - PID test carried out = 4.2ppm.	
			1.60			Soft brown sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of coal and occasional sandstone. (Natural Strata?) 1.70m - PID test carried out = 1.8ppm.	
			1.80			Trial Pit Complete at 1.800m	
1							
2							
Remarks: Good stability. Excavated using a JCB 3CX Sitemaster. Trial pit was backfilled with compacted excavated arisings on completion. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Ltd to BS5930 2015							
Groundwater: No groundwater encountered.							

The Land Consultancy Limited		Contract Name: Commercial Street, Manchester M15 4PZ			Client: Infill Developments Ltd		Borehole ID: WS1							
		Contract Number: TLC1143	Date Started: 28/04/2021	Logged By: S.F.Knott	Start Date: 28/04/2021	End Date: 28/04/2021	Sheet 1 of 1							
T: 01772 610609 sfknott@thelandconsultancy.co.uk www.thelandconsultancy.co.uk		Easting:	Northing:	Ground Level (mAOD):	Hole Type: Windowless Sampling		Scale: 1:25							
Drilling Contractor / Drillers LOT Geotechnics Ltd / Keith Evans & Mick Worthington			Method / Plant Used Archway Competitor Dart Windowless Sampling Rig			Weather / Ground Conditions Weather: Mainly dry, overcast, windy, T=8-12C / Dry								
Samples & In Situ Testing			Strata Details					Groundwater						
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation				
0.20	ES1	SPT(S) 1.20m, N=8 (1,4/3,2,1,2)		(0.45)		1 to 2cm thick layer of quartzite gravel over compact black slightly silty gravelly SAND. Sand is ash rich. Gravel is fine to coarse angular of cinders, brick and sandstone. (MADE GROUND) 0.20m - PID test carried out = 0.7ppm.			1					
0.60	ES2			0.45		Brown gravelly SAND with low cobble content. Gravel is fine to coarse angular of brick and sandstone. Cobbles are of brick. (MADE GROUND) 0.60m - PID test carried out = 1.7ppm.								
				0.90		Soft brown sandy CLAY. (MADE GROUND)								
1.50 - 1.60	ES3	SPT(S) 2.00m, N=7 (1,0/1,1,2,3)		1.15		Dark brownish grey slightly clayey gravelly SAND. Gravel is fine to coarse angular of brick, cinder and coal. (MADE GROUND) 1.15 to 1.30m - PID test carried out = 1.4ppm.			2					
				1.30		Firm brown very sandy gravelly CLAY. Deposit often grades into a very clayey gravelly sand. Gravel is fine to coarse angular to subangular of sandstone and coal. (Probable MADE GROUND) 1.50 to 1.60m - PID test carried out = 1.9ppm.								
				(0.30)		Firm brown and orangish brown sandy CLAY.								
1.90	ES4	SPT(S) 3.00m, N=39 (5,7/8,10,10,11)		(0.50)		1.90m - PID test carried out = 1.4ppm.			3					
				2.10		Brown slightly silty SAND.								
2.50	ES5			(1.55)		>2.50m - Pale grey and yellowish beige. 2.50m - PID test carried out = 1.4ppm.								
		SPT(C) 3.80m, 0 (50 for 100mm/,...)				>3.00m - Grey and gravelly. Gravel is fine to coarse subrounded of sandstone.			4					
						3.20 to 3.40m - PID test carried out = 2.3ppm.								
3.80	ES6			3.65		Very dense dark reddish brown silty gravelly SAND. Gravel is angular of very weak reddish brown sandstone. (Weathered Sherwood Sandstone)			5					
				3.90		3.80m - PID test carried out = 2.7ppm.								
					End of Borehole at 3.90m									
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Hand pit excavated to 1.20m depth to clear services. No groundwater encountered. Galvanised stainless steel monitoring pipes used. Gas taps fitted and protected by a 6" cast iron cover set in concrete flush with the surrounding ground. Filter pack comprised of 10mm washed pea gravel. Seals formed using bentonite granules - small amounts of tap water were poured on the granules to help them go off. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Limited to BS5930:2015.					
Chiselling					Installation			Water Strikes						
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Depth Strike	Depth Casing	Depth Sealed	Time (mins)	Rose To (m)	Remarks
					0.00	0.50	PLAIN	19						
					0.50	1.60	SLOTTED	19						
					0.00	2.10	PLAIN	19						

The Land Consultancy Limited	Contract Name: Commercial Street, Manchester M15 4PZ		Client: Infill Developments Ltd			Borehole ID: WS2							
	Contract Number: TLC1143	Date Started: 28/04/2021	Logged By: S.F.Knott	Start Date: 28/04/2021	End Date: 28/04/2021	Sheet 1 of 1							
	Easting:		Northing:	Ground Level (mAOD):	Hole Type: Windowless Sampling		Scale: 1:25						
T: 01772 610609 sfknott@thelandconsultancy.co.uk www.thelandconsultancy.co.uk		Drilling Contractor / Drillers LOT Geotechnics Ltd / Keith Evans & Mick Worthington		Method / Plant Used Archway Competitor Dart Windowless Sampling Rig		Weather / Ground Conditions Weather: Dry, overcast, windy, T=8-12C / Dry							
Samples & In Situ Testing		Strata Details				Groundwater							
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation					
0.25	ES1	SPT(S) 1.20m, N=0 (0,0/0,0,0,0)		(1.00)		Compact dark grey very gravelly SAND with medium to high cobble content. Sand is slightly ashy. Gravel is fine to coarse angular of brick and sandstone. Cobbles are of sandstone and brick. Occasional polythene , metal pipe and wood fragments noted. (MADE GROUND) 0.25m - PID test carried out = 1.3ppm. >0.50m - Cinder gravel also recovered.	1						
0.90	ES2			1.00		Very soft to soft yellowish orangish brown very sandy CLAY with occasional gravel. Gravel is of brick. (MADE GROUND) 0.90m - PID test carried out = 1.1ppm.							
1.80	ES3			(0.60)		Brownish grey slightly to very clayey gravelly SAND. Gravel is fine and medium angular of coal and gravel. (MADE GROUND) 1.30m - PI test carried out = 1.9ppm.							
1.80	ES3	SPT(S) 2.00m, N=0 (0,0/0,0,0,0)		2.00		Very soft to soft brown slightly sandy CLAY.	2						
2.70 - 2.80	ES4			(0.70)		>2.65m - Firm to stiff yellowish brown.							
3.30 - 3.40	ES5			2.70		Grey and pale yellowish brown very sandy SILT. Sand is fine. 2.70 to 2.80m - PID test carried out = 2.1ppm.							
3.30 - 3.40	ES5	SPT(S) 3.00m, N=40 (1,3/5,7,10,18)		3.10		Pale brownish grey silty SAND.	3						
				(0.40)		3.30 to 3.40m - PID test carried out = 1.2ppm.							
				3.55		>3.45m - Gravelly. Gravel is fine to coarse subangular to subrounded of sandstone.							
		SPT(C) 3.60m, 0 (50 for 105mm/,,)		3.71		Very dense reddish brown slightly silty fine and medium grained SAND. (Weathered Sherwood SSandstone) 3.55 to 3.60m - PID test carried out = 1.1ppm. End of Borehole at 3.71m	4						
Start & End of Shift Observations		Borehole Diameter		Casing Diameter		Remarks:							
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Hand pit excavated to 1.20m depth to clear services. No groundwater encountered. Galvanised stainless steel monitoring pipes used. Gas taps fitted and protected by a 6" cast iron cover set in concrete flush with the surrounding ground. Filter pack comprised of 10mm washed pea gravel. Seals formed using bentonite granules - small amounts of tap water were poured on the granules to help them go off. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Limited to BS5930:2015.				
Chiselling		Installation		Water Strikes									
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Depth Strike	Depth Casing	Depth Sealed	Time (mins)	Rose To (m)	Remarks
				0.00	0.50	PLAIN	19						
				0.50	1.57	SLOTTED	19						
				0.00	2.10	PLAIN	19						

[illegible]

[illegible]

The Land Consultancy Limited	Contract Name: Commercial Street, Manchester M15 4PZ		Client: Infill Developments Ltd		Borehole ID: WS5								
	Contract Number: TLC1143	Date Started: 28/04/2021	Logged By: S.F.Knott	Start Date: 28/04/2021	End Date: 28/04/2021	Sheet 1 of 1							
	Easting:		Northing:	Ground Level (mAOD):	Hole Type: Windowless Sampling	Scale: 1:25							
T: 01772 610609 sfknott@thelandconsultancy.co.uk www.thelandconsultancy.co.uk													
Drilling Contractor / Drillers LOT Geotechnics Ltd / Keith Evans & Mick Worthington		Method / Plant Used Archway Competitor Dart Windowless Sampling Rig		Weather / Ground Conditions Weather: Dry, overcast, windy, T=8-12C / Dry									
Samples & In Situ Testing			Strata Details			Groundwater							
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation					
0.30	ES1			0.05		Quartzite GRAVEL. (MADE GROUND)							
				0.15		TARMAC. (MADE GROUND)							
0.80	ES2	SPT(S) 1.20m, N=0 (0,0/0,0,0,0)		(0.55)		Compact black very gravelly SAND with high cobble content. Gravel is fine to coarse angular of sandstone, brick and occasional pottery. Cobbles are of sandstone and brick. (MADE GROUND) 0.30m - PID test carried out = 1.7ppm.	1						
						0.70			Soft to soft to firm brown, pale yellowish brown and dark grey sandy gravelly CLAY. Gravel is fine to coarse angular of brick, sandstone and occasional clinker. (MADE GROUND) 0.80m - PID test carried out = 1.2ppm.>1.00m - Very soft and soft.				
1.60	ES3	SPT(S) 2.00m, N=4 (0,0/1,0,1,2)		(0.40)		Very soft to firm dark brownish grey very sandy gravelly CLAY. Gravel is fine to coarse angular of coal and brick. (MADE GROUND) 1.60m - PID test carried out = 1.5ppm.	2						
						1.65			Brown very clayey fine and medium grained SAND and soft very sandy CLAY. 1.90m - PID test carried out = 1.3ppm.				
2.50	ES4	SPT(S) 3.00m, N=7 (1,0/1,2,2,2)		(1.70)		Dark brown fine and medium grained SAND.>2.35m - Pale brown. 2.50m - PID test carried out = 1.4ppm.	3						
						3.70			Greyish brown SAND and GRAVEL. Gravel is fine to coarse subrounded to subangular of sandstone.				
3.50	ES5	SPT() 4.00m, 40 (10,13/40 for 255mm)		(0.55)		Very dense dark reddish brown slightly silty fine and medium grained SAND. (Weathered Sherwood Sandstone) End of Borehole at 4.33m	4						
						4.25							
				4.33			5						
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Hand pit excavated to 1.20m depth to clear services. No groundwater encountered. Galvanised stainless steel monitoring pipes used. Gas taps fitted and protected by a 6" cast iron cover set in concrete flush with the surrounding ground. Filter pack comprised of 10mm washed pea gravel. Seals formed using bentonite granules - small amounts of tap water were poured on the granules to help them go off. Recovered soils were logged by Dr Stephen Knott of The Land Consultancy Limited to BS5930:2015.				
Chiselling			Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Depth Strike	Depth Casing	Depth Sealed	Time (mins)	Rose To (m)	Remarks
				0.00	0.50	PLAIN	19						
				0.50	1.55	SLOTTED	19						
				0.00	2.10	PLAIN	19						

APPENDIX D

EA 'PRODUCT 4' MAPS

Flood risk assessment data

Location of site: 383431 / 397433 (shown as easting and northing coordinates)

Document created on: 18 March 2025

This information was previously known as a product 4.

Customer reference number: GAR4N2W6FBFF

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- past floods
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- flood defences and attributes

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is Manchester District.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Manchester Ship Canal 2018

Scenario(s): No defences exist fluvial, no defences exist climate change fluvial

Date: 1 May 2020

Model name: River Medlock 2011

Scenario(s): No defences exist fluvial, no defences exist climate change fluvial

Date: 22 December 2010

These models contain the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.



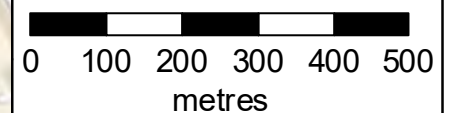
Flood map for planning

Location (easting/northing)
383431/397433

Scale
1:10,000

Created
18 Mar 2025

-  Selected area
-  Main river
-  Flood zone 3
-  Flood zone 2



Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

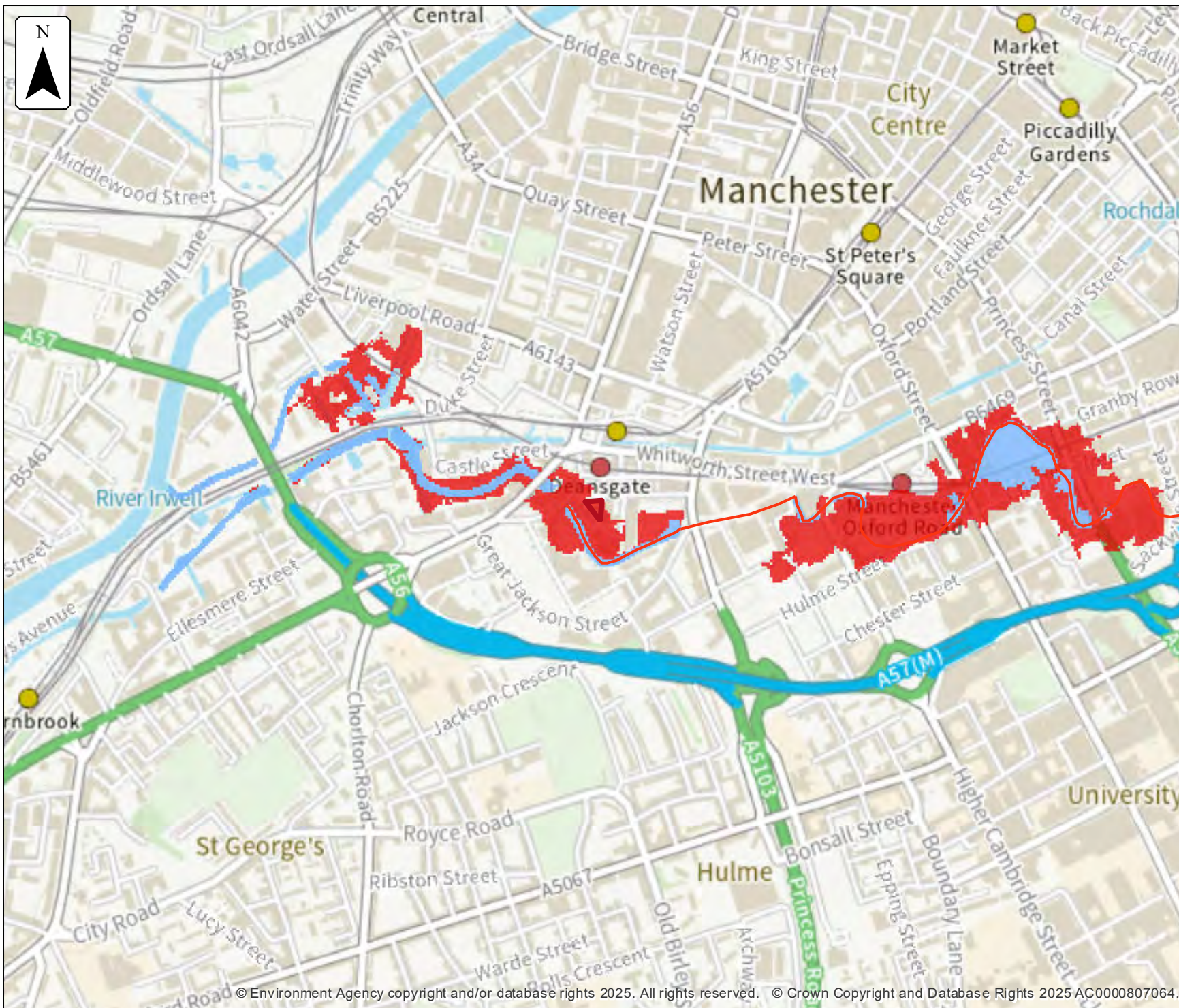
The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- No defences exist modelled fluvial: risk of flooding from rivers where there are no flood defences
- No defences exist climate change modelled fluvial: risk of flooding from rivers where there are no flood defences, including estimated impact of climate change



No defences exist modelled fluvial extent

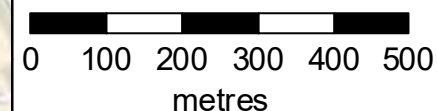
Location (easting/northing)
383431/397433

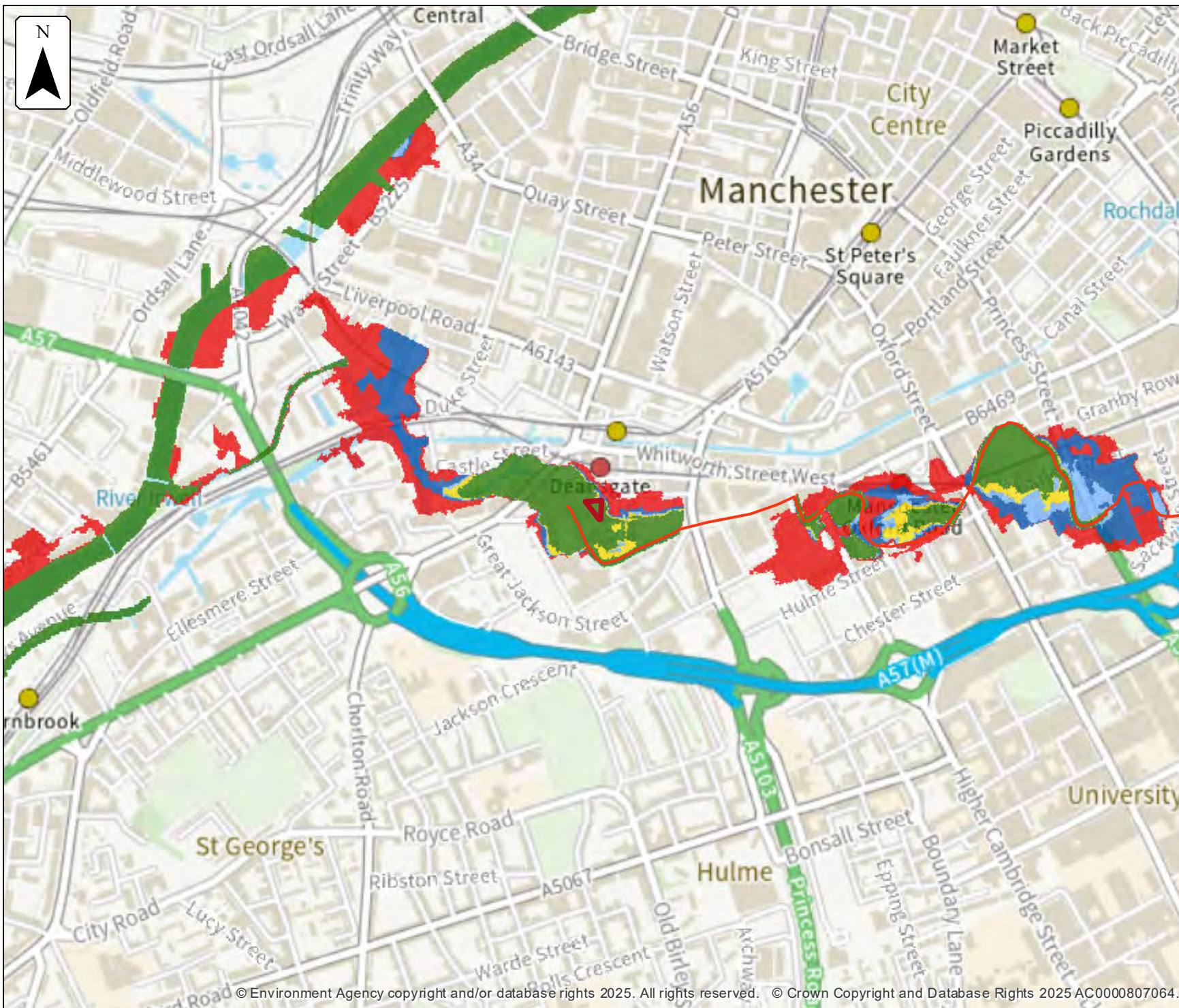
Scale Created
1:10,000 18 Mar 2025

Model name
River Medlock 2011

-  Selected area
-  Main river
- Modelled flood extent
 -  1% AEP
 -  0.1% AEP

Flood extents may not be
visible where they overlap
other return periods





**No defences exist
modelled fluvial extent**

Location (easting/northing)
383431/397433

Scale Created
1:10,000 18 Mar 2025

Model name
Manchester Ship 2018

Selected area

Main river

Modelled flood extent

2% AEP

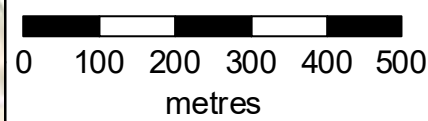
1.33% AEP

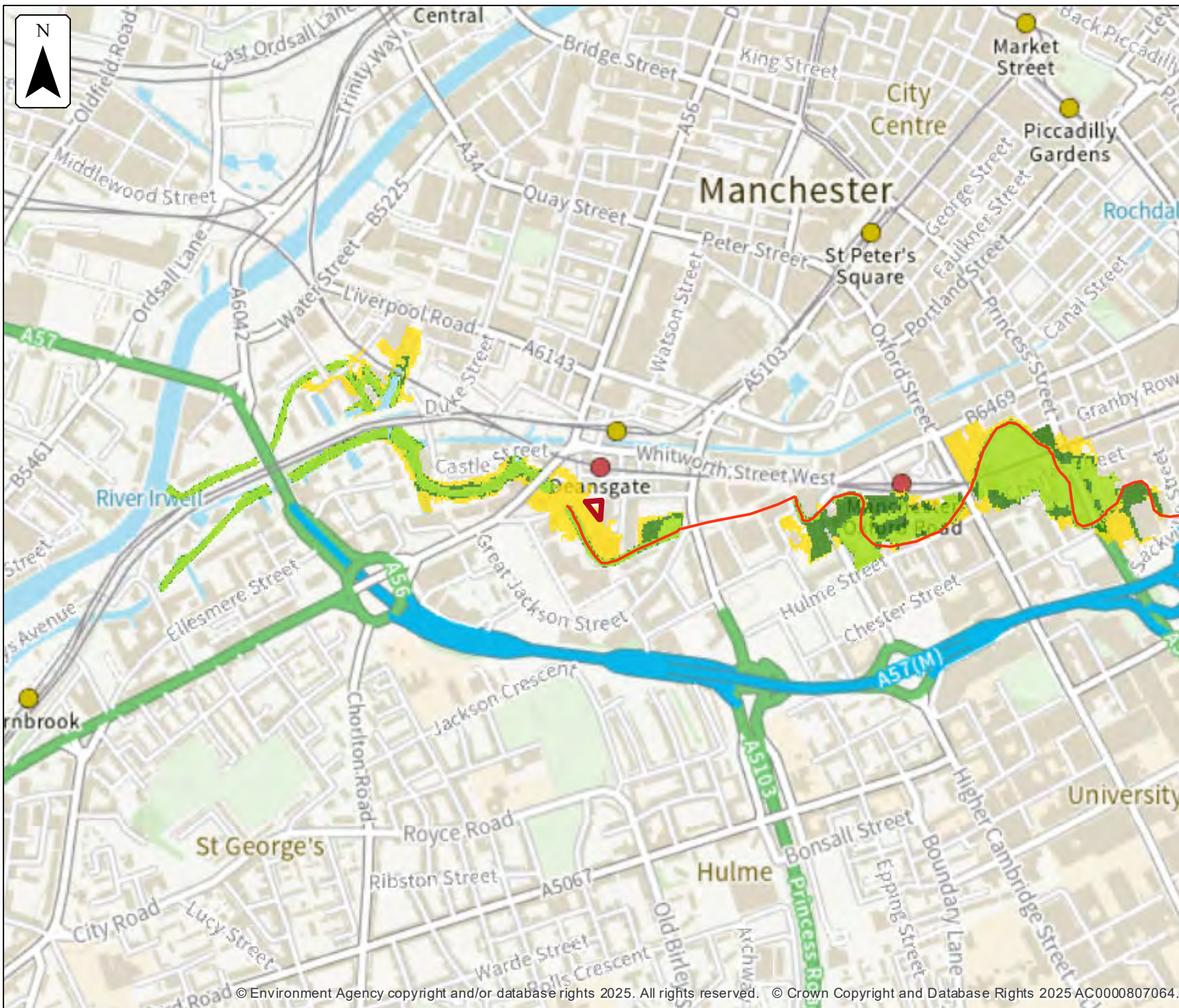
1% AEP

0.5% AEP

0.1% AEP

Flood extents may not be
visible where they overlap
other return periods





No defences exist climate change modelled fluvial extent

Location (easting/northing)
383431/397433

Scale Created
1:10,000 18 Mar 2025

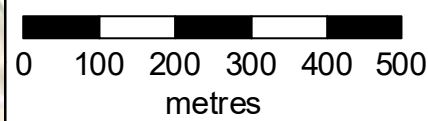
Model name
River Medlock 2011

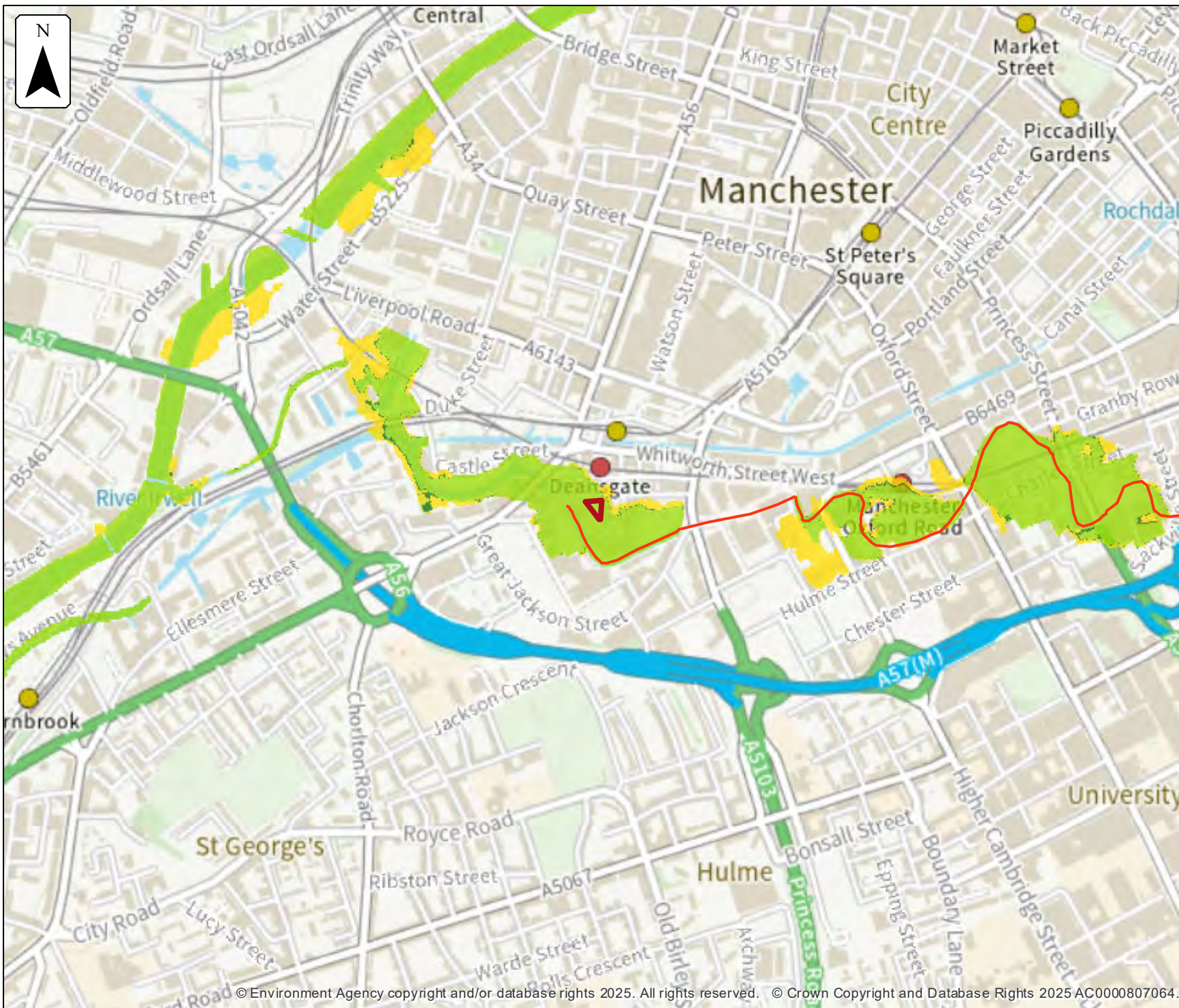
- Selected area
- Main river

Modelled flood extent

- 1% AEP (+20%)
- 1% AEP (+35%)
- 1% AEP (+70%)

Flood extents may not be
visible where they overlap
other return periods





**No defences exist
climate change
modelled fluvial extent**

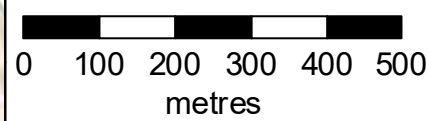
Location (easting/northing)
383431/397433

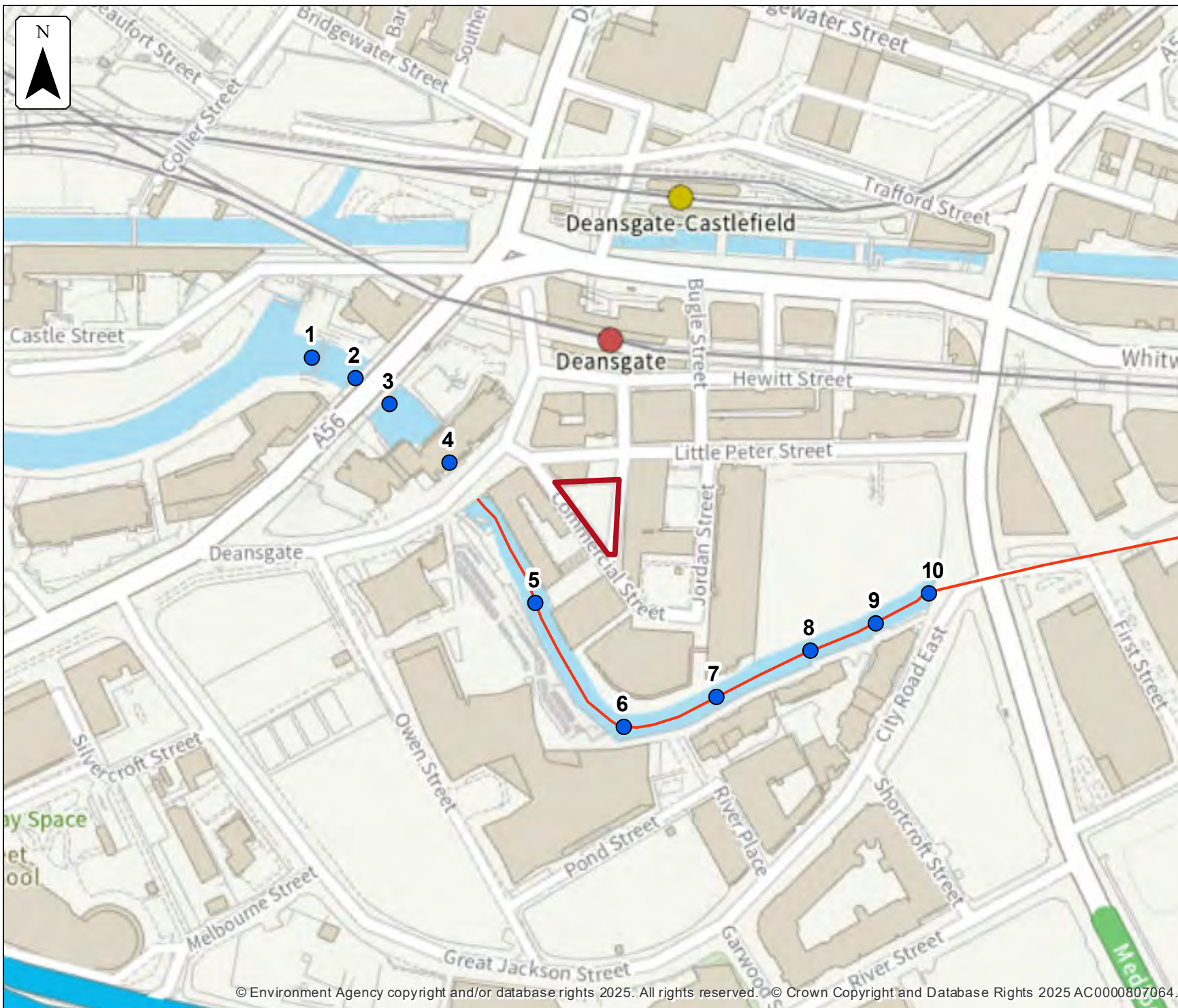
Scale Created
1:10,000 18 Mar 2025

Model name
Manchester Ship 2018

- Selected area
- Main river
- Modelled flood extent
 - 1% AEP (+30%)
 - 1% AEP (+35%)
 - 1% AEP (+70%)

Flood extents may not be
visible where they overlap
other return periods





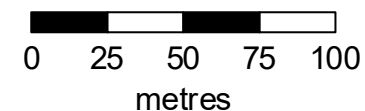
No defences exist modelled fluvial node locations

Location (easting/northing)
383431/397433

Scale Created
1:2,500 18 Mar 2025

Model name
River Medlock 2011

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

No defences exist

Label	Modelled location ID	Easting	Northing	4% AEP	1% AEP	0.1% AEP	4% AEP	1% AEP	0.1% AEP
				Level	Level	Level	Flow	Flow	Flow
1	1468185	383294	397506	25.57	25.74	26.44	38.44	46.14	67.36
2	1468155	383315	397495	25.61	25.79	26.67	38.45	46.15	75.23
3	1468172	383332	397483	25.66	25.85	27.05	38.45	46.15	75.23
4	1468034	383360	397455	25.75	25.96	27.23	38.45	46.15	58.78
5	1468122	383402	397387	27.76	28.06	29.15	51.45	59.54	89.62
6	1468046	383446	397326	27.82	28.13	29.22	51.45	59.55	88.55
7	1468053	383490	397341	27.82	28.12	29.18	51.45	59.55	89.50
8	1468052	383536	397363	27.88	28.18	29.40	51.45	59.55	71.32
9	1468141	383568	397377	28.05	28.36	29.52	51.45	59.50	68.04
10	1468117	383593	397391	28.23	28.54	29.55	51.47	59.55	89.52

Data in this table comes from the River Medlock 2011 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.

If no level or flow data is available for a scenario, no table will be shown.



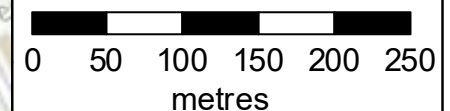
Modelled node locations

Location (easting/northing)
383431/397433

Scale Created
1:5,000 18 Mar 2025

Model name
Manchester Ship 2018

-  Selected area
-  Modelled location
-  Main river



Map Reference	Model Node Reference	Easting	Northing	Data	Normal Operation											Latchford 1 Gate Closed	Latchford 3 Gates Closed	
					20 % AEP (1 in 5 year)	10 % AEP (1 in 10 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year)	0.1 % AEP (1 in 1000 year)
1	ea013_0251_MEDL01_0000u	383369.115	397443.66	Modelled Water Level (m aodN)	28.59	28.73	28.88	29.03	29.12	29.19	29.46	29.51	29.81	29.39	30.11	29.19	29.19	30.12
				Modelled Flow (cumecs)	32.90	38.43	45.39	52.76	57.93	62.30	79.44	82.26	104.14	74.62	127.68	62.30	62.30	128.24
2	ea013_0251_MEDL01_0034	383384	397422	Modelled Water Level (m aodN)	28.59	28.73	28.88	29.03	29.12	29.20	29.47	29.51	29.82	29.39	30.12	29.20	29.20	30.12
				Modelled Flow (cumecs)	32.84	38.36	45.30	52.66	57.81	62.16	79.29	82.10	103.97	74.37	127.34	62.19	62.19	127.72
3	ea013_0251_MEDL01_0074	383407	397374	Modelled Water Level (m aodN)	28.60	28.74	28.89	29.04	29.13	29.20	29.48	29.52	29.82	29.40	30.11	29.20	29.20	30.12
				Modelled Flow (cumecs)	32.59	38.06	44.95	52.25	57.36	61.70	78.66	81.45	103.23	73.80	125.99	61.70	61.70	126.16
4	ea013_0251_MEDL01_0165	383473	397334	Modelled Water Level (m aodN)	28.61	28.76	28.92	29.07	29.16	29.24	29.54	29.58	29.91	29.45	30.23	29.24	29.24	30.23
				Modelled Flow (cumecs)	32.42	37.86	44.71	51.98	57.06	61.38	78.24	81.02	102.79	73.41	124.41	61.38	61.38	124.61
5	ea013_0251_MEDL01_0270	383566	397375	Modelled Water Level (m aodN)	28.64	28.80	28.96	29.12	29.23	29.31	29.62	29.67	30.03	29.54	30.35	29.31	29.31	30.35
				Modelled Flow (cumecs)	32.32	37.75	44.58	51.82	56.89	61.19	78.00	80.77	102.62	73.19	122.66	61.19	61.19	122.77
6	ea013_0251_MEDL01_0298	383596	397397	Modelled Water Level (m aodN)	28.65	28.80	28.97	29.14	29.24	29.33	29.64	29.69	30.05	29.56	30.38	29.33	29.33	30.38
				Modelled Flow (cumecs)	32.22	37.62	44.43	51.65	56.71	60.99	77.74	80.50	102.31	72.96	121.91	61.00	61.00	121.93
7	ea013_0251_MEDL01_0532	383822	397436	Modelled Water Level (m aodN)	28.78	28.96	29.17	29.37	29.51	29.62	30.04	30.11	30.59	29.92	30.92	29.62	29.62	30.92
				Modelled Flow (cumecs)	32.18	37.58	44.38	51.59	56.64	60.92	77.65	80.40	101.99	72.88	122.90	60.92	60.92	122.90
8	ea013_0251_MEDL01_0602d	383838	397409	Modelled Water Level (m aodN)	28.80	28.99	29.20	29.41	29.56	29.67	30.11	30.18	30.67	29.99	31.02	29.67	29.67	31.02
				Modelled Flow (cumecs)	31.95	37.30	44.06	51.21	56.23	60.48	77.07	79.81	100.93	72.35	122.39	60.48	60.48	122.39
9	ea013_0251_MEDL01_0625	383857	397422	Modelled Water Level (m aodN)	28.86	29.06	29.29	29.51	29.66	29.79	30.26	30.34	30.87	30.13	31.28	29.79	29.79	31.28
				Modelled Flow (cumecs)	31.87	37.22	43.95	51.09	56.10	60.34	76.89	79.61	100.61	72.18	122.22	60.34	60.34	122.22
10	ea013_0251_MEDL01_0660	383901	397457	Modelled Water Level (m aodN)	29.01	29.22	29.46	29.70	29.86	29.99	30.48	30.55	31.13	30.34	31.42	29.99	29.99	31.42
				Modelled Flow (cumecs)	31.86	37.21	43.94	51.08	56.09	60.33	76.87	79.60	100.54	72.16	122.20	60.33	60.33	122.20

Model data taken from Manchester Ship Canal 2018

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

Notes:

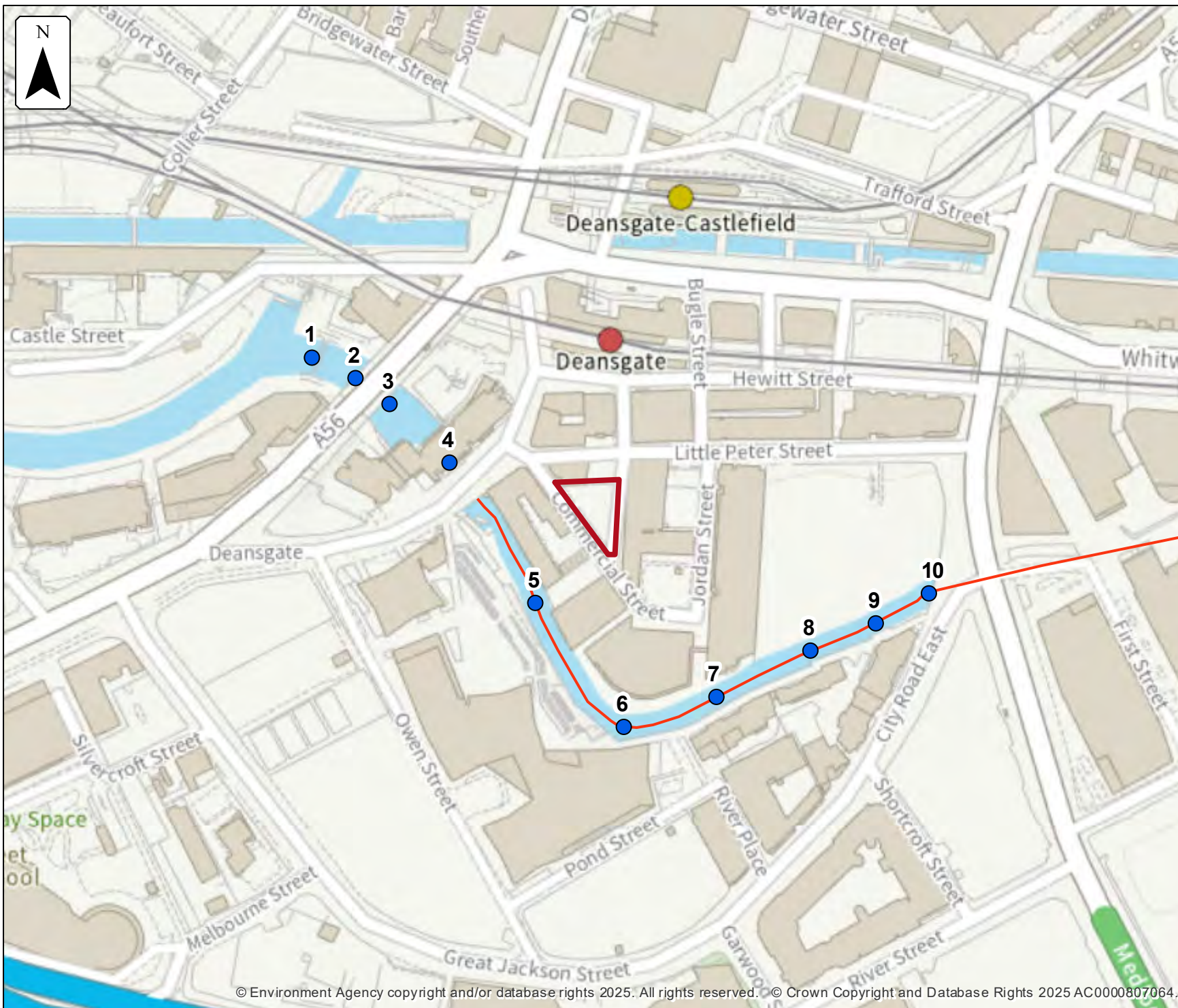
For the Manchester Ship Canal Model, we provide the following three scenarios:

- Normal Operation: All sluice gates operate automatically to maintain a navigable pounded water level upstream of each set of sluice gates. During times of high flow the gates are opened automatically to allow excess water pass downstream. During extreme conditions the sluice gates can be manually overridden to extend the opening heights.
- Latchford 1 Gate Closed Scenario: This scenario represents a single operational sluice gate at Latchford Locks fixed closed. Therefore, only operational movements from 2 active sluice gates. The model setup removes the gate from PID controller setup and an IED file is used to define the sluice gate as fixed in the closed position.
- Latchford 3 Gates Closed Scenario: This scenario has been defined as the removal of operational rules at all three sluice gates at Latchford Locks, thus, all gates are fixed in the closed position resulting in no regulation of upstream water levels. The model setup removes each of the gates from PID controller setup and an IED file is used to define sluice gates fixed in the closed position.

*Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2080's (2070 - 2115).

Please see <https://www.gov.uk/guidance/food-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance.

The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.



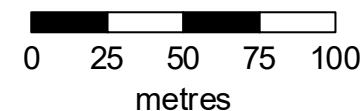
**No defences exist
climate change
modelled fluvial
node locations**

Location (easting/northing)
383431/397433

Scale Created
1:2,500 18 Mar 2025

Model name
River Medlock 2011

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

No defences exist climate change

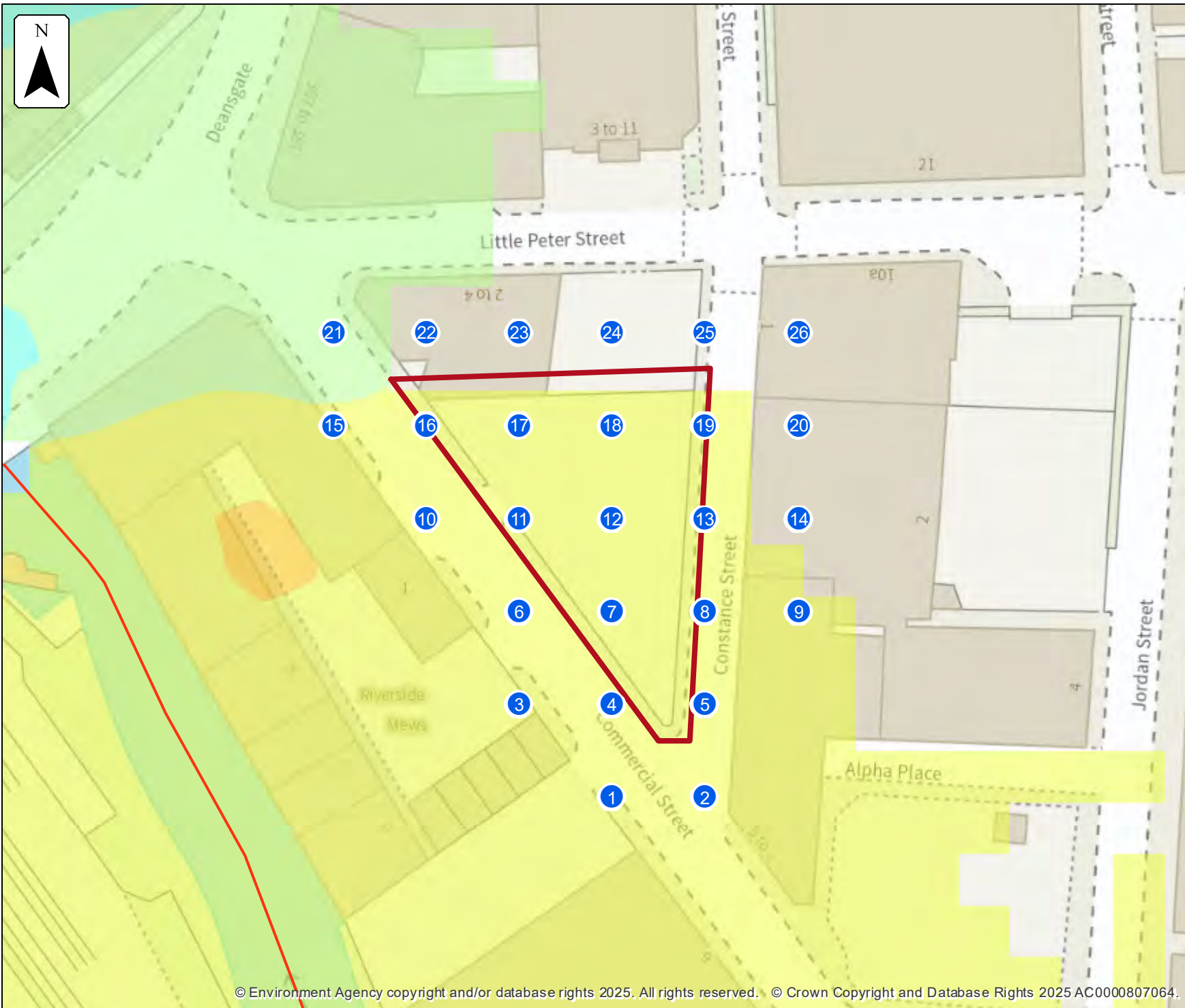
Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+35%)	1% AEP (+70%)	1% AEP (+20%)	1% AEP (+35%)	1% AEP (+70%)
				Level	Level	Level	Flow	Flow	Flow
1	1468185	383294	397506	25.87	25.95	26.20	51.28	54.82	62.23
2	1468155	383315	397495	25.93	26.02	26.30	51.28	54.81	62.96
3	1468172	383332	397483	26.01	26.13	26.49	51.28	54.81	62.96
4	1468034	383360	397455	26.13	26.25	26.65	51.29	54.82	57.07
5	1468122	383402	397387	28.36	28.75	28.98	65.05	69.14	76.91
6	1468046	383446	397326	28.42	28.80	29.04	65.05	69.16	77.04
7	1468053	383490	397341	28.41	28.79	29.02	65.05	69.17	77.09
8	1468052	383536	397363	28.46	28.84	29.14	65.06	67.98	69.84
9	1468141	383568	397377	28.66	29.05	29.30	62.41	62.49	62.50
10	1468117	383593	397391	28.81	29.12	29.34	65.13	69.39	77.12

Data in this table comes from the River Medlock 2011 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.

If no level or flow data is available for a scenario, no table will be shown.



No defences exist modelled fluvial extent and height

Location (easting/northing)
383431/397433

Scale Created
1:500 18 Mar 2025

Model name
River Medlock 2011

Selected area

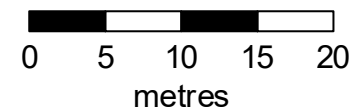
Main river

Modelled 2D grid

Water level in mAOD

- 0 - 28.0
- 28.0 - 28.25
- 28.25 - 28.5
- 28.5 - 28.75
- 28.75 - 29.0
- 29.0 - 29.25
- 29.25 - 29.5
- 29.5 - 29.75
- 29.75 - 30.0

This map shows the
0.1% AEP height data



Sample point data

No defences exist

Label	Easting	Northing	4% AEP	1% AEP	0.1% AEP	4% AEP	1% AEP	0.1% AEP
			Depth	Depth	Depth	Height	Height	Height
1	383433	397405	NoData	NoData	0.72	NoData	NoData	29.18
2	383442	397405	NoData	NoData	0.30	NoData	NoData	29.18
3	383424	397414	NoData	NoData	0.70	NoData	NoData	29.19
4	383433	397414	NoData	NoData	0.68	NoData	NoData	29.18
5	383442	397414	NoData	NoData	0.28	NoData	NoData	29.18
6	383424	397423	NoData	NoData	0.73	NoData	NoData	29.17
7	383433	397423	NoData	NoData	0.43	NoData	NoData	29.18
8	383442	397423	NoData	NoData	0.37	NoData	NoData	29.18
9	383451	397423	NoData	NoData	0.11	NoData	NoData	29.18
10	383415	397432	NoData	NoData	0.75	NoData	NoData	29.14
11	383424	397432	NoData	NoData	0.55	NoData	NoData	29.16
12	383433	397432	NoData	NoData	0.35	NoData	NoData	29.17
13	383442	397432	NoData	NoData	0.32	NoData	NoData	29.18
14	383451	397432	NoData	NoData	NoData	NoData	NoData	NoData
15	383406	397441	NoData	NoData	0.75	NoData	NoData	29.03
16	383415	397441	NoData	NoData	0.48	NoData	NoData	29.06

Label	Easting	Northing	4% AEP	1% AEP	0.1% AEP	4% AEP	1% AEP	0.1% AEP
			Depth	Depth	Depth	Height	Height	Height
17	383424	397441	NoData	NoData	0.07	NoData	NoData	29.15
18	383433	397441	NoData	NoData	0.07	NoData	NoData	29.17
19	383442	397441	NoData	NoData	0.11	NoData	NoData	29.18
20	383451	397441	NoData	NoData	NoData	NoData	NoData	NoData
21	383406	397450	NoData	NoData	0.50	NoData	NoData	28.82
22	383415	397450	NoData	NoData	NoData	NoData	NoData	NoData
23	383424	397450	NoData	NoData	NoData	NoData	NoData	NoData
24	383433	397450	NoData	NoData	NoData	NoData	NoData	NoData
25	383442	397450	NoData	NoData	NoData	NoData	NoData	NoData
26	383451	397450	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			Could not determine	Could not determine	0.66	Could not determine	Could not determine	29.18

Data in this table comes from the River Medlock 2011 model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.

If no height or depth data is available for a scenario, no table will be shown.

'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Manchester District.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

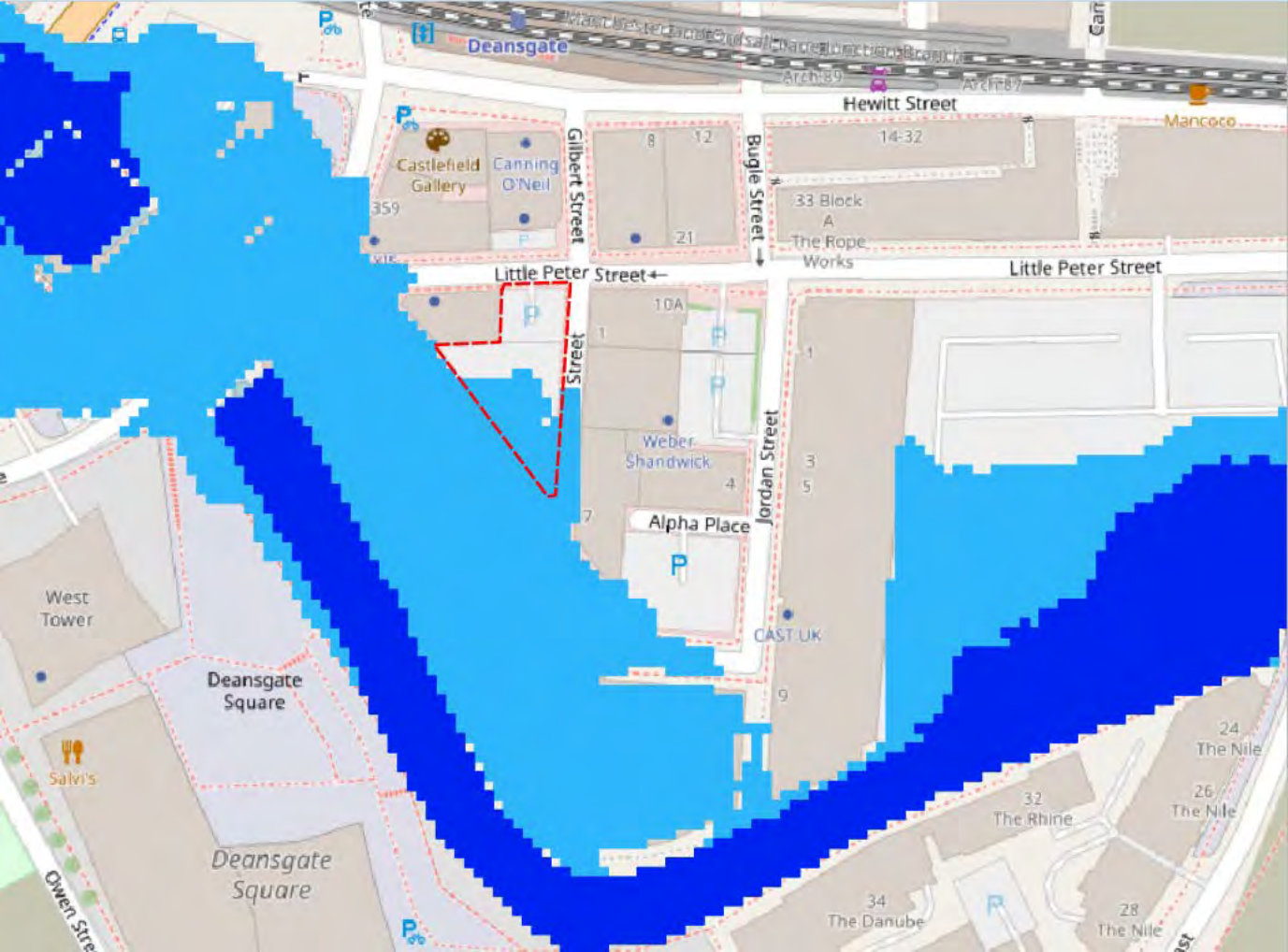
Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

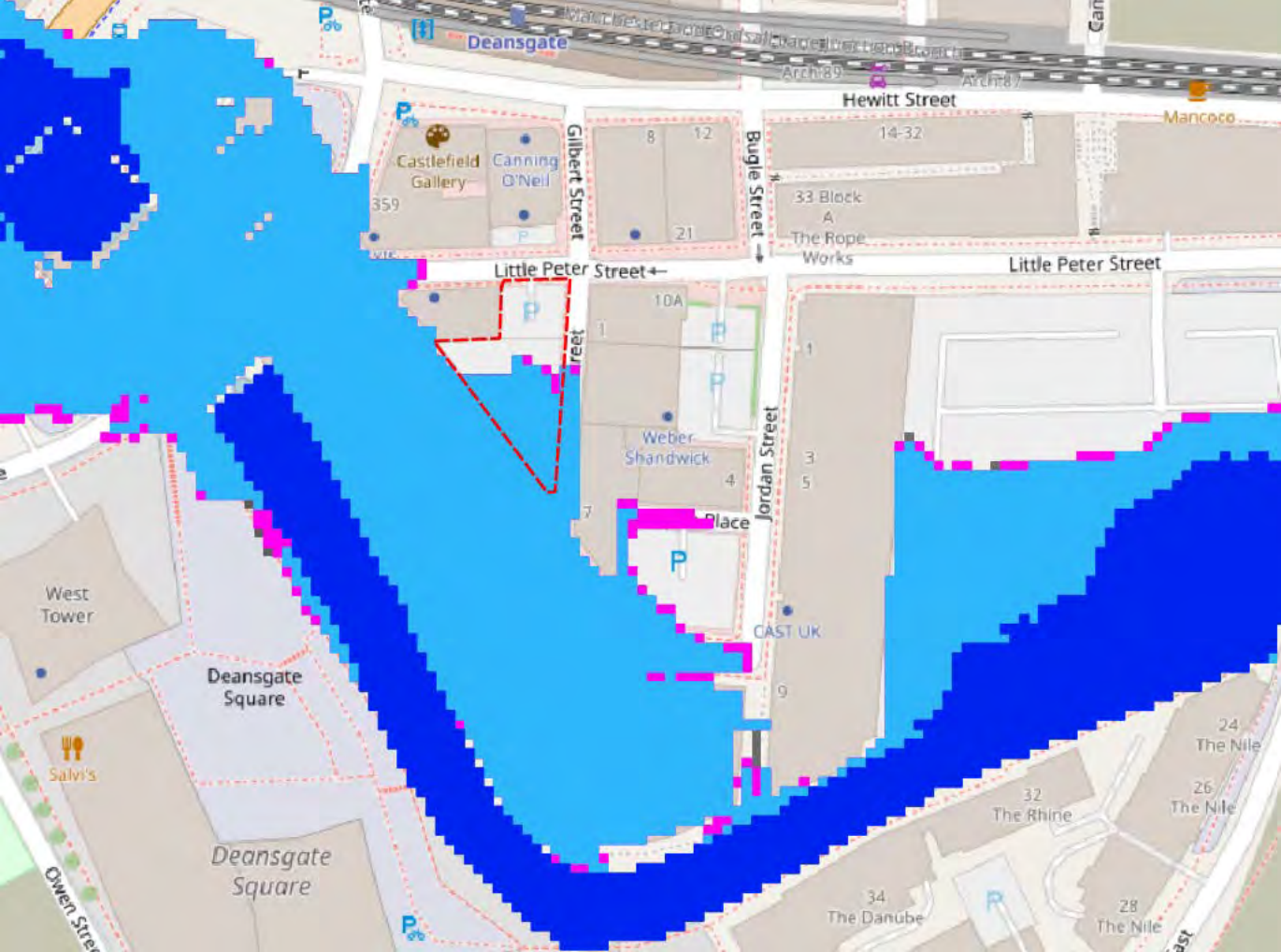
[Find out more about flood risk activity permits](#)

Help and advice

Contact the Greater Manchester Merseyside and Cheshire Environment Agency team at inforequests.gmmc@environment-agency.gov.uk for:

- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for





APPENDIX E

PROPOSED DRAINAGE LAYOUT & DETAILS

TOPOGRAPHICAL NOTES:

The topographical information and buried services shown on this drawing were provided to BKPL by others. BKPL have not verified this information and therefore we can not guarantee its accuracy. The position and alignment of services may differ from that shown and other buried services may be present.

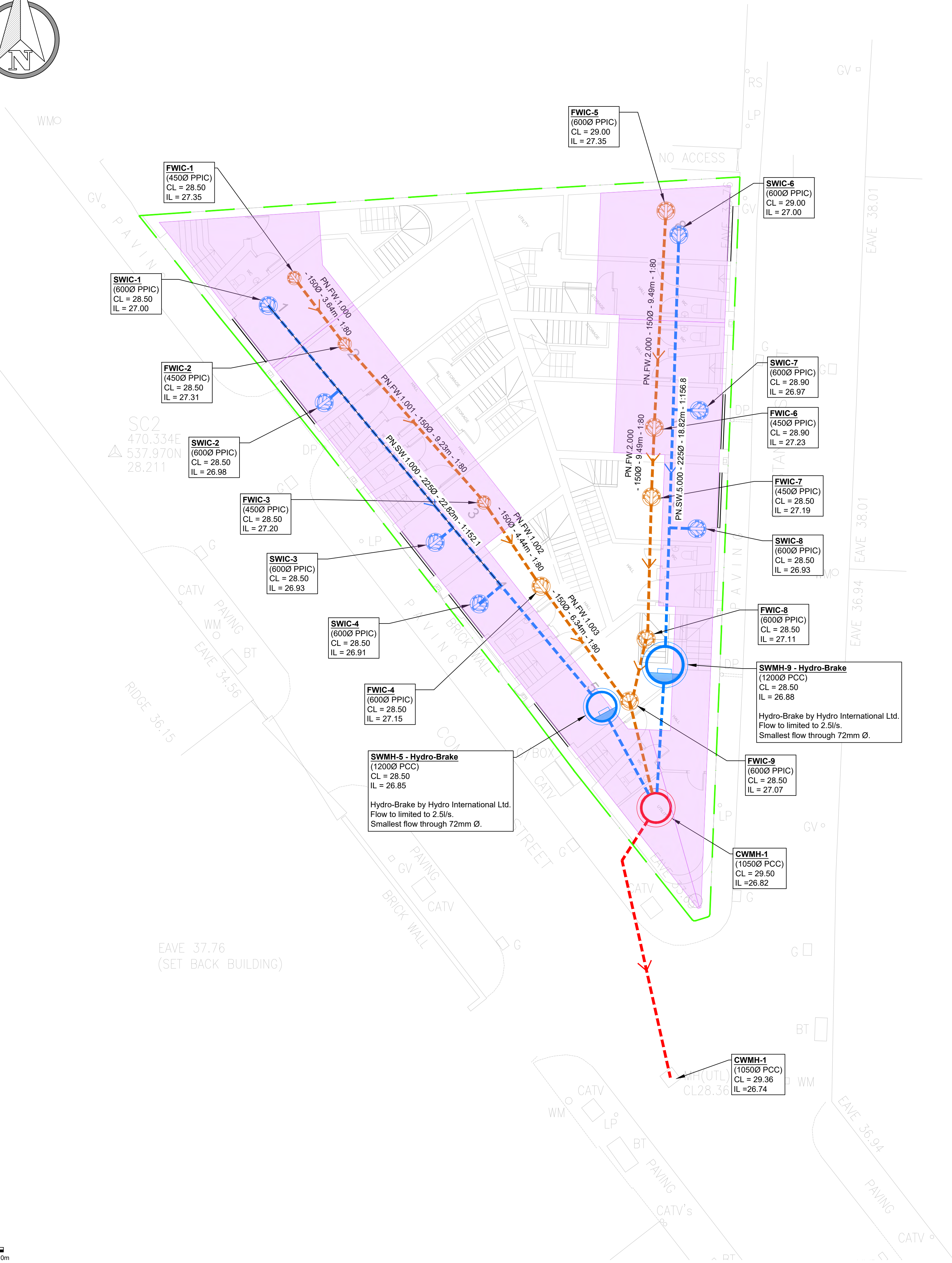
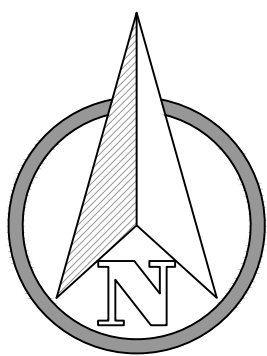
The contractor must verify the location of all buried services before any excavation or piling works begin. Damage to existing services could present a major health and safety risk plus associated commercial penalties.

Levels information shown is based on information available. This office is to be made aware of any discrepancies found on site.

Prior to installation of any proposed site drainage, the invert level of existing outfall/connection is to be confirmed on site.

DRAINAGE NOTE:

All information shown is subject to local building control & local water authority applications, comments & approvals.



DRAINAGE NOTES:

- All adoptable works to be in accordance with 'SSG appendix C' where applicable.
- All manhole cover levels to be confirmed by Architect.
- Clay pipes to be flexibly jointed and comply with the requirements of BS EN 295.
- Concrete pipes to be flexibly jointed and comply with the requirements of BSEN 1916 and BS 5911.
- Plastic pipes (PVC-U) to be flexibly jointed and comply with the requirements of BS EN 1401-1 1998.
- All surface water pipes to be 110mm Ø, laid at a gradient no flatter than 1:80 (UNO).
- All foul water pipes to be 110mm Ø, laid at a gradient no flatter than 1:40 (UNO).
- For minimum depths requiring pipe protection refer to drainage details drawings.
- Protection to drains and gully connections may be concrete bed surround between cover depths of 450mm to 200mm.
- Until final surface is placed, heavy traffic is not to be allowed over pipe trenches without special precautions.
- Pipes and fittings are to be laid in accordance with the manufacturers recommendations.
- All manholes to be Type B. 1200mm Ø precast concrete manhole rings with minimum 150mm concrete surround (UNO). All manhole covers to be D400 class (UNO). Refer to drainage details drawings for manhole installation details.
- All foul water pop up & RWP locations are TBC by Architect.
- Rodding access is to be provided at all pop-ups & RWP's.
- For setting out of all pop-up positions refer to Architect's details.
- Civil engineering contractor to arrange for:
 - Own services and temporary supplies.
 - Pathway & partial closure as deemed required by their method statement. Including costs.
 - Temporary adequate over pumping as deemed required by civil engineers method of construction.
- The contractor should confirm the locations for existing services prior construction.
- Prior to installation of any proposed site drainage, the invert level of existing outfall/connection is to be confirmed on site.

DRAINAGE LINE TYPES KEY:

REF.	DESCRIPTION
	Proposed FW network
	Proposed SW network
	Proposed CW network
	Proposed Blue Roof
	Boundary Line

DRAINAGE ANNOTATION KEY:

REF.	DESCRIPTION
SW	Surface water drainage
FW	Foul water drainage
CW	Combined water drainage
MH	Manhole
IC	Inspection chamber
BD	Backdrop required
PCC	Precast concrete chamber
PPIC	Polypropylene inspection chamber
GU	Gully
CL	Cover level (m)
IL	Invert level (m)
SVP	Soil vent pipe
PU	Pop up
RWP	Rainwater downpipe

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- This document uses status codes in accordance with ISO EN 19650: Work in progress: S0 - WIP Shared (non-contractual): S1 - Coordination, S2 - Information, S3 - Review, S4 & S5 - Approval. Published (contractual): A1, An, etc. (where "n" relates to the project stage)
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P01	12.08.25	Issued for Approval	CM
REV.	DATE	REVISION DETAILS	INITIALS
CURRENT DRAWING REVISION CHECKED BY			EZ
CURRENT DRAWING REVISION APPROVED BY			EZ
DRAWING STATUS: S4		PROJECT STAGE: STAGE 2	

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www.booth-king.co.uk office@booth-king.co.uk
RAMSBOTTOM MANCHESTER EDINBURGH
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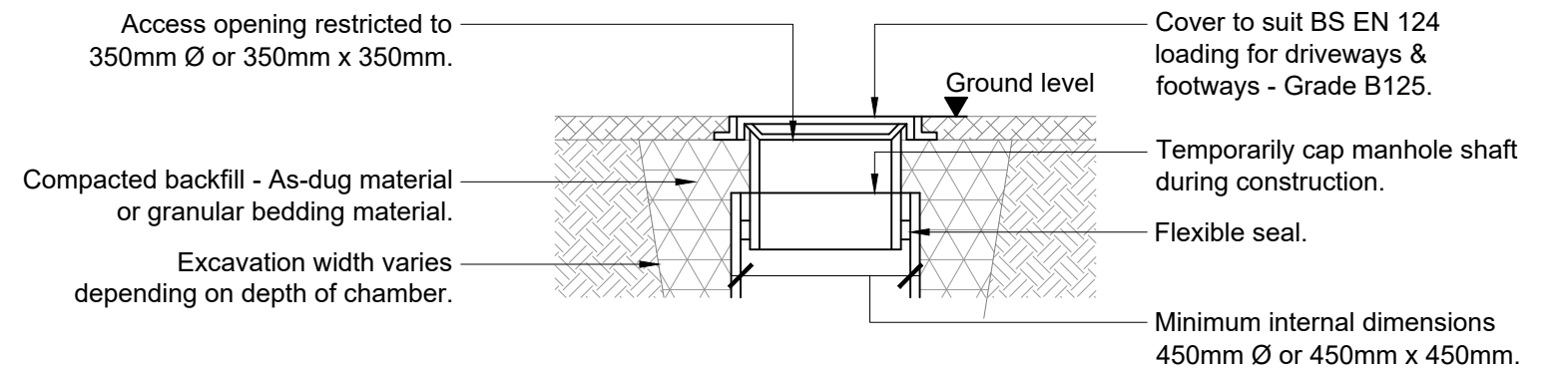
PROJECT:
**Knott Mill Townhouses,
Manchester**

TITLE:
PROPOSED DRAINAGE GA

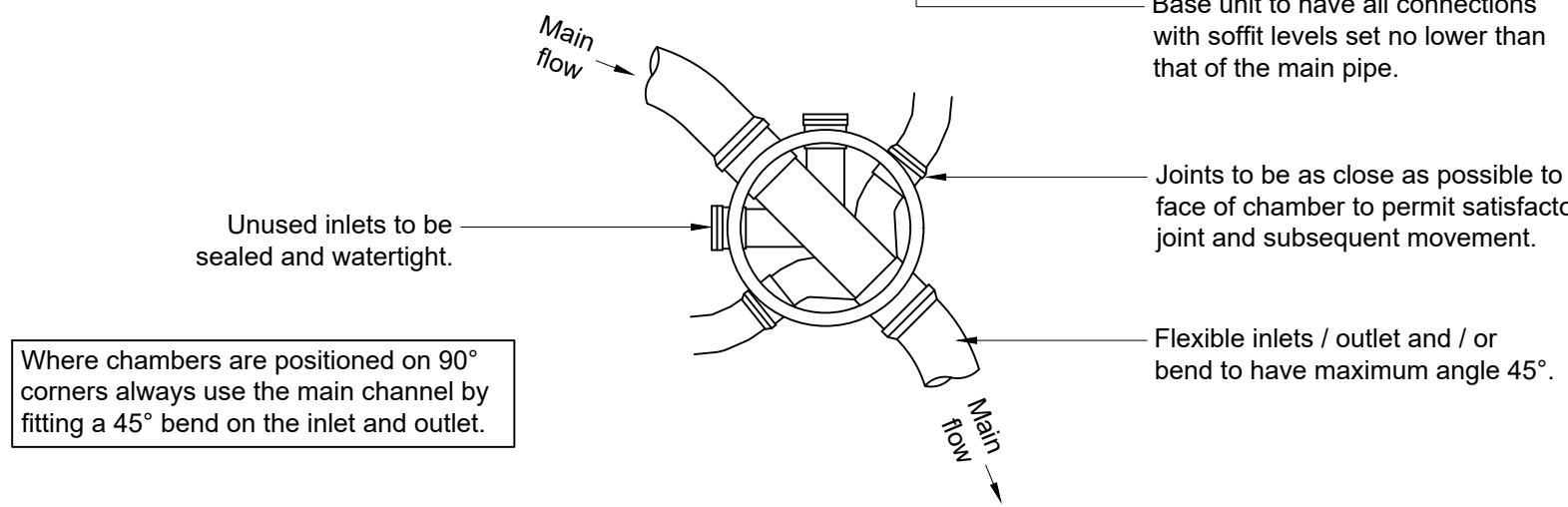
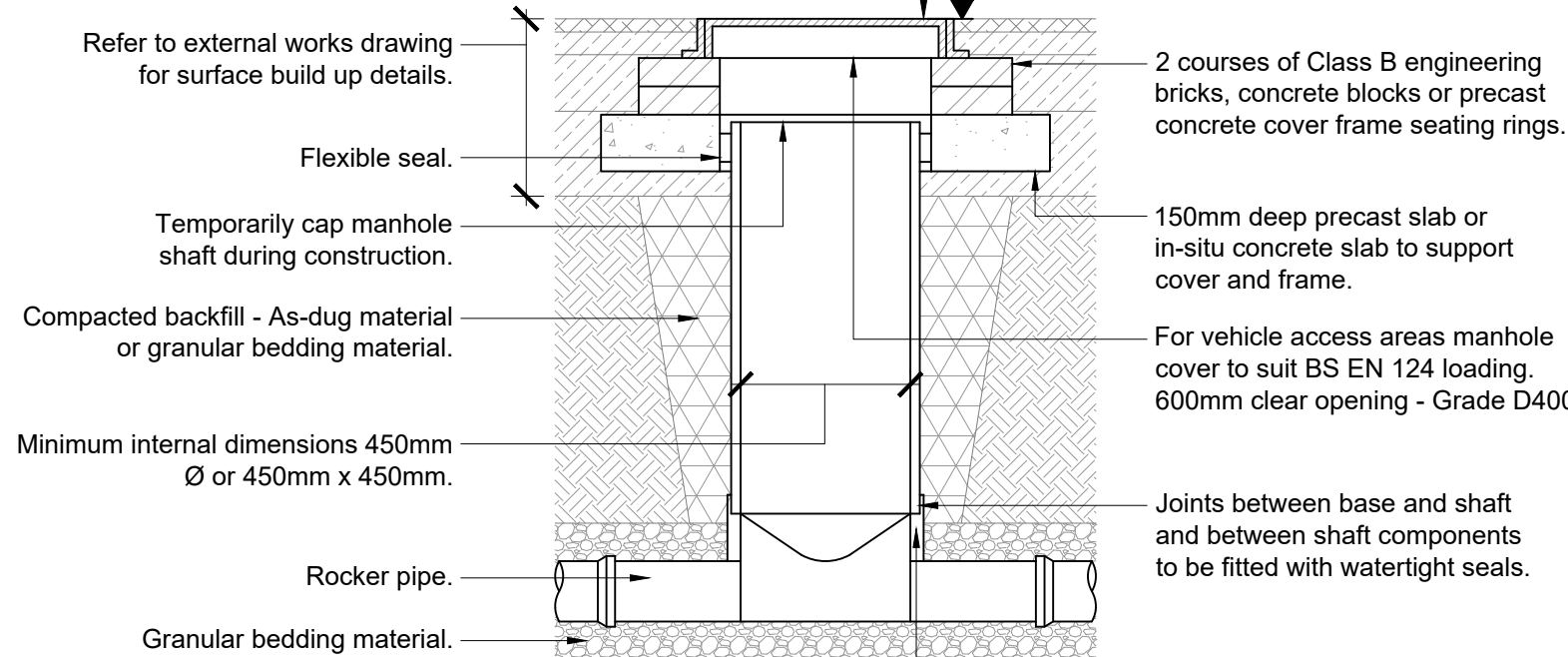
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.
1:100	CM	Aug '25	P01	15606

DRAWING REF:
15606-BKP-XX-XX-DR-C-0500

Plastic chambers and rings shall comply with BS EN 13598-1 and BS EN 13598-2 or have equivalent independent approval.



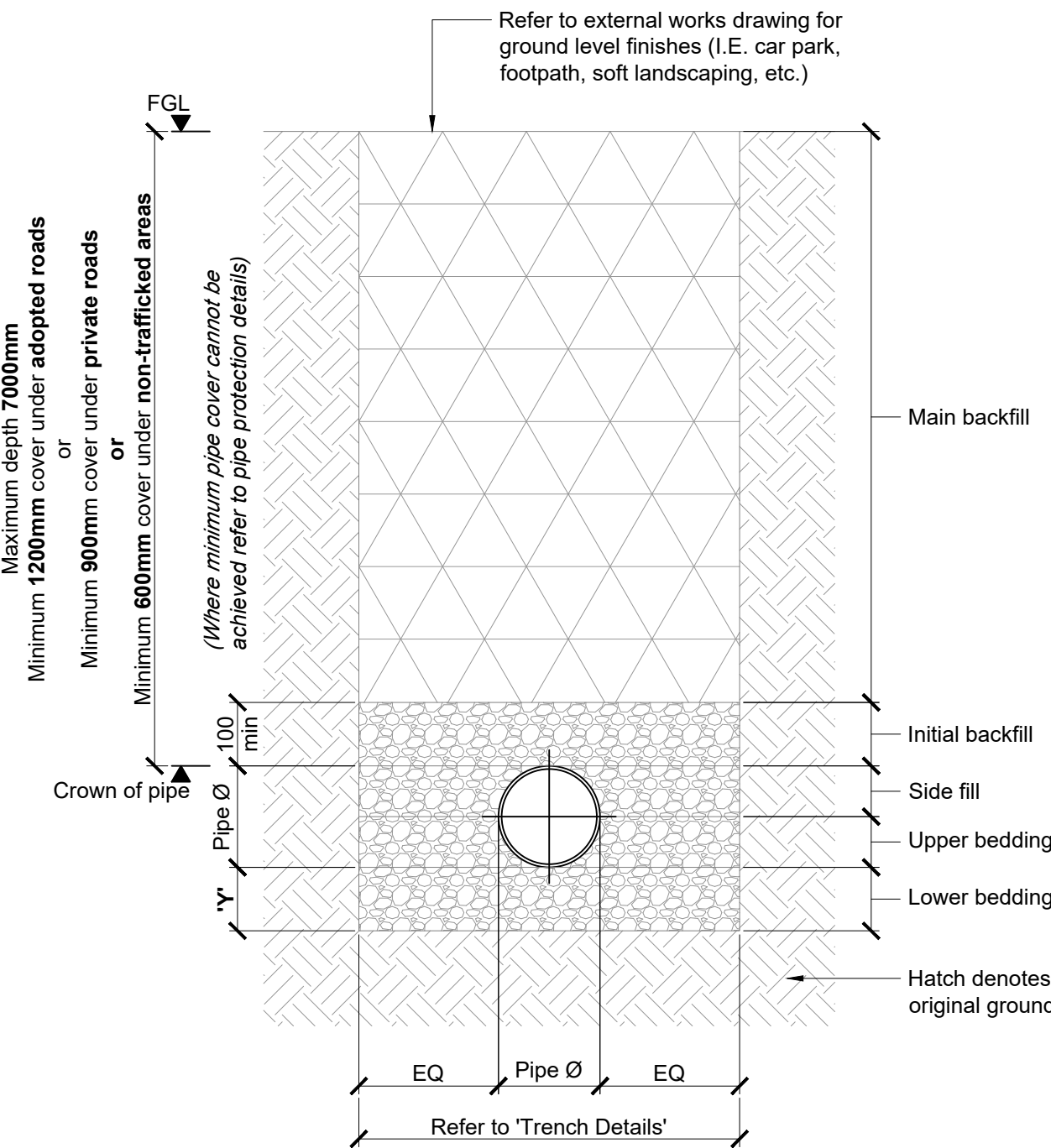
Plastic chambers and rings shall comply with BS EN 13598-1 and BS EN 13598-2 or have equivalent independent approval.



TYPICAL INSPECTION CHAMBER DETAIL - 'TYPE 3' (FLEXIBLE MATERIAL DETAIL)

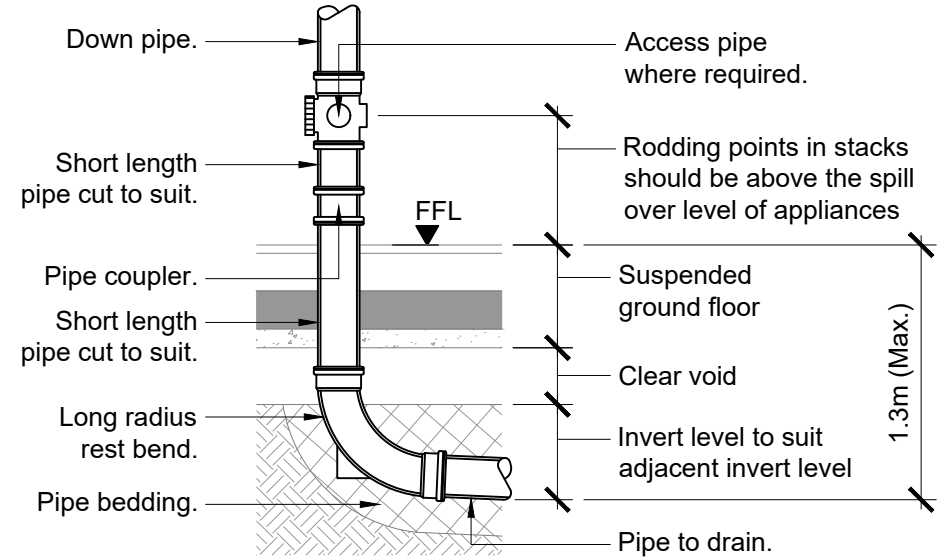
(Depth from cover level to soffit of pipe 3m)

SCALE 1:20



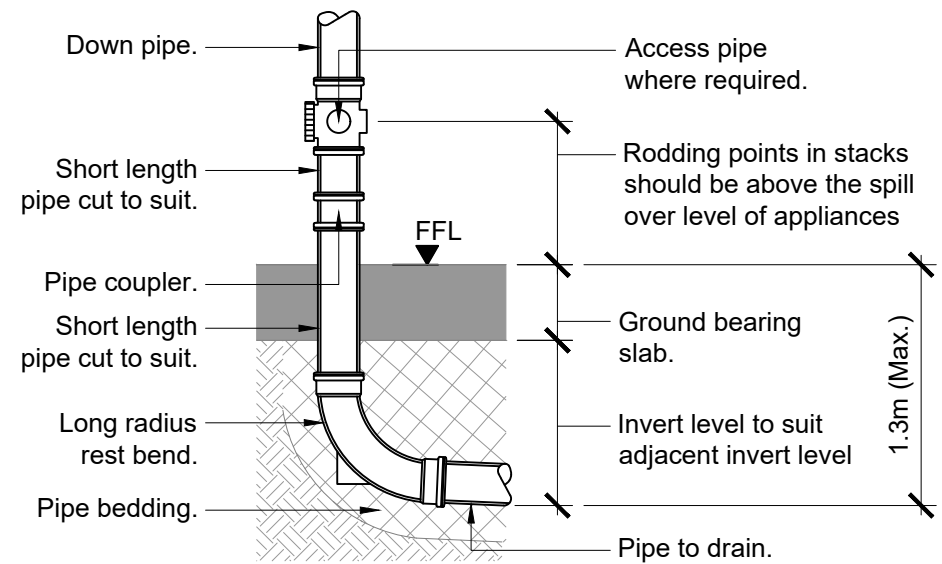
TYPICAL PIPE BEDDING DETAILS

SCALE 1:10



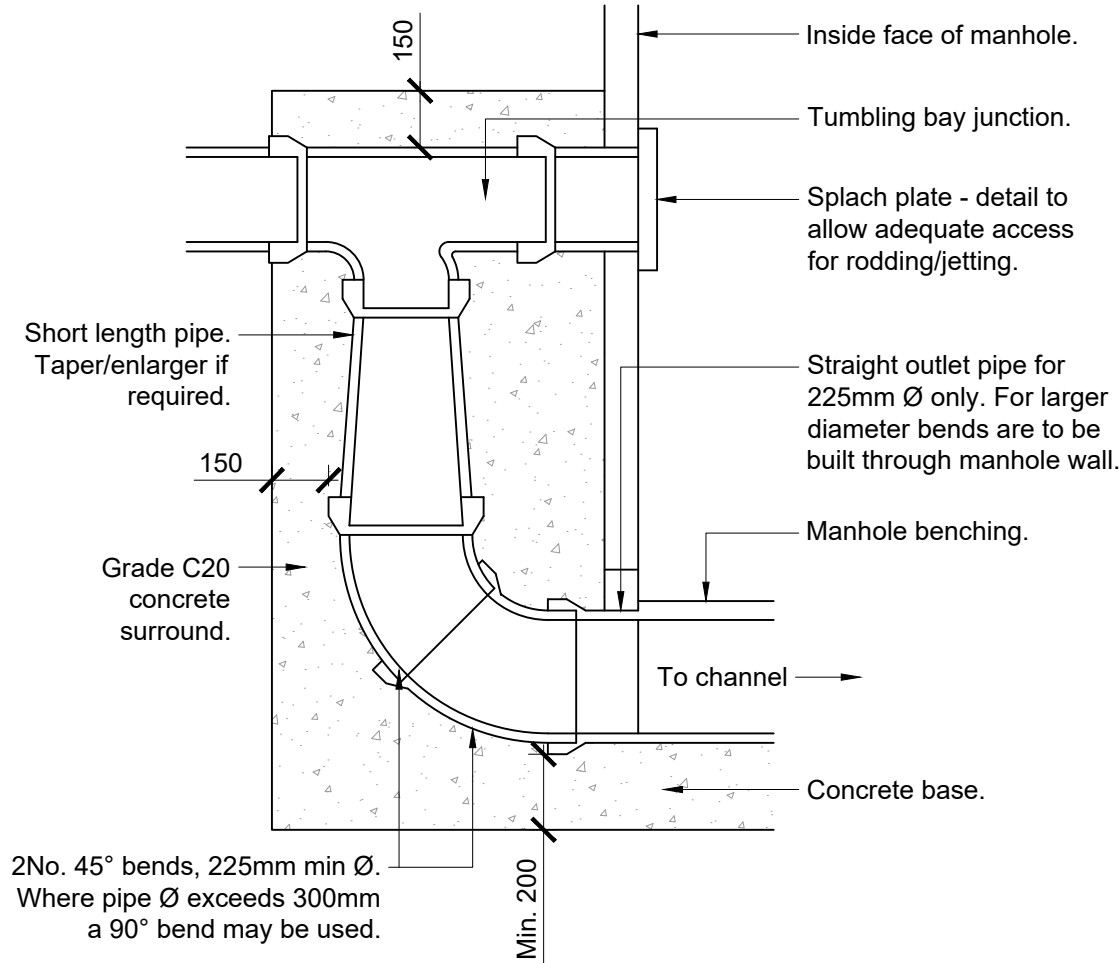
TYPICAL LONG BEND RADIUS DETAIL

SCALE 1:20



TYPICAL LONG BEND RADIUS DETAIL

SCALE 1:20



Important note:
Extreme care to be taken when constructing external backdrops and ramps to support pipes & fittings during concreting works.

TYPICAL EXTERNAL BACKDROP DETAIL

SCALE 1:20

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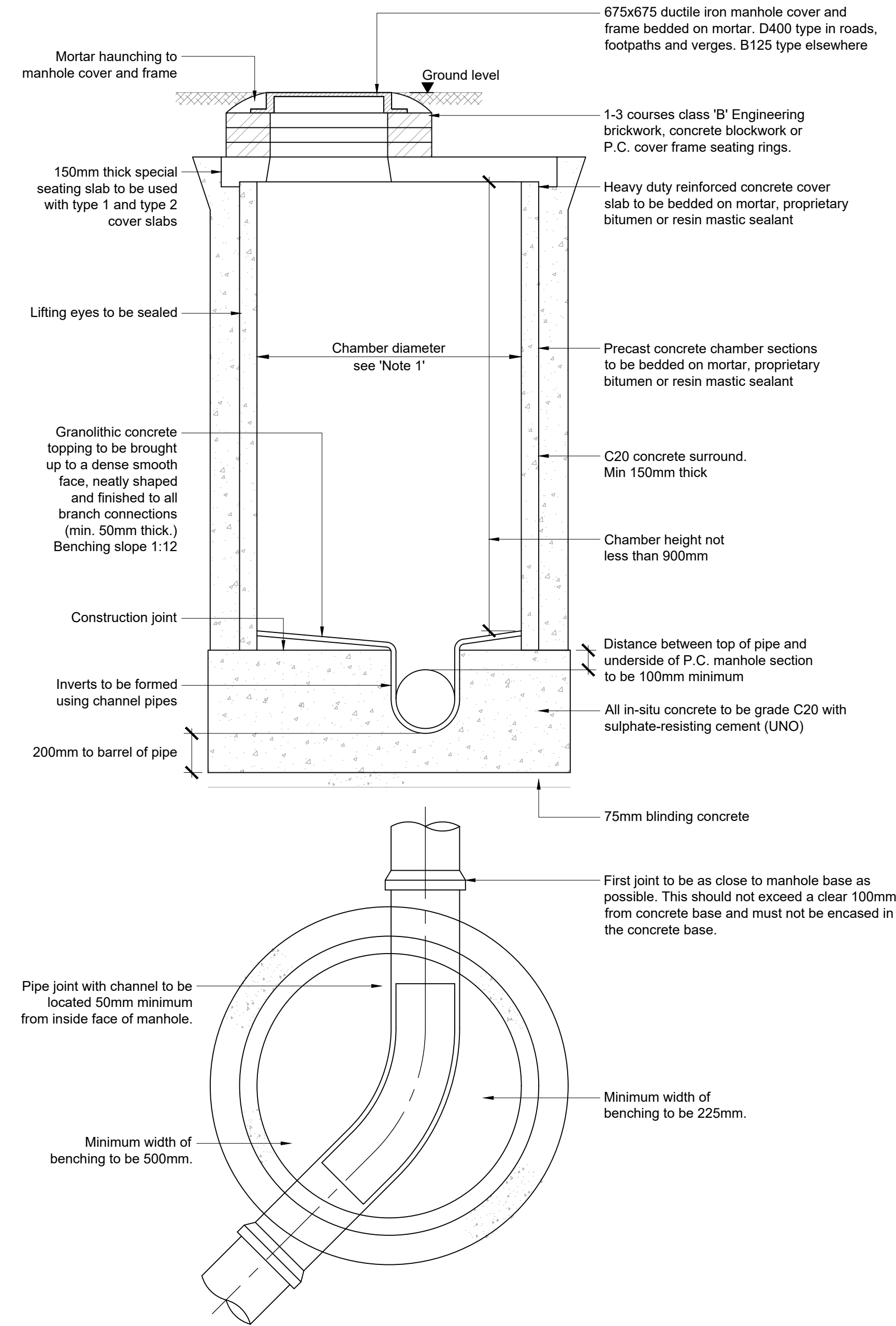
P01	12.08.25	Issued for Approval	JDE
REV.	DATE	REVISION DETAILS	INITIALS
CURRENT DRAWING REVISION CHECKED BY			
CURRENT DRAWING REVISION APPROVED BY			
DRAWING STATUS:		PROJECT STAGE:	
S4		Stage 2	

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Tel: 01706 822 022 Tel: 0161 694 7087 Tel: 0131 229 1547

PROJECT: Knott Mill Townhouses, Manchester				
TITLE: Drainage Details Sheet 1				
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.
N.T.S	JDE	Aug '25	P01	15606
DRAWING REF: 15606-BKP-XX-XX-DR-C-0510				

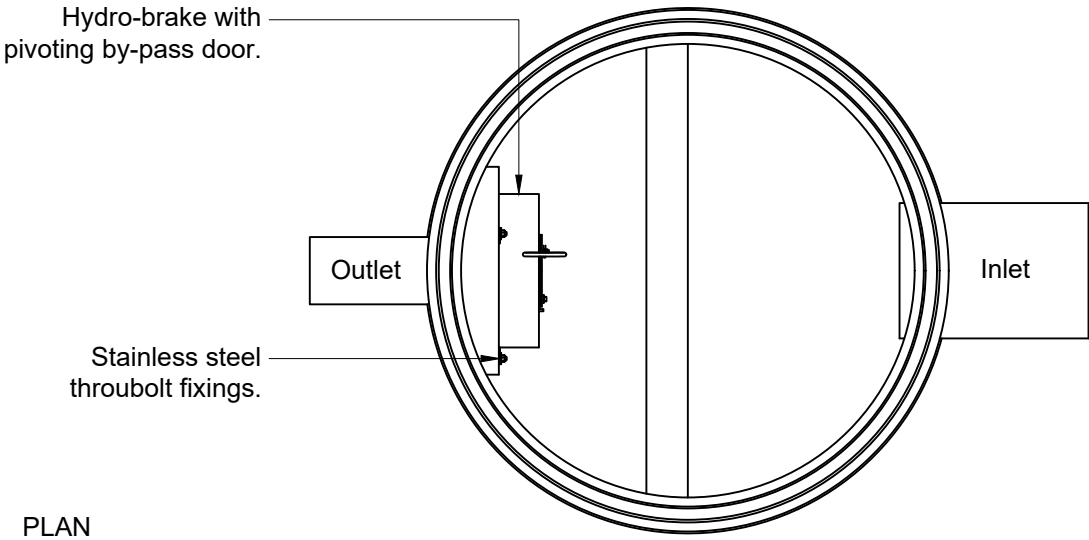


TYPICAL MANHOLE DETAIL
SCALE 1:20

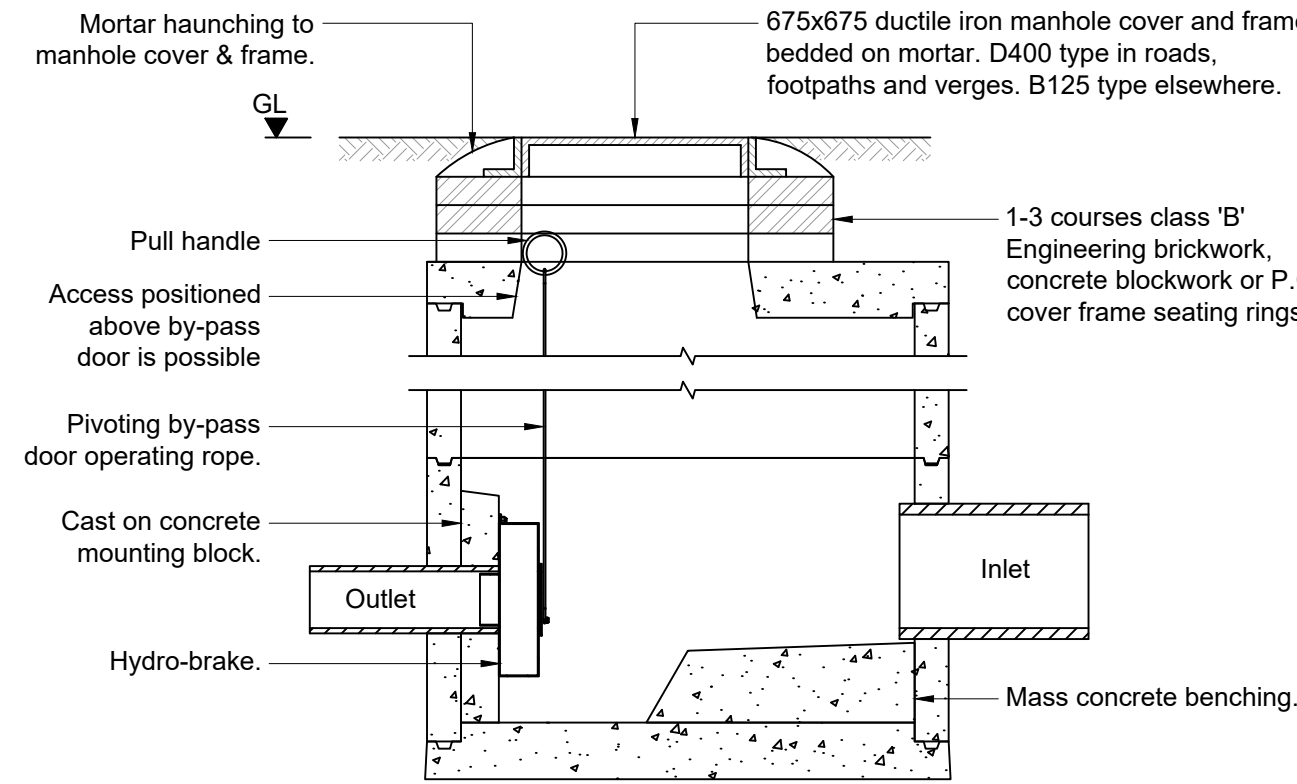
ADDITIONAL NOTES:

- Manhole diameter to be as follows :

1200mm Ø (pipe Ø up to 300mm)
1350mm Ø (pipe Ø > 300mm up to 450mm)
1500mm Ø (pipe Ø > 450mm up to 525mm)
1800mm Ø (pipe Ø > 525mm up to 750mm)
2100mm Ø (pipe Ø > 750mm up to 900mm)
- 1050mm concrete rings may be used where the manhole is of a 'Straight Through' or 'Terminal' type, where the depth to invert does not exceed 2.5m and the pipe diameter is not greater than 150mm.
- Where the depth to the top of the benching exceeds 3.0m, a type '2' manhole shall be used.
- Manhole construction to be in accordance with the current editions of 'Sewers for Scotland' section 4 and 'Civil Engineering Specification for the Water Industry'.
- Top and bottom P.C. rings to be plain ended. Channel to be formed using pre-formed half channel.
- Where pipes are 600mm diameter or greater, handrail, safety chain and toe holes to be provided.
- Connection to be made soffit/soffit where upstream pipe is smaller than outlet pipe. Invert/ invert when upstream pipe is equal or larger than outlet.
- A flexible pipe shall be provided as close as feasible to the outside face of the manhole. The next pipe away will be a rocker pipe. See Clause 4.6.6.2.
- Where there is no change in pipe diameter, the manhole invert shall follow the same gradient as the outgoing sewer.
- Step irons or otherwise to be fitted as required by the Authority's policy.



PLAN



SECTION

TYPICAL HYDROBRAKE CHAMBER DETAIL
SCALE 1:20

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CURRENT DRAWING REVISION CHECKED BY			EZ
CURRENT DRAWING REVISION APPROVED BY			EZ
DRAWING STATUS:		PROJECT STAGE:	
S4		Stage 2	

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PROJECT: Knott Mill Townhouses, Manchester				
TITLE: Drainage Details Sheet 2				
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.
N.T.S	JDE	Aug '25	P01	15606
DRAWING REF: 15606-BKP-XX-XX-DR-C-0511				

APPENDIX F

FOUL & SURFACE WATER CALCULATIONS

Summary

Method		Standard	Peak Flow (l/s)	24 Hr Storage Volume (m ³)	Comments
1	Flow rate assessment - l/head per day	BS EN 752 & Flows and Loads 4	0.44	5.76	Provides a reasonable estimate of the actual flows based on the anticipate occupancy of the development using tailored values of occupants daily water consumption
2	Flow rate assessment - l/head per day	British Water CoP	0.31	4.03	Provides an estimate of flows based on the dwelling occupancy set out in the British Water Code of Practice. Could well be an overestimate of occupancy for a retirement complex
3	Discharge Unit basis	Sewers for Adoption 8 th Edition	0.41	5.33	This is the method of flow assessment set out in sewers For adoption. This might be the basis on which United Utilities expect foul flows to be assessed when we make a Section 106 Application for a connection to the Adopted sewer

15606 Knott Mill Townhouse: Foul Flow Assessment			07/08/2025	BKP
Assessment Based on British Water Code of Practice - Flows and Loads-4				
	Nr	Occupants/ Dwelling	Total Occupants	
2 bed houses	0		0	
3 bed houses	0		0	
3 Bed houses	8	4	32	
4 Bed houses	0		0	
Total Number of Residents			32	
Diversity Factor P	0.7			0.7 Assumed
Effective population (P)			22	
Nature of Occupancy	Anticipated occupancy	Foul flow rate		
	Nr	l/head/day	Litres	
Residents	22	180	4,032	
Staff	0	100	0	
Daily Totals			4,032	litres
Dry weather flow	0.05			litres/second
Peak flow	6 x DWF			0.28 litres/second
Infiltration allowance	0.03			litres/second
Total Peak Flow	0.31			litres/second
24 Hour Storage volume	4.032			m ³

15606 Knott Mill Townhouse: Foul Flow Assessment		07/08/2025	BKP
Based on Sewers for adoption 8th Edition - Section B4			
Sewers for Adoption 8th edition the peak design flow rates for dwellings should be taken as 4000 litres per dwelling per day (0.05 litres per second per dwelling). Note: This is a design peak flow rate not a daily average water usage, and represents the peak flow rate from a number of appliances. Alternatively the flow rates can be calculated in accordance with BS EN 12056-2:2000 System II			
Total Nr of houses	8		
Peak Flow rate per dwelling	=	4000	<i>litres/dwelling/day</i>
Peak flow (includes infiltration allowance)	=	0.4	<i>litres/second</i>
Peak Flow	= 6 x DWF	Where DWF is the average flow	
Average Flow	DWF	=	0.1 <i>litres/second</i>
Total Daily Flow	=	5,333	<i>litres</i>
Daily Totals	5,334 <i>litres</i>		
Dry weather flow	=	0.06	<i>litres/second</i>
Peak flow	8 x DWF	=	0.37 <i>litres/second</i>
Infiltration allowance 10%	=	0.04	<i>litres/second</i>
Total Peak Flow	0.41 <i>litres/second</i>		
24 Hour Storage volume	5.33 <i>m³</i>		

Assessment based on flow rate/head/day in accordance with BS EN 752 & BWCP

Total Occupants		24		
Residents	100%	24		
Residents - care support	0%	0		
Visitors/Guests	0%	0		
Nature of Occupancy	Anticipated occupancy	Foul flow rate		
	Nr	l/head/day	Litres	
Residents	32	180	5,760	
Residents - care support	0	350	0	
Staff	0	100	0	
Visitors/Guests	0	150	0	
Daily Totals			5,760	litres
Dry weather flow	0.07			litres/second
Peak flow	6 x DWF			litres/second
Infiltration allowance	0.04			litres/second
Total Peak Flow	0.44			litres/second
24 Hour Storage volume	5.76			m³

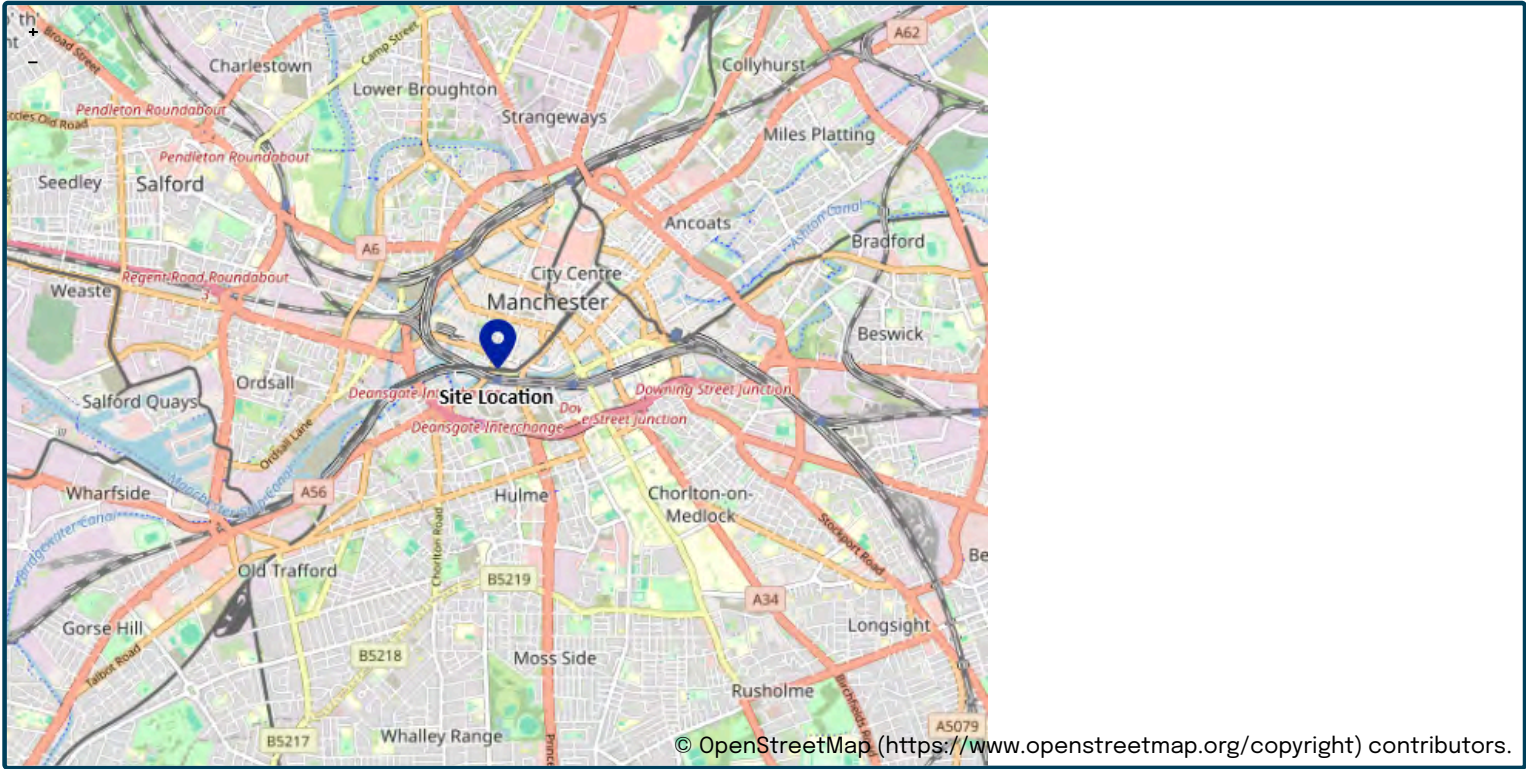
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	29/07/2025
Calculated by	Eleni Zachara
Reference	15606
Model version	2.1.2

Location

Site name	Knott Mill
Site location	Manchester



Site easting (British National Grid)	383433
Site northing (British National Grid)	397433

Site details

Total site area (ha)	0.044	ha
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Greenfield runoff

Method

Method	FEH statistical
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FEH statistical

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	879	mm	879
BFIHOST	0.451		
QMed-QBar conversion	1.075		1.075
QMed (l/s)	0.26	l/s	
QBar (FEH statistical) (l/s)	0.28	l/s	

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	10		10
1 year growth factor	0.87		
2 year growth factor	0.93		
10 year growth factor	1.38		
30 year growth factor	1.7		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	0.2	l/s
Flow rate 2 year (l/s)	0.3	l/s
Flow rate 10 years (l/s)	0.4	l/s
Flow rate 30 years (l/s)	0.5	l/s
Flow rate 100 years (l/s)	0.6	l/s
Flow rate 200 years (l/s)	0.7	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.1.2) developed by HR Wallingford and available at uksuds.com (<https://www.uksubs.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksubs.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	SWIC-1	SWMH-5	22.818	0.600	27.000	26.850	0.150	152.1	225
1.001	SWMH-5	CWMH-1	5.024	0.600	26.850	26.820	0.030	167.5	225
5.000	SWIC-6	SWMH-9	18.822	0.600	27.000	26.880	0.120	156.8	225
5.001	SWMH-9	CWMH-1	6.271	0.600	26.880	26.840	0.040	156.8	225
1.002	CWMH-1	Outfall	11.814	0.600	26.820	26.740	0.080	147.7	225

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	45	0	0

Node SWMH-5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	26.850	Product Number	CTL-SHE-0072-2500-1200-2500
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.5	Min Node Diameter (mm)	1200

Node SWMH-9 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	26.880	Product Number	CTL-SHE-0072-2500-1200-2500
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.5	Min Node Diameter (mm)	1200

Node SWIC-1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	27.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.50	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	31.0	0.0	0.200	31.0	0.0	0.201	0.0	0.0

Node SWIC-6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	27.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.50	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	32.0	0.0	0.200	32.0	0.0	0.201	0.0	0.0

Node SWMH-5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.50	Time to half empty (mins)	58

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	91.0	0.0	0.200	91.0	0.0	0.201	0.0	0.0

Node SWMH-9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.880
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.50	Time to half empty (mins)	47

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	62.0	0.0	0.200	62.0	0.0	0.201	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	SWIC-1	37	27.013	0.013	0.5	0.2116	0.0000	OK
	SWIC-2							
	SWIC-3							
	SWIC-4							
360 minute summer	SWMH-5	216	26.895	0.045	0.8	2.0945	0.0000	OK
60 minute summer	SWIC-6	37	27.013	0.013	0.5	0.2179	0.0000	OK
	SWIC-7							
	SWIC-8							
360 minute summer	SWMH-9	216	26.923	0.043	0.6	1.3815	0.0000	OK
360 minute summer	CWMH-1	216	26.841	0.021	0.7	0.0294	0.0000	OK
360 minute summer	Outfall	216	26.760	0.020	0.7	0.0000	0.0000	OK
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	SWIC-1	1.000	SWMH-5	0.3	0.211	0.007	0.0447	
360 minute summer	SWMH-5	1.001	CWMH-1	0.4	0.253	0.009	0.0074	
60 minute summer	SWIC-6	5.000	SWMH-9	0.3	0.199	0.007	0.0380	
360 minute summer	SWMH-9	5.001	CWMH-1	0.3	0.323	0.008	0.0067	
360 minute summer	CWMH-1	1.002	Outfall	0.7	0.404	0.017	0.0209	6.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	SWIC-1	20	27.032	0.032	2.3	0.5025	0.0000	OK
	SWIC-2							
	SWIC-3							
	SWIC-4							
120 minute summer	SWMH-5	80	26.954	0.104	4.3	4.8392	0.0000	OK
30 minute summer	SWIC-6	20	27.032	0.032	2.3	0.5201	0.0000	OK
	SWIC-7							
	SWIC-8							
60 minute summer	SWMH-9	44	26.986	0.106	5.1	3.4209	0.0000	OK
60 minute summer	CWMH-1	45	26.861	0.041	3.0	0.0593	0.0000	OK
60 minute summer	Outfall	45	26.780	0.040	3.0	0.0000	0.0000	OK
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	SWIC-1	1.000	SWMH-5	1.8	0.316	0.044	0.1933	
120 minute summer	SWMH-5	1.001	CWMH-1	1.5	0.374	0.037	0.0202	
30 minute summer	SWIC-6	5.000	SWMH-9	1.8	0.290	0.044	0.1717	
60 minute summer	SWMH-9	5.001	CWMH-1	1.5	0.489	0.037	0.0196	
60 minute summer	CWMH-1	1.002	Outfall	3.0	0.613	0.070	0.0578	12.0

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SWIC-1	12	27.039	0.039	3.6	0.6142	0.0000	OK
	SWIC-2							
	SWIC-3							
	SWIC-4							
60 minute summer	SWMH-5	46	26.994	0.144	9.3	6.6943	0.0000	OK
15 minute summer	SWIC-6	12	27.039	0.039	3.6	0.6350	0.0000	OK
	SWIC-7							
	SWIC-8							
60 minute summer	SWMH-9	42	27.028	0.148	7.3	4.7463	0.0000	OK
60 minute summer	CWMH-1	46	26.867	0.047	3.9	0.0679	0.0000	OK
60 minute summer	Outfall	46	26.786	0.046	3.9	0.0000	0.0000	OK
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SWIC-1	1.000	SWMH-5	2.8	0.388	0.066	0.2351	
60 minute summer	SWMH-5	1.001	CWMH-1	2.0	0.397	0.049	0.0249	
15 minute summer	SWIC-6	5.000	SWMH-9	2.7	0.361	0.066	0.2090	
60 minute summer	SWMH-9	5.001	CWMH-1	2.0	0.526	0.048	0.0235	
60 minute summer	CWMH-1	1.002	Outfall	3.9	0.661	0.092	0.0700	17.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	SWIC-1	20	27.037	0.037	3.0	0.5806	0.0000	OK
	SWIC-2							
	SWIC-3							
	SWIC-4							
60 minute summer	SWMH-5	46	26.981	0.131	8.5	6.1206	0.0000	OK
30 minute summer	SWIC-6	20	27.037	0.037	3.0	0.6018	0.0000	OK
	SWIC-7							
	SWIC-8							
60 minute summer	SWMH-9	44	27.015	0.135	6.6	4.3304	0.0000	OK
60 minute summer	CWMH-1	45	26.867	0.047	3.8	0.0666	0.0000	OK
60 minute summer	Outfall	45	26.785	0.045	3.8	0.0000	0.0000	OK
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	SWIC-1	1.000	SWMH-5	2.5	0.330	0.059	0.2610	
60 minute summer	SWMH-5	1.001	CWMH-1	1.9	0.392	0.047	0.0242	
30 minute summer	SWIC-6	5.000	SWMH-9	2.5	0.307	0.059	0.2300	
60 minute summer	SWMH-9	5.001	CWMH-1	1.9	0.521	0.046	0.0230	
60 minute summer	CWMH-1	1.002	Outfall	3.8	0.655	0.088	0.0682	15.7

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SWIC-1	12	27.046	0.046	4.7	0.7226	0.0000	OK
	SWIC-2							
	SWIC-3							
	SWIC-4							
60 minute summer	SWMH-5	45	27.040	0.190	12.5	8.8773	0.0000	OK
60 minute summer	SWIC-6	45	27.066	0.066	3.5	1.0752	0.0000	OK
	SWIC-7							
	SWIC-8							
60 minute summer	SWMH-9	43	27.065	0.185	9.8	5.9313	0.0000	OK
60 minute summer	CWMH-1	44	26.870	0.050	4.3	0.0709	0.0000	OK
60 minute summer	Outfall	47	26.788	0.048	4.3	0.0000	0.0000	OK
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SWIC-1	1.000	SWMH-5	3.9	0.409	0.092	0.3225	
60 minute summer	SWMH-5	1.001	CWMH-1	2.1	0.406	0.053	0.0266	
15 minute summer	SWIC-6	5.000	SWMH-9	3.8	0.379	0.093	0.2882	
60 minute summer	SWMH-9	5.001	CWMH-1	2.1	0.537	0.051	0.0248	
60 minute summer	CWMH-1	1.002	Outfall	4.3	0.677	0.100	0.0743	23.3

General Maintenance Blue Roof Systems

Sustainable drainage solutions



General maintenance procedures

Blue roof systems

Blue roofs are designed to be part of the drainage strategy for the building therefore, inspections should be carried out once a quarter as part of a regular maintenance regime. Bauder also advises for the roof to be inspected after a significant storm event to ensure no blockage has occurred to the outlet.

Key principles

The blue roof system is designed so that the outlets and overflows are clearly marked and easily accessed for regular maintenance regimes, including inspections of all blue roof components. It is important that the route on to the blue roof is accessible at all times.

Actions required

Outlets and flow restrictors

- Inspect all outlets, checking the flow restrictor has not been tampered with, damaged or removed.
- Carefully clear any debris (leaves, etc) from the inspection chamber.
- Check and replace pebble margin (if required) around the inspection chamber (this helps filter the water entering the outlet).
- Confirm the outlet will drain freely.
- Make sure the inspection chamber is securely fitted and locked closed.

Overflows

- Inspect all overflows to ensure the overflow will discharge freely.
- Carefully clear any debris (leaves, etc) from the overflow.
- Inspect the overflow for any signs of discharge (remember overflows are only designed to function during a 1:100 year event).
- Where parapet overflows are used to discharge to ground level, the discharge point should be inspected to assess whether the overflow has discharged.
- Regular discharge of water via the overflow indicates that the roof is not functioning correctly and a more thorough investigation may be required. Contact Bauder for advice.

Note: An inspection log should be kept of all inspections flagging any issue or concern.

Blue Roof Attenuation Cells

- Check that the surface finishes of the blue roof (green or hard landscaping) are still correctly installed and in good condition. That there has been no movement to the finished surface during investigations or activities by other trades.
- That the filter fleece is still in place on vertical edges around outlets. Ensure there is no openings that might allow leaves and debris into the blue roof system.

General maintenance procedures

Blue roof systems

General Maintenance

- All leaf litter should be removed from the roof surface. This is mainly a concern during the autumn and winter visits. Cut back tree limbs that overhang the roof to give at least a 1 metre clearance, this will significantly reduce any risk of any blockage to outlets.
- Access ladders and man-safe system should be regularly inspected and date tagged as required so that the blue roof can always be accessed.

Green roof maintenance

Please refer to our green roof maintenance guides for advice on how to maintain the green roof component of your blue roof, all are available to [download on our website](#)

- **Extensive Lightweight Sedum Green Roof Systems**
- **Extensive Biodiverse Green Roof Systems**
- **Intensive Hard and Soft Green Roof Systems**

boothking

Booth King Partnership Ltd.
Company No. 06206269

Head Office (Ramsbottom)

Tollgate House 9C/D, Bridge
Street, Ramsbottom BL0 9AB
01706 822 022
office@booth-king.co.uk

Manchester Office

First Floor, Calico, 55 Mosley
Street, Manchester M2 3HQ
0161 694 7087
manchester@booth-king.co.uk

Edinburgh Office

54 Warrender Park Road,
Edinburgh EH9 1HH
0131 229 1547
edinburgh@booth-king.co.uk



Approved Body for
Certification of Design
under the SER Ltd. Scheme

