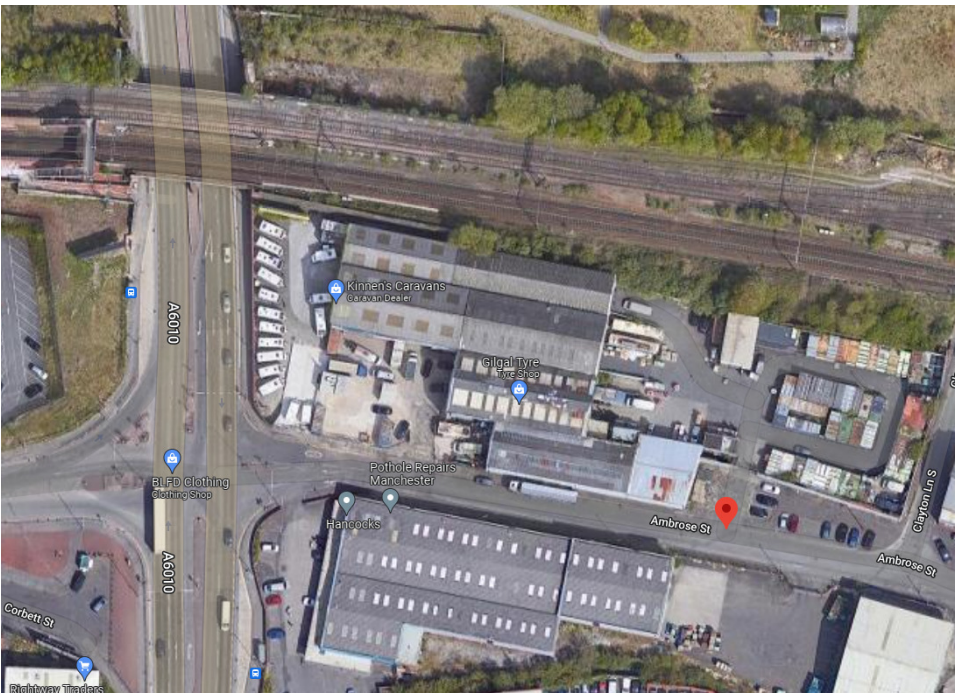


FLOOD RISK ASSESSMENT & OUTLINE DRAINAGE STRATEGY

at

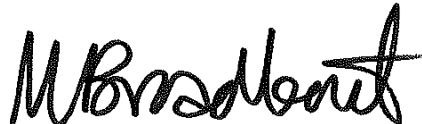
Land off Ambrose Street
Manchester
M12 5DD



Storage World Self Storage & Workspace LLP
Old Hall Street
Middleton
M24 1AG



Contract No: 11325
Dated: 1st November 2022
Contract Ref: PG/MB/11325

Prepared by	Signature	Date
Paul Graveney BEng (Hons), CEng, MICE Civil Engineer		01/11/22
Verified		
Michael Broadbent BEng(Hons) CEng MIStructE Technical Director		01/11/22

Issue	Description	Date	Originator	Approved
1	First Issue	13/10/22	PG	MB
2	Final Issue for Planning	01/11/22	PG	MB

This report is the property of Thomason Partnership Limited and is confidential to the client designated in the report. Whilst it may be shown to their professional advisers, the contents are not to be disclosed to, or made use of, by any third party, without our express written consent. Without such consent, we can accept no responsibility to any third party.

Whilst every effort has been made to fully inspect those parts of the building requested of us, no permanent or secured fixtures and fittings will have been removed. We will not have inspected woodwork or other parts of the structure which were covered, unexposed or inaccessible, and we are therefore unable to report that any such part of the property is free from defect.

Thomason Partnership Limited certify that they have carried out the work contained herein with due care and diligence to their best belief and knowledge based on the time and information available.

This report is made on behalf of Thomason Partnership Limited. By receiving it and acting on it, the client – or any third party relying on it – accepts that no individual is personally liable in contract, tort or breach of statutory duty (including negligence).

THOMASONS

CONTENTS**EXECUTIVE SUMMARY****1.0 INTRODUCTION****2.0 DEVELOPMENT DESCRIPTION AND LOCATION**

- 2.1 Site Location
- 2.2 Existing Site Description
- 2.3 Local Hydrology
- 2.4 Proposed Development

3.0 PLANNING POLICY AND CONSULTATION

- 3.1 Planning Policy Requirement
- 3.2 Strategic Flood Risk Assessment (SFRA)
- 3.3 Statutory Authority Correspondence

4.0 DEFINITION OF FLOOD HAZARD

- 4.1 Sources of information
- 4.2 Flooding from Sea (Tidal) and Rivers & Watercourses (Fluvial)
- 4.3 Sewers and Private Drainage
- 4.4 Groundwater
- 4.5 Surface Flooding (Overland Flow)
- 4.6 Artificial Sources
- 4.7 Summary

5.0 ASSESSMENT OF FLOOD RISK ON PROPOSED DEVELOPMENT

- 5.1 Summary
- 5.2 Flooding from the Fluvial Influenced Corn Brook

6.0 SUSTAINABLE DRAINAGE SYSTEM (SuDS) ASSESSMENT

- 6.1 Consultation
- 6.2 Existing Surface Water Runoff
- 6.3 Geology
- 6.4 Hydrological Assessment
- 6.5 Existing Sewer Records
- 6.6 Sustainable Drainage Systems

7.0 OUTLINE DRAINAGE STRATEGY

- 7.1 Surface Water Drainage
- 7.2 Management & Maintenance
- 7.3 Foul Drainage

8.0 MANAGEMENT MEASURES, OFF SITE IMPACTS AND RESIDUAL RISK

- 8.1 Flood Risk Management Measures
- 8.2 Off Site Impacts
- 8.3 Residual Risk

Appendix A – Architect Layout Plan**Appendix B – Topographical Survey****Appendix C – Thomason Drawings****Appendix D – Outline Calculations****Appendix E – Environment Agency Flood Data****Appendix F – United Utilities Pre Development Enquiry Response**

EXECUTIVE SUMMARY

The proposal is for the demolition of a group of existing commercial buildings and the construction of a storage building with external parking and access road. The overall site is approximately 0.52Ha in plan footprint.

According to the Environment Agency (EA) Indicative flood maps for planning, the majority of the development holds a Flood Zone 1 classification, i.e. land assessed as having less than a 1 in 1000 annual probability of fluvial flooding ($<0.1\%$) in any year. However, there is a small area of Flood Zone 2, i.e. land assessed as having greater than a 1 in 1000 ($>0.1\%$) but less than a 1 in 100 ($<1.0\%$) annual probability of fluvial flooding in any year. The finished floor level of the new building will be set a minimum of 600mm above the peak 1000 year flood level from the adjacent culverted watercourse.

The development target has been assessed against the NPPF 'Sequential Test'. Taking into consideration that the application is for a commercial development predominantly in Flood Zone 1, Tables 1, 2 & 3 of the NPPF have been appraised to confirm that development is appropriate, the sequential test is passed, and the exception tests is not required. This Flood Risk Assessment has considered all other forms of flooding and overall, has found that the site is at low risk of flooding from all sources.

The surface drainage strategy as outlined below is to restrict the proposed flow rate to ensure that the flood risk to the site and surrounding catchment is not increased by development. The drainage hierarchy has been considered in the drainage strategy discussed in Section 6. The surface water runoff will be collected from the impermeable areas and directed to the culverted watercourse via a new connection to the east of the site. The runoff rates will be restricted to 21l/s which is a 50% reduction in the existing peak 1 year flow rates. The SuDS hierarchal approach will be considered a flow control and offline geocellular crates incorporated. A drainage layout with outline hydraulic calculations have been prepared to support this approach and can be found in the Appendices.

There is no residual flood risk from the development site to the surrounding district due to the restriction in storm water flow rates. The development does not therefore increase the risk of flooding to other adjacent neighbourhoods. Out of chamber or gully flooding for the extreme 100 year plus climate change event may occur within the development site and is classed as exceedance flows. Flood water from this event will be contained within the development site and directed away from the building to the external yards and hard landscaped areas.

Foul water generated by the development will continue to discharge to the existing combined sewer in Ambrose Street via an existing connection. The foul discharge does not present an increased flood risk to the surrounding district.

1.0 INTRODUCTION

Thomasons has been appointed by Storage World to prepare this Flood Risk Assessment (FRA) to support a planning application for the demolition of an existing group of buildings and construction of a new storage unit with external parking on land off Ambrose Street, Manchester, M12 5DD. The assessment has been undertaken in line with Section 10 of the 'National Planning Policy Framework' plus the accompanying Technical Guidance on Flood Risk.

This Report has been commissioned by Storage World and is specific to their interests in the commercial development as described by the Architectural plan enclosed in Appendix A. This report may not be assigned.

The report has been commissioned to identify likely flooding issues associated with the proposed development, any likely constraints that could be imposed and to advise on the technical feasibility of providing drainage for the development proposals. Post planning and as the detailed design progresses, the information and details within this report may have to be refined, modified and updated to suit requirements and obligations of the Environment Agency, Manchester City Council as Lead Local Flood Authority (LLFA), United Utilities and other statutory authorities. The Flood Risk Assessment will include the following scope of works:

- Identify available data relating to flood risk at the site.
- Determine whether the site is at risk from flooding, including from breach or overtopping of any existing flood defences, surface water flooding and/or ground water flooding.
- Identify available data relating to drainage at the existing site, including historical discharges.
- Discuss, if required, Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk. Determine any potential increase in surface water runoff as a result of the proposed development.
- Devise an appropriate outline foul and surface water drainage strategy to deal with any increase in surface water runoff and include for climate change.
- Consider the recommendations of the Level 1 and Level 2 Manchester City Council Strategic Flood Risk Assessments (SFRA).
- Prepare the Flood Risk Assessment report.
- Assess mitigation measures & off-site impacts and define any residual risks.

2.0 DEVELOPMENT DESCRIPTION AND LOCATION

2.1 Site Location

The site is referenced in Table 1, and a site location map is provided in Figure 1.

Table 1: Site Referencing Information

Item	Brief Description
Site name	Storage World
Site address and location	Land off Ambrose Street, Manchester, M12 5DD.
Council Area	Manchester City Council
Approximate Grid Reference	OS: N: 387259, E: 397214
General Locality	The site is located in the Gorton area of Manchester, some 2km to the west of Manchester City Centre.

2.2 Existing Site Description

The development site (Red Line Boundary) is roughly rectangular in plan shape and situated in a commercial and industrial led area with some residential dwellings beyond to the north and south. The site currently encompasses a group of warehouse buildings with parking areas.

Pottery Lane is located along the western boundary with a railway line as a flyover to the north, beyond that are fields belonging to Bridge college. Ambrose Street and access to the site is located to the south with further commercial and industrial developments located to the east, south and west of the site

Figure 1 overleaf identifies the overall site location details. Further details of the existing layout can be seen on the Red Line Plans in Appendix A and the Topographical survey in Appendix B.

The development site can be classed as Brownfield for drainage purposes.

Figure 1 – Location Plan



2.3 Local Hydrology

The closest identified watercourse to the development boundary is the corn Brook, located approximately 60m to the south of the site flowing westerly in both open channel and culvert. The Ashton Canal some 800m to the north of the site.

2.4 Proposed Development

This report has been prepared to support a full planning application for the demolition of an existing group of buildings and construction of a new storage unit with external parking and access on land off Ambrose Street.

The current outline Architectural site Master Plan in Appendix A provides an indication of the proposed development intent.

3.0 PLANNING POLICY AND CONSULTATION

3.1 Planning Policy Requirement

The flood maps for planning provided by the Environment Agency (EA) locate the majority of the site in low-risk Flood Zone 1, i.e. land assessed as having less than a 1 in 1000 (0.1%) annual probability of fluvial flooding in any year. However, there is a small area of Flood Zone 2 set down from the main building in the southeast corner, i.e. land assessed as having greater than a 1 in 1000 (>0.1%) but less than a 1 in 100 (<1.0%) annual probability of fluvial flooding in any year. As a requirement of the new NPPF (2021), Paragraph 162, the proposed development should satisfy the requirements of the Sequential Test and where applicable the Exception Test.

Sequential Test:

Under the NPPF (2021), Flood Zone 1 is defined as low probability flood risk. The proposal is for a commercial development, which in line with Table 2 is classified as 'less Vulnerable'.

Placing both these criteria into Table 3 (Flood Risk Vulnerability and Flood Zone 'Compatibility'), Less Vulnerable development in Flood Zone 2 determines that the Sequential test is passed, and Exception test is not required.

3.2 Strategic Flood Risk Assessment (SFRA)

SFRA's assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area, how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB's) or Local Planning Authorities should prepare SFRA's in consultation with the EA.

The building sits within the coverage of Manchester City Council Level 2 Hybrid SFRA Final Report March 2011: a combined study undertaken by the local authorities forming the AGMA body. The published SFRA identifies current and future broad scale flood related issues in Trafford. The JBA Consulting 'final report' is dated March 2011 and remains current at the time of this assessment. The purpose of the SFRA is to assess and map all known sources of flood risk including fluvial, surface water, sewer, groundwater and all impounded water bodies, taking into account future climate change predictions.

A summary of the main elements from the SFRA associated with the district is detailed below. The full report can be obtained from the Manchester City Council website.

- SFRA provides a detailed understanding of flood risks across all areas from all sources.

- SFRA maps indicate the site to be at low risk of fluvial flooding (FZ1). However, these have now been superseded by the recently completed hydraulic modelling of the Corn Brook Culvert by the EA.
- Full sequential and exception tests to be carried out (where applicable).
- Flood resilient construction to be used where applicable.
- Safe dry access and egress to be assured.
- Surface Water drainage should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no building flooding in a 1 in 100 year plus climate change event. Where possible sustainable drainage should be incorporated.

3.3 Statutory Authority Correspondence

Thomasons have consulted with the EA to obtain the modelled flood levels from the Corn Brook Culvert. Full details can be found in Appendix D.

United Utilities have also been consulted via a pre development enquiry.

4.0 DEFINITION OF FLOOD HAZARD

4.1 Sources of information

The NPPF requires the developer to consider the impact of runoff generated by the proposed development onto the downstream catchment, and to assess the risk of runoff from the surrounding district impacting on the development's footprint. Further, the report is to consider flood risk from all other sources. This section defines the flood risk receptors and anticipated flood risk. Section 5 then discusses in further the probability of flooding from defined sources and the likely impacts.

Table 2 summarises the main sources of information used in the identification of flood risk.

Table 2: Sources of information used in the identification of flood risk.

Source of Information	Details
Environment Agency Flood Map	From EA website and formal Written Response
United Utility Sewer Records	Various Maps
Historic Maps	From various websites
Local SFRA	Report & Various Maps

4.2 Flooding from Sea (Tidal) and Rivers & Watercourses (Fluvial)

As mentioned in earlier sections, the closest identified watercourse to the development boundary is the Corn Brook, located 60m south of the site within 3rd party land.

Figure 2 below indicates that the flood maps for planning provided by the Environment Agency (EA) locate the majority of the site in low-risk Flood Zone 1, i.e. land assessed as having less than a 1 in 1000 (0.1%) annual probability of fluvial flooding in any year. However, there is a small area of Flood Zone 2 set down from the main building in the southeast corner, i.e. land assessed as having greater than a 1 in 1000 (>0.1%) but less than a 1 in 100 (<1.0%) annual probability of fluvial flooding in any year. Refer to Section 5 for full details of this associated with the development intent.

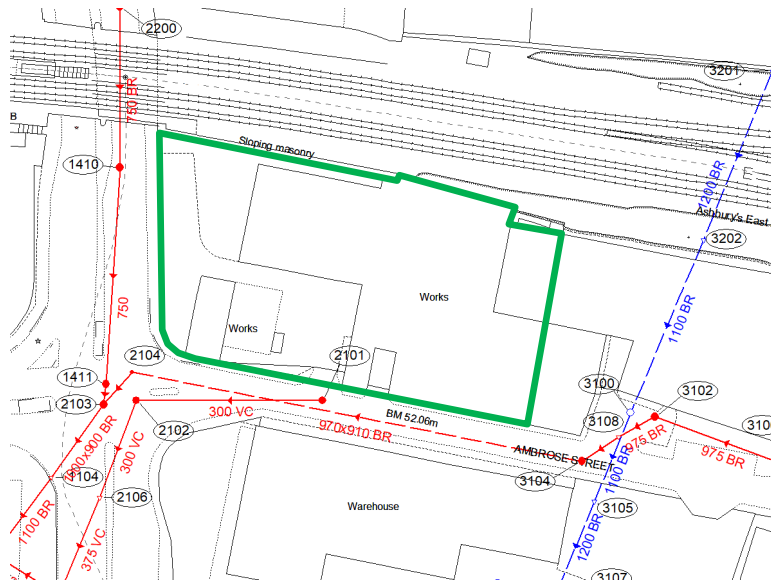
The map displays the development site in Gorton, Manchester, with various flood zones and watercourse features. The legend identifies the following elements:

- Selected location:** Indicated by a red pin.
- Main river:** Represented by a blue line.
- Flood zone 1:** Light blue shaded area.
- Flood zone 2:** Medium blue shaded area.
- Flood zone 3:** Dark blue shaded area.
- Flood defence:** Represented by an orange line.
- Areas benefitting from flood defences:** Represented by a hatched pattern.
- Water storage area:** Represented by a blue checkered pattern.

The map shows the development site (red rectangle) and the Corn Brook Watercourse (blue line) flowing through the area. Surrounding streets include Stainforth Street, Kay Street, Whitworth Street, and Gorton Road. Landmarks such as St Barnabas Church, The Manchester College Openshaw Campus, and St Francis Church are also visible.

The UU adopted sewers and private drainage networks serving the surrounding district ensures that the development footprint is protected from the impact of both upstream and downstream runoff. It is speculated that complete protection may well exist beyond a storm event equivalent to the 30 year statistical event. Beyond this projection, there may be a small degree of peripheral 'Exceedance' flooding in the highways associated with the surface water sewer, which is set much lower than the proposed building. In light of this the risk of flooding from sewer / drainage can be considered to be low.

Figure 3 – United Utilities Sewer Records (from 2006)



4.4 Groundwater

No site-specific intrusive Phase 2 Site Investigation has been carried out at the site.

However, a review of historical site investigations at the site and the Manchester Level 2 Strategic Flood Risk Assessment (SFRA) would indicate that no groundwater flooding has been experienced in the locality of the development site and therefore the risk can be considered low.

4.5 Surface Flooding (Overland Flow)

The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- High risk means that each year this area has a chance of flooding of greater than 3.3%.
- Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%.
- Low risk means that each year this area has a chance of flooding of between 0.1% and 1%.
- Very Low risk means that each year this area has a chance of flooding of less than 0.1%.

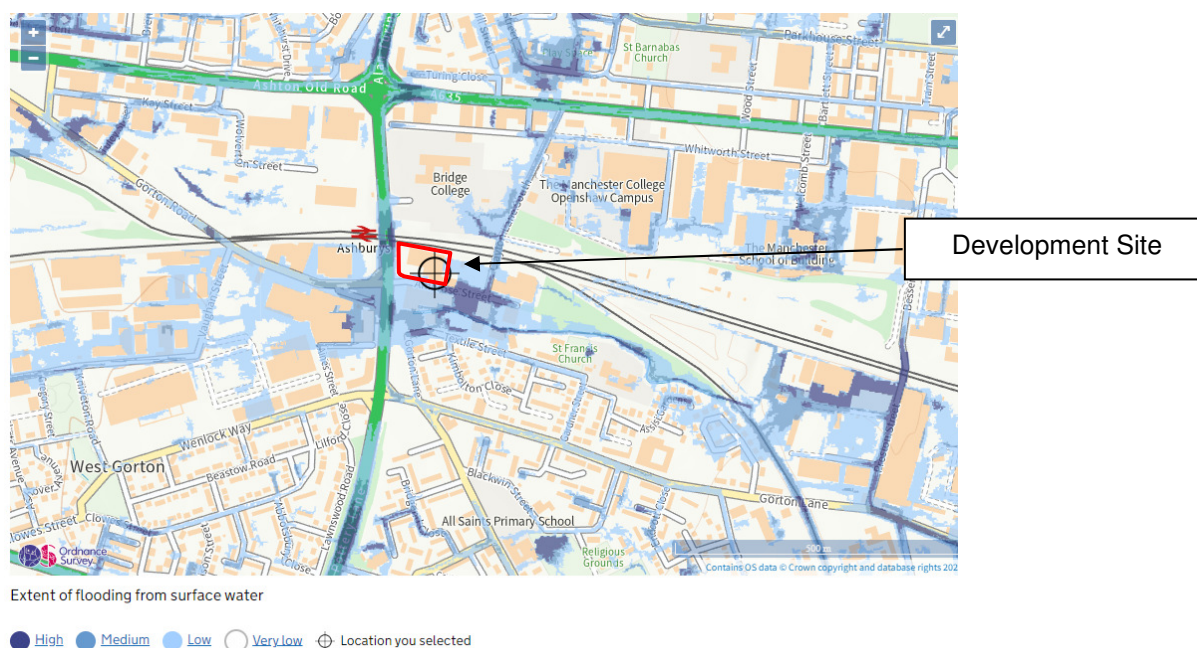
The general area within and surrounding the proposed development falls in a south westerly direction. Any overland flows from the north will be intercepted by the existing railway line. Flooding from the east will be conveyed along Ambrose Street and also towards the Corn Brook further south, thus away from the site.

The Environment Agency's surface water flood maps (refer to Figure 4) show the site area at very low risk of surface flooding. There is a small area to the east side at low risk, associated with the low-lying levels. Any areas shown as at medium/high risk are contained within Ambrose Street, with these areas being a sufficient distance away from the site to have no implications for flood risk or access and egress.

There are no existing surface water flow routes through the site that would need to be maintained.

As part of the proposed development the levels across the development will ensure that all low points are located away from buildings, thus posing a low risk. The new surface water drainage will also be designed and installed in accordance with the latest guidance and climate change allowances to ensure no surface water ponding will occur.

Figure 4 – The Environment Agency's Indicative Surface Water Flood Map



4.6 Artificial Sources

No other artificial sources such as canals, reservoirs or other waterbodies have been identified in the vicinity of the site to pose a flood risk.

4.7 Summary

Table 3 below considers each of the sources and defines in tabular format the probability of flood risk associated to each and the likely impacts.

Table 3: Flood Risk Summary

Source	Flood Risk	Impact	Remarks
Tidal	Low	Low	The site is not at risk of Tidal flooding
Fluvial (Watercourse)	Low-Medium	Low	Site located predominantly in Low Risk Flood Zone 1 from Fluvial Flooding according to the EA indicative flood maps. Small area located in medium risk Flood Zone 2. Further assessment is identified Section 5 on this risk.
Surface (Overland Flood Flow)	Low	Low	Site and surrounding area has a nominal fall to the south west. SFRA and EA maps indicate site to be at very low risk from surface water flooding. Post development mitigation measures such as raised FFL to mitigate risk.
Sewers & Drainage	Low	Low	Large diameter existing UU sewer located in adjoining highways to serve the local area.
Groundwater	Low	Low	No indication through SFRA that site at risk of groundwater flooding.
Artificial Sources	Low	Low	No Artificial sources in close proximity.

5.0 ASSESSMENT OF FLOOD RISK ON PROPOSED DEVELOPMENT

5.1 Summary

As discussed in Section 3, the development site has been categorised in accordance with the SFRA only as being partly located within a potential Medium Flood Risk Area from fluvial flooding. This is related to flood risk from the Corn Brook. As such further assessment is required.

Other flood risk sources such as watercourse, groundwater, sewer and overland flows have been considered and have been found not to be a flood risk generator to the site.

5.2 Flooding from the Fluvial Influenced Corn Brook

The EA have been consulted to provide the modelled flood data from the Corn Brook via a Product 4 request. A response was received on the 14th October with the detailed flood levels.

Based on a review of the EA flood data, Table 4 below outlines the peak flood levels.

Table 4: Peak Flood Level – Corn Brook

Node Ref:	1 in 100 year (1% AEP)	1 in 100 year (1% AEP)	1 in 1000 year (0.1% AEP)
4	50.02m AOD	50.73m AOD	52.00m AOD

The proposed finished floor level (FFL) of the new building is to be set at approximately 52.65m AOD. This level is 0.65m higher than the 1 in 1000-year flood event and significantly above all other flood levels.

In light of this, this data has confirmed that the development building is located outside of the impact of fluvial based flood waters and can be classed as located in low-risk Flood Zone 1. There may be some minor flooding in the adjacent Ambrose Street highway outside of the site boundary that is set down from the FFL of the building.

6.0 SUSTAINABLE DRAINAGE SYSTEM (SuDS) ASSESSMENT

6.1 Consultation

Thomasons have consulted with United Utilities via a predevelopment enquiry. In response, they have confirmed that evidence should be provided that the SuDS Hierarchy has been assessed. Should this assessment confirm that the only viable surface water outfall is to drain to a combined sewer then they would allow connect at a peak rate not exceeding 21l/s. Full details can be found in Appendix F.

6.2 Existing Surface Water Runoff

In terms of drainage runoff characteristics the site is classed as 'Brownfield', which are defined in Table 5 below.

Table 5: Existing Brownfield Runoff Rates

	Site Area (ha)	1 Year (30mm/hr)	30 Year (65mm/hr)	100 year (95mm/hr)
Development Site	0.52	43 l/s	94 l/s	137 l/s

In line with MCC policy the peak 1 year rate of runoff will be reduced by 50% for all events. Thus a flow rate of 21l/s is to be utilised.

6.3 Geology

No specific Phase 2 site investigation has been undertaken at the site. A review of the British Geological Society (BGS) online ground data would indicate the superficial deposits to comprise Till/Divensian (clay). The bedrock comprises the Etruria Formation of Sandstone and mudstone. A review of a local BGS borehole data has also identified the underlying ground to encompass yellow clay over brown clay. In light of this, infiltration based SuDS devices are deemed to be unsuitable for use on the site.

6.4 Hydrological Assessment

The closest identified feature is Corn Brook, located some 60m beyond the southern boundary in 3rd party land.

6.5 Existing Sewer Records

The United Utilities (UU) sewer records have been reviewed and there are a number of combined sewers within Ambrose Street to the south of the site.

6.6 Sustainable Drainage Systems

SuDS Objectives:

Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed both to manage the environmental risks resulting from the urban runoff and to contribute wherever possible to environmental enhancement. SuDS objectives are therefore to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

The SuDS Management Train

The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:

1. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.
2. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
3. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.
4. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

SuDS Site Constraints

SuDS techniques are suitable for all sites in some form; therefore, an assessment of the existing site is required so that SuDS limitations can be determined.

- **Land Use Characteristics:** The type of development plot reduces the range of prevention options, though site control SuDS devices can be considered below ground.
- **Site Characteristics:** Based on an assessment of the historic site investigation, shallow infiltration SuDS devices would not be suitable for use on the site.

- Catchment Characteristics: In terms of runoff characteristics the site is considered to be 'Brownfield'.
- Environmental and Amenity Performance: The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. Most 'Green' type SuDS options cannot be considered for this site due to the type of development. Maintenance plans will be prepared for all SuDS devices that are included.

SuDS Methods

Tables 6 and 7, below, provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates and volumes and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the storage and distribution development.

Table 6: Surface SuDS Methods

Method	Comment	Suitability for development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	<u>Not suitable:</u> Architectural proposals for the development involve a pitched roof arrangement which are not suitable for green roofs.
Water Butts	Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas.	<u>Not Suitable</u> Not appropriate for developments like these.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site and reduces treated water consumption.	<u>Not suitable:</u> - Additional costs of installation would have severe effect on viability of the development. - Running and maintenance costs would not be acceptable to our client. - The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs.
Infiltration	Reduces total run off volume from the development.	<u>Not suitable:</u> Underlying cohesive ground is unsuitable for infiltration based SuDS options.
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development. - Can be used to enhance water quality.	<u>Not suitable:</u> Underlying cohesive ground is unsuitable for infiltration based SuDS options.

Method	Comment	Suitability for development
Permeable Surfacing (Standard)	• Can be used to enhance quality of runoff water. • Sub-base provides 'source' storage and reduces the volume of storage downstream. • The storage can be created with selection of the stone fill or use of plastic box stems. • Impermeable membrane at base of construction to prevent impact on pavement stability.	<u>Not suitable:</u> • Underlying cohesive ground is unsuitable for infiltration based SuDS options.
Swales, basins and ponds	• Provide areas for above ground surface runoff storage. • Swales also allow filtering of particulate matter, improving water quality	<u>Not suitable:</u> • Space constraints on site do not permit large above ground areas for storage. • No scope to reduce car parking numbers due to site viability.

Table 7: Sub-Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	• Suitable for sites with insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc. • Can be very effective infiltration devices subject to ground conditions.	<u>Suitable:</u> • Subject to details design and drainage layout.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally suitable for adoption by the statutory water company (e.g. United Utilities).	Not Suitable: • More suited to large housing developments.

SuDS Hierarchal Approach

Based on the SuDS assessment in Tables 6 and 7, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Table 8: SuDS Hierarchal Approach

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Underlying cohesive ground is unsuitable for infiltration based SuDS options.
Connection to Watercourse	Yes	New connection to culverted watercourse at restricted rates.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity
Connection to a Combined Sewer	No	Higher options take precedent.

SuDS Design Philosophy

The SuDS assessment and hierarchal approach discussed in Tables 6, 7 & 8 above has defined the overall SuDS strategy. Thus the SuDS philosophy for the development site is the promotion of Site Control techniques with discharge to the combined sewer at restricted rates to reduce the flooding impact and downstream flooding.

The following design philosophy is proposed:

- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to connection.
- Site Control by the inclusion of a geocellular attenuation tank beneath the car park.
- Aim to limit where possible the impermeable fraction of development.

7.0 OUTLINE DRAINAGE STRATEGY

7.1 Surface Water Drainage

The general principle of the surface water drainage strategy is to collect the runoff from the new building & parking area, and direct to a below ground surface water drainage network within the car parking area. This will outfall to the culverted watercourse to the east of the development site via a new connection. A flow restricting device will be placed on the network with the peak flows restricted to 21l/s as described in Section 6.1 and an offline geocellular tank will retain the peak flows.

The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance, i.e. up to the 30 year storm return period criterion.

Flooding can occur on a local scale beyond the 30 year criterion due to runoff exceeding the capacity of the minor system during extreme events and it can only be addressed on a site-specific basis. Design and Construction Guidance (DCG) states that properties should be protected against flooding from extreme events (1 in 30 year) and that flood pathways are identified when the drainage system is exceeded.

In the case of this development, exceedance flows will be all those over and above the 30 year design criterion set by Building Regulations guidance. Using storage within the external parking areas would be achievable and would direct flood water away from the proposed building, with flows directed back into the surface water drainage network as water levels in the drainage network receded.

In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nationwide allowances, each area will have its own peak rainfall allowances. In the case of the Manchester area, this is the Irwell Management Catchment peak rainfall allowances.

Based on the nature of the development, a lifespan of 50 years is anticipated. Therefore, the potential climate change allowance for the 2070's ranges between 30% for the central allowance and 45% for the upper end allowance. As such, an allowance of 30% for climate change on peak rainfall intensity will be included in calculations.

Runoff from roofs is generally considered to be clean and will be discharged directly into the surface water network. As the number of car parking spaces will be limited, a petrol interceptor is not to be considered. Silt will be prevented from entering the drainage system by the use of trapped gullies, silt boxes and separators.

Although it is envisaged that Prevention and Source Controls measures could be included in the final scheme, this strategy will assume for outline calculations purposes that only Site Control methods are incorporated. A full detailed hydraulic surface water network has been simulated in the Microdrainage Design Software. This takes into account the peak discharge rate of 21l/s and assumes no prevention & source control measures are incorporated and no infiltration to ground is possible. It is noted that these rates and volumes are preliminary for this outline assessment and are likely to alter at detailed design stage when more site-specific information is made available.

Drawing 11325-FRA-001 in Appendix C indicates the Drainage Strategy based on the Architect's masterplan intent, with the hydraulic calculations in Appendix D.

7.2 Management & Maintenance

The long-term maintenance of the new drainage infrastructure will be with the owner / occupier of the proposed commercial units in line with best practice guidance. Annual inspections will need to be carried out and clearing of drainage channels, gullies, catchpits and petrol interceptors undertaken. Typically the maintenance regime will be in line with Table 10 below.

Table 10: Outline Management and Maintenance Strategy

<u>Future Maintenance of the Drainage System</u>			
Responsibility	Feature	Maintenance	Frequency
Owner / Occupier / Management Company	Drainage Channel.	Regular maintenance / removal of blockages and silts.	Ad-hoc flushing / jetting and emptying of silt traps required.
	Rainwater gutters, downpipes and above ground drainage.	Regular maintenance and inspections.	Ad-hoc sweeping and emptying of silt and debris required. Annual visual inspections to check for damage/leaks.
	Flow control chambers.	Regular maintenance / removal of blockages and debris.	Annual inspection and following significant rainfall events.
	Geocellular Attenuation / Tanks	Regular maintenance / removal of blockages and debris.	Annual inspection and following significant rainfall events.
	Pipes, sewers, manholes, outfall headwall.	Regular maintenance / removal of blockages and debris.	Annual inspection and removal of silts if required.

7.3 Foul Drainage

Foul water flows generated from the site will discharge unrestricted to the existing foul water drain connecting to the combined sewer within Ambrose Street.

The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance.

8.0 MANAGEMENT MEASURES, OFF SITE IMPACTS AND RESIDUAL RISK

8.1 Flood Risk Management Measures

The surface water drainage strategy for the new development site will be to drain into the adjacent culverted watercourse via a new connection. The new surface water networks will be designed in line with current British Standard guidance up to the 100 year storm return period including an allowance for climate change. Beyond the 30 year criterion out of chamber flooding may occur with flood water directed away from the building to the parking areas where it will then be directed back into the drainage network as the pipe water levels recede.

The use of a flow restricting device and SuDS in the form of Site Control measures will help to minimise the flood risk impact to the surrounding sewers.

There will be a site management health and safety document prepared in respect of the final development. This will include the required maintenance regime for the on-site drains and drainage facilities such as the channels, gullies, pipes, manholes and all SuDS facilities.

The owner will be responsible for site cleanliness, gully emptying and drain cleansing to ensure that the surface water drainage system will always operate at its maximum efficiency.

8.2 Off Site Impacts

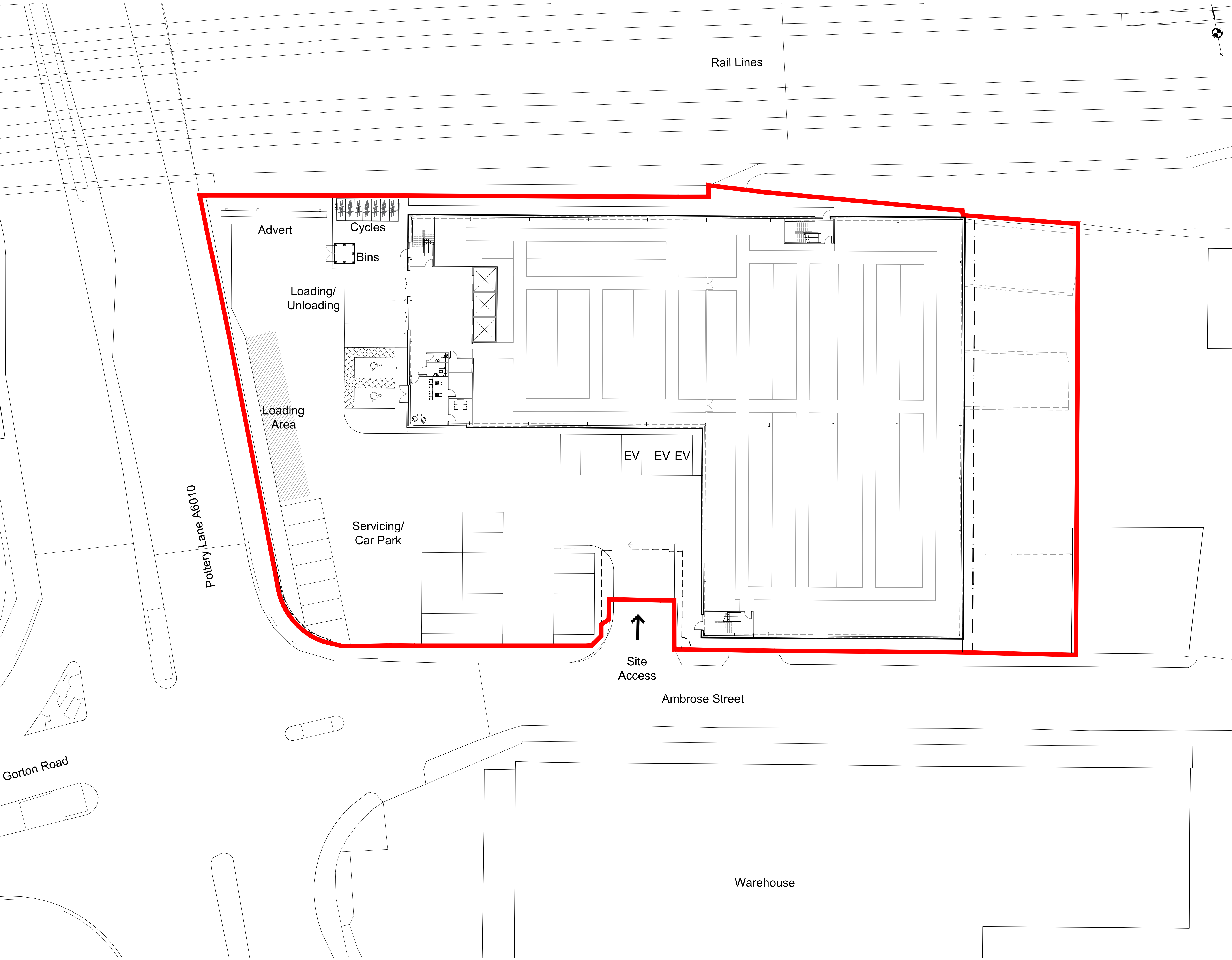
Surface water runoff will mimic the pre-development scenario as there is no change to the impermeable areas or the drainage networks, therefore not increasing the flood risk to the downstream catchment.

8.3 Residual Risk

With careful design of the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.

Flood risk to people and property can be managed but it can never be completely removed; a residual risk remains after flood management or mitigation measures have been put in place. The only known flood related residual risk that will remain after flood management or mitigation measures have been put in place will be the risk of flooding from the drainage networks beyond the extreme event. By raising the building levels the risk is mitigated.

Appendix A – Architect Layout Plan



SCHEDULE OF ACCOMMODATION:		
SITE AREA	1.27 Acres	
	0.52 Hectares	
LINE OF FENCE/RETAINING WALL		
GROSS INTERNAL FLOOR AREA		
GROUND FLOOR	2,320sqm	/ 24,974sqft
FIRST FLOOR	2,320sqm	/ 24,974sqft
SECOND FLOOR	2,320sqm	/ 24,974sqft
THIRD FLOOR	2,320sqm	/ 24,974sqft
FOURTH FLOOR	2,320sqm	/ 24,974sqft
TOTAL FLOOR AREA -	11,600sqm	/ 124,870sqft
GROSS EXTERNAL FLOOR AREA		
GROUND FLOOR	2,395sqm	/ 25,782sqft
FIRST FLOOR	2,395sqm	/ 25,782sqft
SECOND FLOOR	2,395sqm	/ 25,782sqft
THIRD FLOOR	2,395sqm	/ 25,782sqft
FOURTH FLOOR	2,395sqm	/ 25,782sqft
TOTAL FLOOR AREA -	11,975sqm	/ 128,910sqft
PARKING SPACES	25no. STANDARD SPACES	
	3no. LOADING SPACES	
	2no. DDA SPACES	
	3no. EV SPACES	
	14no. CYCLE SPACES	

B	STAIR AMENDED, BINSTORE ADDED	10.10.22	PS	GB
A	PLAN AMENDED	03.10.22	PS	GB
Rev	Description	Date	By	CHK

Status	Purpose for Issue	
Planning	☐ Tender	☐
Construction	☐ As Built	☐ INFORMATION

Client
STORAGE WORLD

Contract
PROPOSED WORKS
STORAGE WORLD, AMBROSE STREET,
MANCHESTER

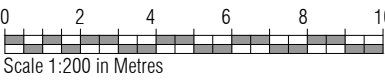
Drawing
PROPOSED SITE PLAN

bateandtaylor
architects

macintosh house
4a cambridge street
manchester m1 5gg
tel: 0161 236 0999
fax: 0161 236 0404
mail@bate-taylor.co.uk
www.bate-taylor.co.uk

Drawing No.	MH1314-07	Revision	B
Scales	1:200@A1	Date	SEPT '22
Drawn	PS	Checked	GB

This drawing is the copyright of the Architect and may not be reproduced without licence.
DO NOT scale from this drawing.



Appendix B – Topographical Survey

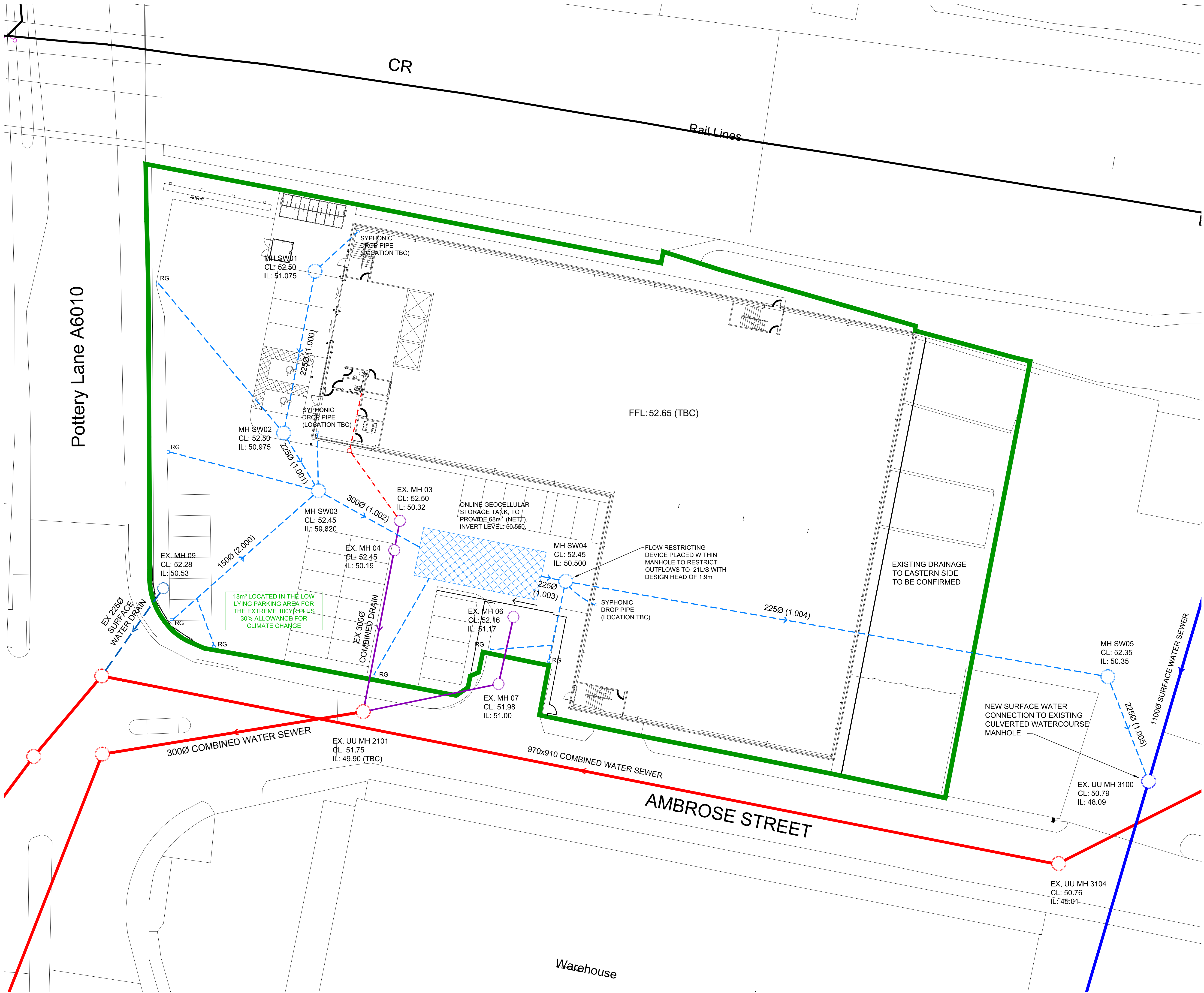
Appendix C – Thomason Drawings

GENERAL NOTES

- DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- DO NOT SCALE FROM THE DRAWINGS OR THE COMPUTER DIGITAL DATA, ONLY FIGURED DIMENSIONS ARE TO BE USED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, FABRICATION, ERECTION AND REMOVAL OF ALL TEMPORARY WORKS AND SHALL PROVIDE ALL TEMPORARY BRACING AS NECESSARY TO MAINTAIN STRUCTURAL STABILITY DURING CONSTRUCTION.
- IF THE CONTRACTOR CONSIDERS THAT HE DOES NOT HAVE SUFFICIENT INFORMATION TO SAFELY COMPLETE THE WORKS DETAILED ON THIS DRAWING, HE SHOULD CONTACT THE ENGINEER.

KEY

- EXISTING COMBINED WATER SEWER
- EXISTING CULVERTED WATERCOURSE
- EXISTING COMBINED WATER DRAINAGE
- EXISTING SURFACE WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- SITE BOUNDARY



P2	SURFACE WATER OUTFALL AMENDED	PG	01.11.22	MB
P1	INFORMATION	PG	11.10.22	MB
Rev	Description	By	Date	Chkd



STORAGE WORLD,
AMBROSE STREET, MANCHESTER

DRAINAGE STRATEGY PLAN

INFORMATION

Drawing No.	11325-FRA-001	Revision	P2
Scale	1:200	Size	A1
Drawn	PG	Date	OCT 22
Chkd	CH	Passed	MB

Appendix D – Outline Calculations

		Page 1
	Ambrose Street, Manchester Surface Water Network	
Date 01/11/2022 File Ambrose Street - Surfac...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.358	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.257	4-8	0.153

Total Area Contributing (ha) = 0.410

Total Pipe Volume (m³) = 5.597

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.000	0.100	180.0	0.083	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	7.000	0.080	87.5	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	22.000	0.130	169.2	0.050	4.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.31	51.075	0.083	0.0	0.0	0.0	0.97	38.6	11.2
1.001	50.00	4.39	50.975	0.130	0.0	0.0	0.0	1.40	55.6	17.6
2.000	50.00	4.48	51.100	0.050	0.0	0.0	0.0	0.77	13.6	6.8

©1982-2017 XP Solutions

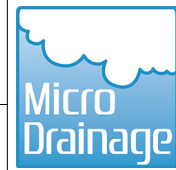
		Page 3						
		Ambrose Street, Manchester Surface Water Network						
Date 01/11/2022 File Ambrose Street - Surfac...		Designed by paulg Checked by						
Innovyze		Network 2017.1.2						
PIPELINE SCHEDULES for Storm								
Upstream Manhole								
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SW01	52.500	51.075	1.200	Open Manhole	1200
1.001	o	225	SW02	52.500	50.975	1.300	Open Manhole	1200
2.000	o	150	RG	52.000	51.100	0.750	Open Manhole	1200
1.002	o	300	SW03	52.400	50.820	1.280	Open Manhole	1200
1.003	o	300	TANK	52.400	50.550	1.550	Open Manhole	1200
1.004	o	225	SW04	52.450	50.500	1.725	Open Manhole	1500
1.005	o	225	SW05	52.350	50.200	1.925	Open Manhole	1200
Downstream Manhole								
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.000	180.0	SW02	52.500	50.975	1.300	Open Manhole	1200
1.001	7.000	87.5	SW03	52.400	50.895	1.280	Open Manhole	1200
2.000	22.000	169.2	SW03	52.400	50.970	1.280	Open Manhole	1200
1.002	13.000	130.0	TANK	52.400	50.720	1.380	Open Manhole	1200
1.003	5.000	100.0	SW04	52.450	50.500	1.650	Open Manhole	1500
1.004	62.000	206.7	SW05	52.350	50.200	1.925	Open Manhole	1200
1.005	12.000	10.0	SEWER	50.790	49.000	1.565	Open Manhole	0
Free Flowing Outfall Details for Storm								
Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)		
1.005	SEWER	50.790	49.000	48.090	0	0		
Simulation Criteria for Storm								
Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow		0.000				
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage		2.000				
Hot Start (mins)	0	Inlet Coefficient		0.800				
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)		0.000				
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)		60				
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)		1				
Number of Input Hydrographs		0	Number of Storage Structures		1			
Number of Online Controls		1	Number of Time/Area Diagrams		0			
Number of Offline Controls		0	Number of Real Time Controls		0			
Synthetic Rainfall Details								
©1982-2017 XP Solutions								

		Page 4																				
	Ambrose Street, Manchester Surface Water Network																					
Date 01/11/2022 File Ambrose Street - Surfac...	Designed by paulg Checked by																					
Innovyze	Network 2017.1.2																					
Simulation Criteria for Storm <table><tr><td>Rainfall Model</td><td>FSR</td><td>Profile Type</td><td>Summer</td></tr><tr><td>Return Period (years)</td><td>2</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>M5-60 (mm)</td><td>18.000</td><td>Storm Duration (mins)</td><td>30</td></tr><tr><td>Ratio R</td><td>0.358</td><td></td><td></td></tr></table>			Rainfall Model	FSR	Profile Type	Summer	Return Period (years)	2	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	18.000	Storm Duration (mins)	30	Ratio R	0.358		
Rainfall Model	FSR	Profile Type	Summer																			
Return Period (years)	2	Cv (Summer)	0.750																			
Region	England and Wales	Cv (Winter)	0.840																			
M5-60 (mm)	18.000	Storm Duration (mins)	30																			
Ratio R	0.358																					
©1982-2017 XP Solutions																						

		Page 5																																																																								
	Ambrose Street, Manchester Surface Water Network																																																																									
Date 01/11/2022 File Ambrose Street - Surfac...	Designed by paulg Checked by																																																																									
Innovyze	Network 2017.1.2																																																																									
<u>Online Controls for Storm</u>																																																																										
<u>Hydro-Brake® Optimum Manhole: SW04, DS/PN: 1.004, Volume (m³): 3.7</u>																																																																										
Unit Reference MD-SHE-0190-2100-1900-2100																																																																										
Design Head (m) 1.900																																																																										
Design Flow (l/s) 21.0																																																																										
Flush-Flo™ Calculated																																																																										
Objective Minimise upstream storage																																																																										
Application Surface																																																																										
Sump Available Yes																																																																										
Diameter (mm) 190																																																																										
Invert Level (m) 50.500																																																																										
Minimum Outlet Pipe Diameter (mm) 225																																																																										
Suggested Manhole Diameter (mm) 1800																																																																										
Control Points Head (m) Flow (l/s)																																																																										
Design Point (Calculated) 1.900 21.0																																																																										
Flush-Flo™ 0.557 21.0																																																																										
Kick-Flo® 1.188 16.8																																																																										
Mean Flow over Head Range - 18.3																																																																										
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated																																																																										
<table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>6.6</td><td>1.200</td><td>16.9</td><td>3.000</td><td>26.1</td><td>7.000</td><td>39.3</td></tr><tr><td>0.200</td><td>17.4</td><td>1.400</td><td>18.2</td><td>3.500</td><td>28.1</td><td>7.500</td><td>40.6</td></tr><tr><td>0.300</td><td>19.7</td><td>1.600</td><td>19.3</td><td>4.000</td><td>30.0</td><td>8.000</td><td>41.9</td></tr><tr><td>0.400</td><td>20.6</td><td>1.800</td><td>20.5</td><td>4.500</td><td>31.7</td><td>8.500</td><td>43.2</td></tr><tr><td>0.500</td><td>21.0</td><td>2.000</td><td>21.5</td><td>5.000</td><td>33.4</td><td>9.000</td><td>44.4</td></tr><tr><td>0.600</td><td>21.0</td><td>2.200</td><td>22.5</td><td>5.500</td><td>35.0</td><td>9.500</td><td>45.5</td></tr><tr><td>0.800</td><td>20.5</td><td>2.400</td><td>23.5</td><td>6.000</td><td>36.5</td><td></td><td></td></tr><tr><td>1.000</td><td>19.4</td><td>2.600</td><td>24.4</td><td>6.500</td><td>37.9</td><td></td><td></td></tr></table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	6.6	1.200	16.9	3.000	26.1	7.000	39.3	0.200	17.4	1.400	18.2	3.500	28.1	7.500	40.6	0.300	19.7	1.600	19.3	4.000	30.0	8.000	41.9	0.400	20.6	1.800	20.5	4.500	31.7	8.500	43.2	0.500	21.0	2.000	21.5	5.000	33.4	9.000	44.4	0.600	21.0	2.200	22.5	5.500	35.0	9.500	45.5	0.800	20.5	2.400	23.5	6.000	36.5			1.000	19.4	2.600	24.4	6.500	37.9		
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																			
0.100	6.6	1.200	16.9	3.000	26.1	7.000	39.3																																																																			
0.200	17.4	1.400	18.2	3.500	28.1	7.500	40.6																																																																			
0.300	19.7	1.600	19.3	4.000	30.0	8.000	41.9																																																																			
0.400	20.6	1.800	20.5	4.500	31.7	8.500	43.2																																																																			
0.500	21.0	2.000	21.5	5.000	33.4	9.000	44.4																																																																			
0.600	21.0	2.200	22.5	5.500	35.0	9.500	45.5																																																																			
0.800	20.5	2.400	23.5	6.000	36.5																																																																					
1.000	19.4	2.600	24.4	6.500	37.9																																																																					
©1982-2017 XP Solutions																																																																										

		Page 6																																																																																				
	Ambrose Street, Manchester Surface Water Network																																																																																					
Date 01/11/2022 File Ambrose Street - Surfac...	Designed by paulg Checked by																																																																																					
Innovyze	Network 2017.1.2																																																																																					
Storage Structures for Storm Cellular Storage Manhole: TANK, DS/PN: 1.003 Invert Level (m) 50.550 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>90.0</td><td>90.0</td><td>5.200</td><td>0.0</td><td>120.4</td></tr><tr><td>0.400</td><td>90.0</td><td>105.2</td><td>5.600</td><td>0.0</td><td>120.4</td></tr><tr><td>0.800</td><td>90.0</td><td>120.4</td><td>6.000</td><td>0.0</td><td>120.4</td></tr><tr><td>0.801</td><td>0.0</td><td>120.4</td><td>6.400</td><td>0.0</td><td>120.4</td></tr><tr><td>1.600</td><td>0.0</td><td>120.4</td><td>6.800</td><td>0.0</td><td>120.4</td></tr><tr><td>2.000</td><td>0.0</td><td>120.4</td><td>7.200</td><td>0.0</td><td>120.4</td></tr><tr><td>2.400</td><td>0.0</td><td>120.4</td><td>7.600</td><td>0.0</td><td>120.4</td></tr><tr><td>2.800</td><td>0.0</td><td>120.4</td><td>8.000</td><td>0.0</td><td>120.4</td></tr><tr><td>3.200</td><td>0.0</td><td>120.4</td><td>8.400</td><td>0.0</td><td>120.4</td></tr><tr><td>3.600</td><td>0.0</td><td>120.4</td><td>8.800</td><td>0.0</td><td>120.4</td></tr><tr><td>4.000</td><td>0.0</td><td>120.4</td><td>9.200</td><td>0.0</td><td>120.4</td></tr><tr><td>4.400</td><td>0.0</td><td>120.4</td><td>9.600</td><td>0.0</td><td>120.4</td></tr><tr><td>4.800</td><td>0.0</td><td>120.4</td><td>10.000</td><td>0.0</td><td>120.4</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	90.0	90.0	5.200	0.0	120.4	0.400	90.0	105.2	5.600	0.0	120.4	0.800	90.0	120.4	6.000	0.0	120.4	0.801	0.0	120.4	6.400	0.0	120.4	1.600	0.0	120.4	6.800	0.0	120.4	2.000	0.0	120.4	7.200	0.0	120.4	2.400	0.0	120.4	7.600	0.0	120.4	2.800	0.0	120.4	8.000	0.0	120.4	3.200	0.0	120.4	8.400	0.0	120.4	3.600	0.0	120.4	8.800	0.0	120.4	4.000	0.0	120.4	9.200	0.0	120.4	4.400	0.0	120.4	9.600	0.0	120.4	4.800	0.0	120.4	10.000	0.0	120.4
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																	
0.000	90.0	90.0	5.200	0.0	120.4																																																																																	
0.400	90.0	105.2	5.600	0.0	120.4																																																																																	
0.800	90.0	120.4	6.000	0.0	120.4																																																																																	
0.801	0.0	120.4	6.400	0.0	120.4																																																																																	
1.600	0.0	120.4	6.800	0.0	120.4																																																																																	
2.000	0.0	120.4	7.200	0.0	120.4																																																																																	
2.400	0.0	120.4	7.600	0.0	120.4																																																																																	
2.800	0.0	120.4	8.000	0.0	120.4																																																																																	
3.200	0.0	120.4	8.400	0.0	120.4																																																																																	
3.600	0.0	120.4	8.800	0.0	120.4																																																																																	
4.000	0.0	120.4	9.200	0.0	120.4																																																																																	
4.400	0.0	120.4	9.600	0.0	120.4																																																																																	
4.800	0.0	120.4	10.000	0.0	120.4																																																																																	
©1982-2017 XP Solutions																																																																																						

Ambrose Street, Manchester
Surface Water Network



Date	01/11/2022
------	------------

Designed by paulg

File Ambrose Street - Surfac...

Checked by

Innovyze

Network 2017.1.2

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

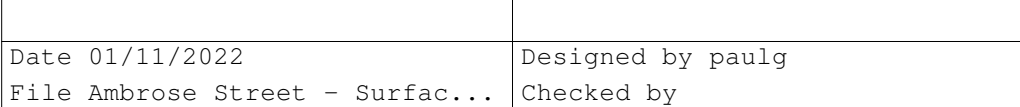
Rainfall Model	FSR	Ratio R	0.358
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
1.000	SW01	15 Winter	1	+0%	30/15 Summer				51.160
1.001	SW02	15 Winter	1	+0%	30/15 Summer				51.072
2.000	RG	15 Winter	1	+0%	30/15 Summer	100/30 Winter			51.175
1.002	SW03	15 Winter	1	+0%	30/15 Summer	100/60 Winter			50.960
1.003	TANK	30 Winter	1	+0%	30/15 Summer	100/60 Winter			50.713
1.004	SW04	30 Winter	1	+0%	30/15 Summer				50.707
1.005	SW05	30 Winter	1	+0%					50.253

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Level Exceeded
		Depth (m)	Volume (m³)			Flow (l/s)	
1.000	SW01	-0.140	0.000	0.31		10.7	OK
1.001	SW02	-0.128	0.000	0.39		15.3	OK
2.000	RG	-0.075	0.000	0.50		6.4	OK
1.002	SW03	-0.160	0.000	0.44		34.9	OK
1.003	TANK	-0.137	0.000	0.24		14.5	OK



File Ambrose Street - Surfac...

Checked by

Network 2017.1.2

PN	US/MH Name	Surcharged		Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow (l/s)					
1.004	SW04	-0.018	0.000	0.51		17.9	OK		
1.005	SW05	-0.172	0.000	0.13		17.9	OK		

Ambrose Street, Manchester
Surface Water Network



Date	01/11/2022
------	------------

Designed by paulg

File Ambrose Street - Surfac...

Checked by

Innovyze

Network 2017.1.2

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.358
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
1.000	SW01	15 Winter	30	+0%	30/15 Summer				51.316
1.001	SW02	15 Winter	30	+0%	30/15 Summer				51.242
2.000	RG	15 Winter	30	+0%	30/15 Summer	100/30 Winter			51.314
1.002	SW03	15 Winter	30	+0%	30/15 Summer	100/60 Winter			51.142
1.003	TANK	60 Winter	30	+0%	30/15 Summer	100/60 Winter			51.070
1.004	SW04	60 Winter	30	+0%	30/15 Summer				51.063
1.005	SW05	30 Winter	30	+0%					50.257

PN	Surcharged Flooded			Pipe	Status	Level Exceeded	
	US/MH Name	Depth (m)	Volume (m³)	Flow / Overflow (l/s)			Flow (l/s)
1.000	SW01	0.016	0.000	0.70	24.1	SURCHARGED	
1.001	SW02	0.042	0.000	0.94	37.5	SURCHARGED	
2.000	RG	0.064	0.000	1.14	14.7	SURCHARGED	6
1.002	SW03	0.022	0.000	1.13	89.3	SURCHARGED	1
1.003	TANK	0.220	0.000	0.32	19.7	SURCHARGED	1

		Page 11						
		Ambrose Street, Manchester Surface Water Network						
Date 01/11/2022 File Ambrose Street - Surfac...		Designed by paulg Checked by						
Innovyze		Network 2017.1.2						
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>								
Simulation Criteria								
Areal Reduction Factor 1.000		Additional Flow - % of Total Flow 0.000						
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000						
Hot Start Level (mm) 0		Inlet Coefficient 0.800						
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000						
Foul Sewage per hectare (l/s) 0.000								
Number of Input Hydrographs 0		Number of Storage Structures 1						
Number of Online Controls 1		Number of Time/Area Diagrams 0						
Number of Offline Controls 0		Number of Real Time Controls 0						
Synthetic Rainfall Details								
Rainfall Model FSR		Ratio R 0.358						
Region England and Wales Cv (Summer) 0.750								
M5-60 (mm) 18.000		Cv (Winter) 0.840						
Margin for Flood Risk Warning (mm)		300.0						
Analysis Timestep 2.5		Second Increment (Extended)						
DTS Status		OFF						
DVD Status		ON						
Inertia Status		ON						
Profile(s)		Summer and Winter						
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440						
Return Period(s) (years)		1, 30, 100						
Climate Change (%)		0, 0, 30						
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SW01	60 Winter	100	+30%	30/15 Summer			
1.001	SW02	60 Winter	100	+30%	30/15 Summer			
2.000	RG	60 Winter	100	+30%	30/15 Summer	100/30 Winter		
1.002	SW03	60 Winter	100	+30%	30/15 Summer	100/60 Winter		
1.003	TANK	60 Winter	100	+30%	30/15 Summer	100/60 Winter		
1.004	SW04	60 Winter	100	+30%	30/15 Summer			
1.005	SW05	360 Winter	100	+30%				
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	52.462	1.162	0.000	0.61	21.2	FLOOD RISK	
1.001	SW02	52.439	1.239	0.000	0.80	31.8	FLOOD RISK	
2.000	RG	52.019	0.769	18.775	1.32	17.0	FLOOD	6
1.002	SW03	52.401	1.281	0.924	0.95	75.4	FLOOD	1
1.003	TANK	52.400	1.550	0.050	0.37	22.5	FLOOD	1
©1982-2017 XP Solutions								

Appendix E – Environment Agency Flood Data

Flood risk assessment data

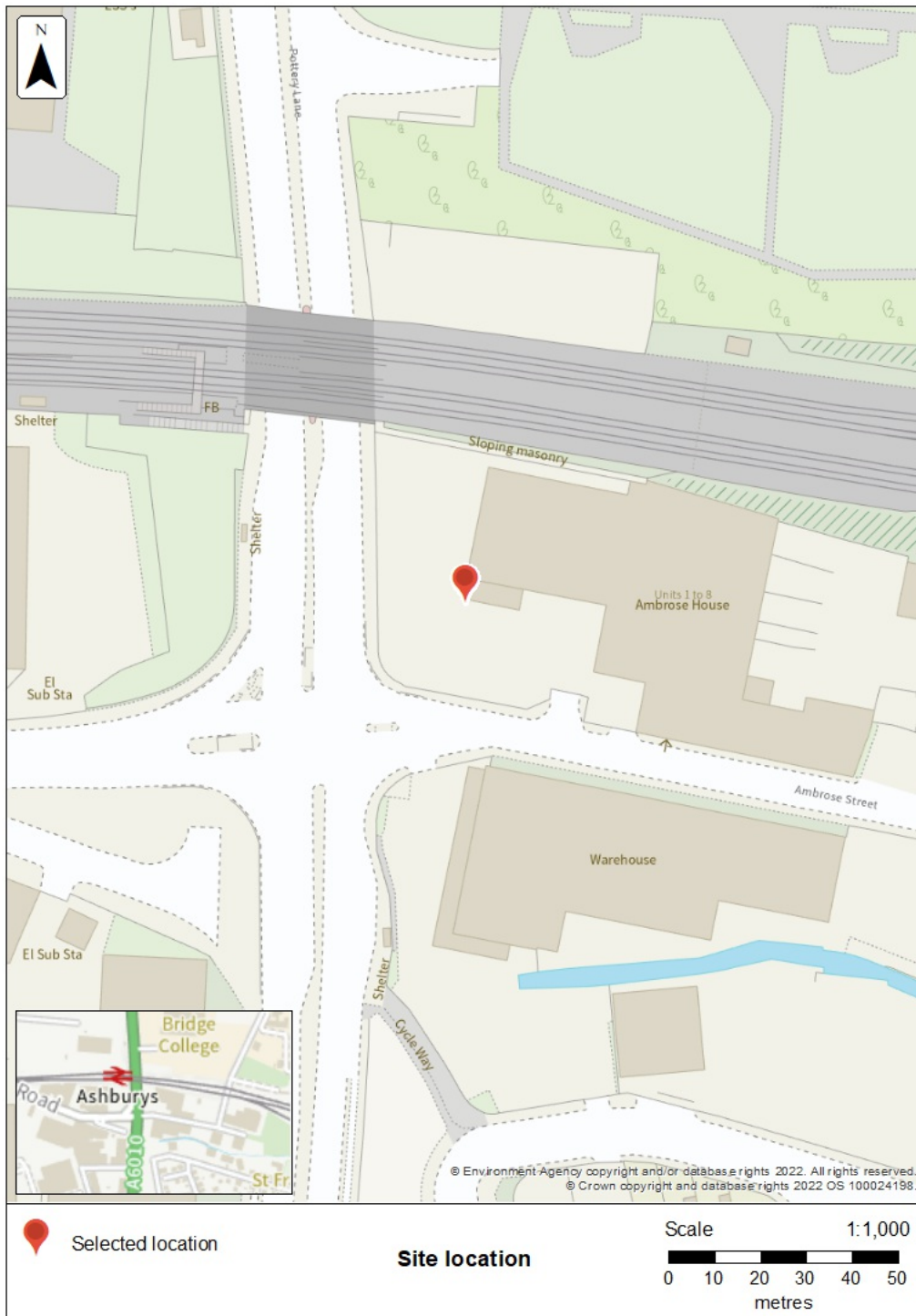
Location of site: 387241 / 397198 (shown as easting and northing coordinates)

Document created on: 20 September 2022

This information was previously known as a product 4.

Customer reference number: DC6G832AYB1M

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)
- 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:

- historic flooding
- flood defences and attributes

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to flooding from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

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

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

About the models used

Model name: Corn Brook 2017

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

Date: 31 December 2017

This model contains 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 1.

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

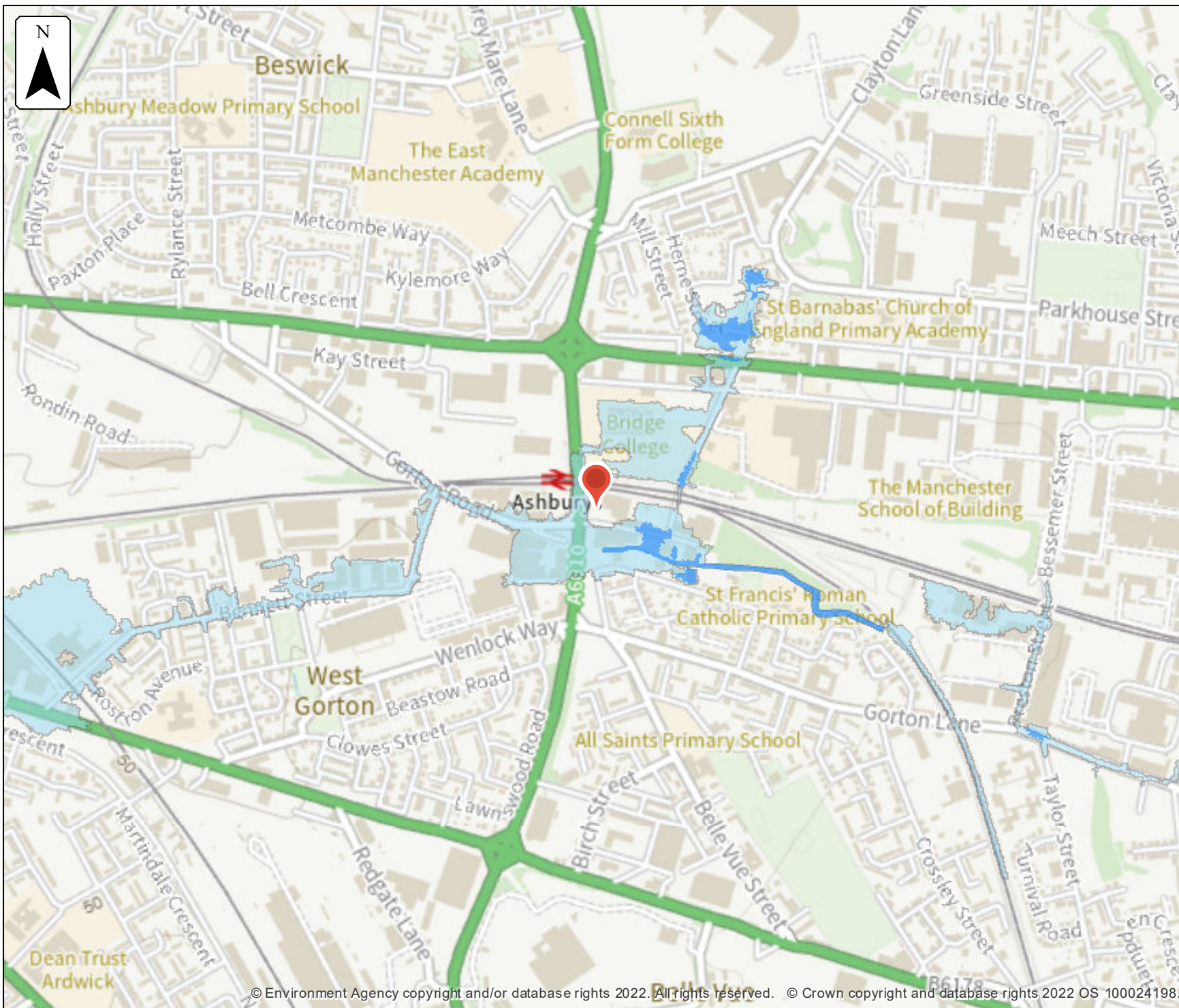
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- 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

This data is updated on a quarterly basis as better data becomes available.



Flood map for planning

Location (easting/northing)
387241/397198

Scale
1:10,000

Created
20 Sep 2022



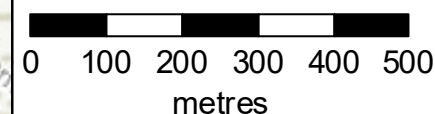
Selected location



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

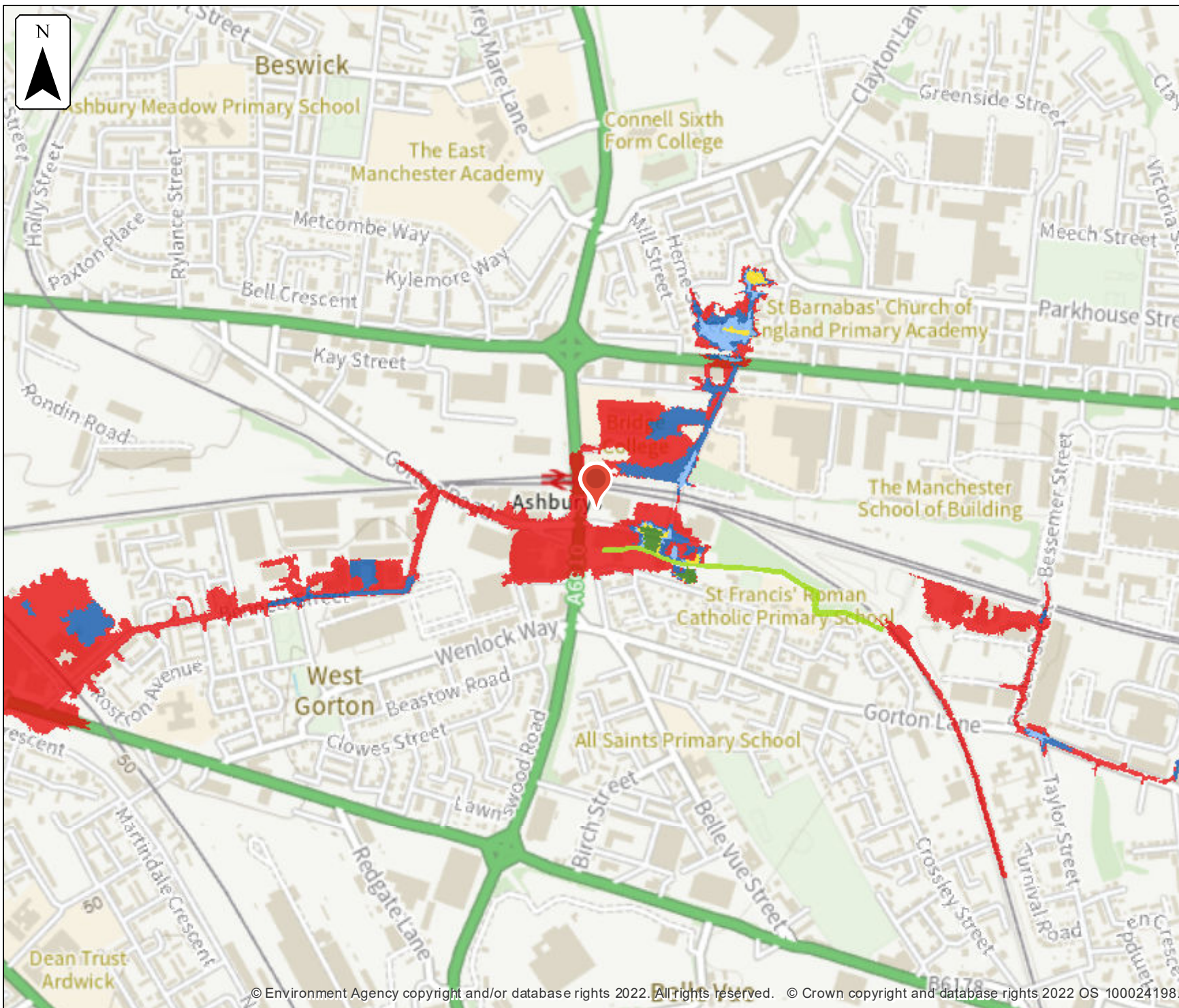
The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

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)
387241/397198

Scale Created
1:10,000 20 Sep 2022

Model name
Corn Brook 2017

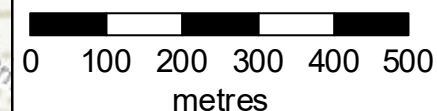


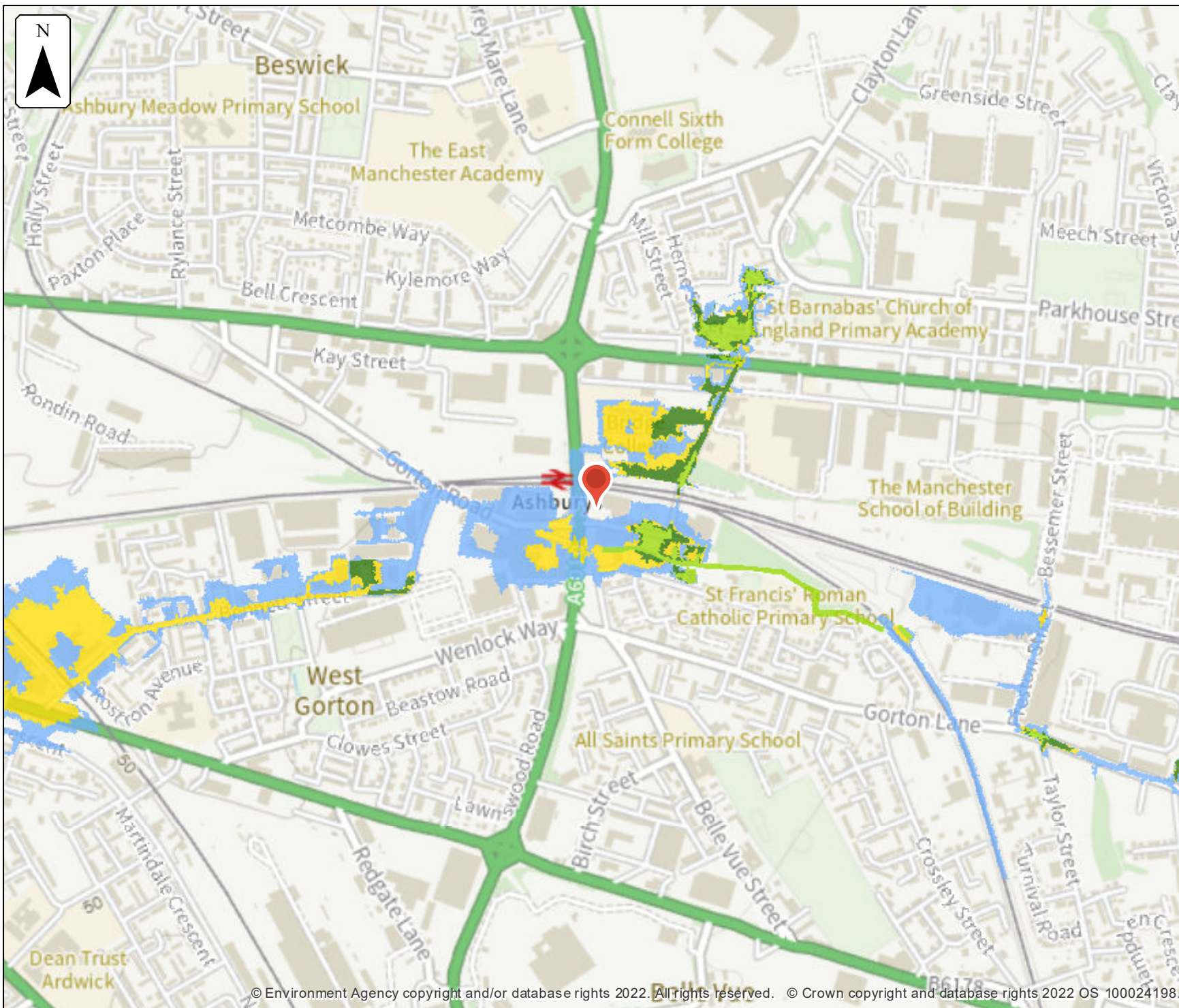
Selected location

Modelled flood extent

- 5% AEP
- 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)
387241/397198

Scale Created
1:10,000 20 Sep 2022

Model name
Corn Brook 2017

 Selected location

 Main river

Modelled flood extent

 1.0% AEP (+30%)

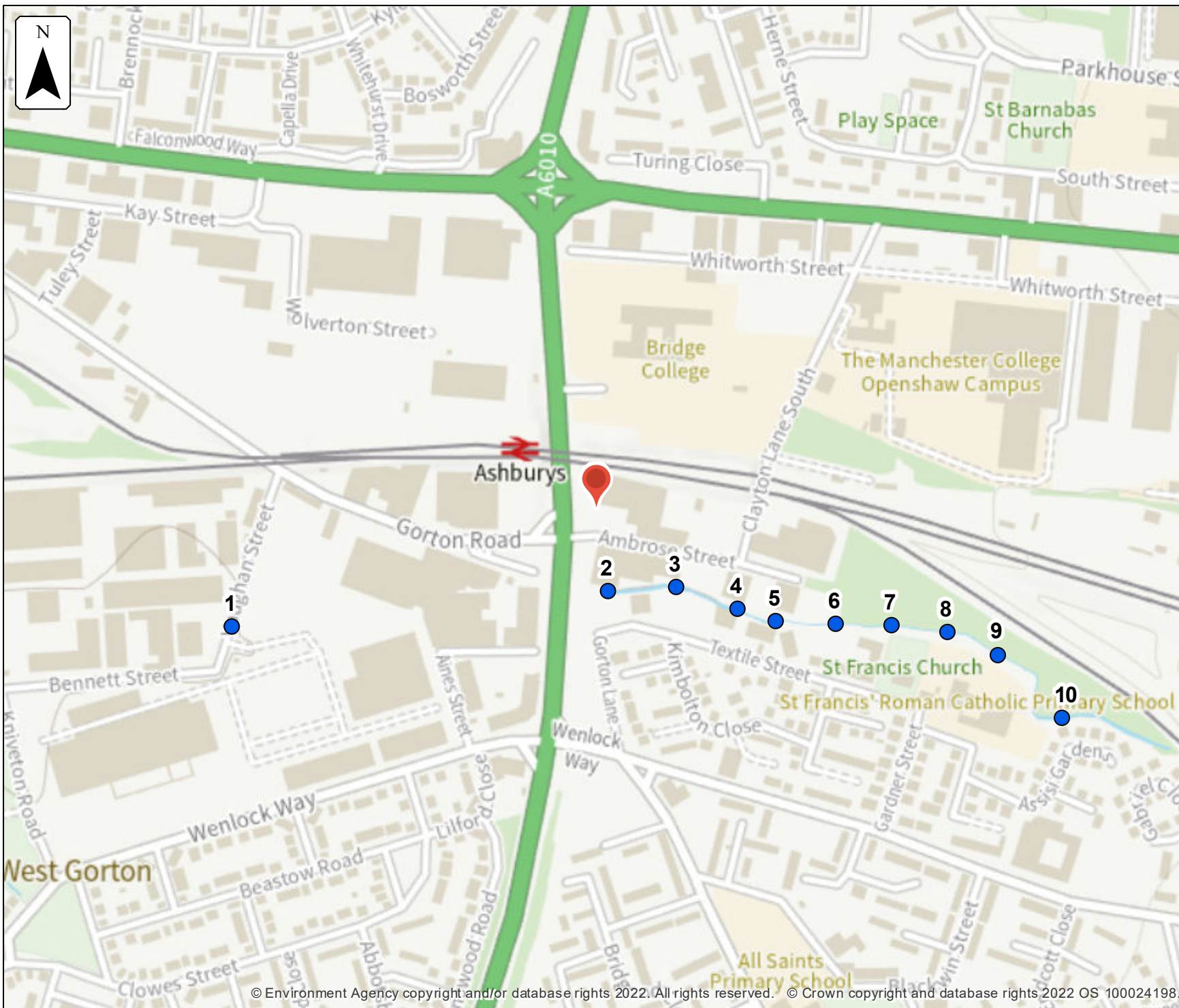
 1.0% AEP (+35%)

 1.0% AEP (+70%)

 0.1% AEP (+30%)

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


0 100 200 300 400 500
metres



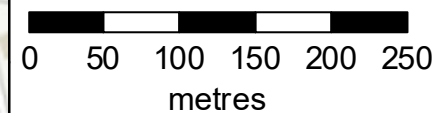
**No defences exist
modelled fluvial
node locations**

Location (easting/northing)
387241/397198

Scale Created
1:5,000 20 Sep 2022

Model name
Corn Brook 2017

-  Selected location
-  Modelled location



Modelled node locations data

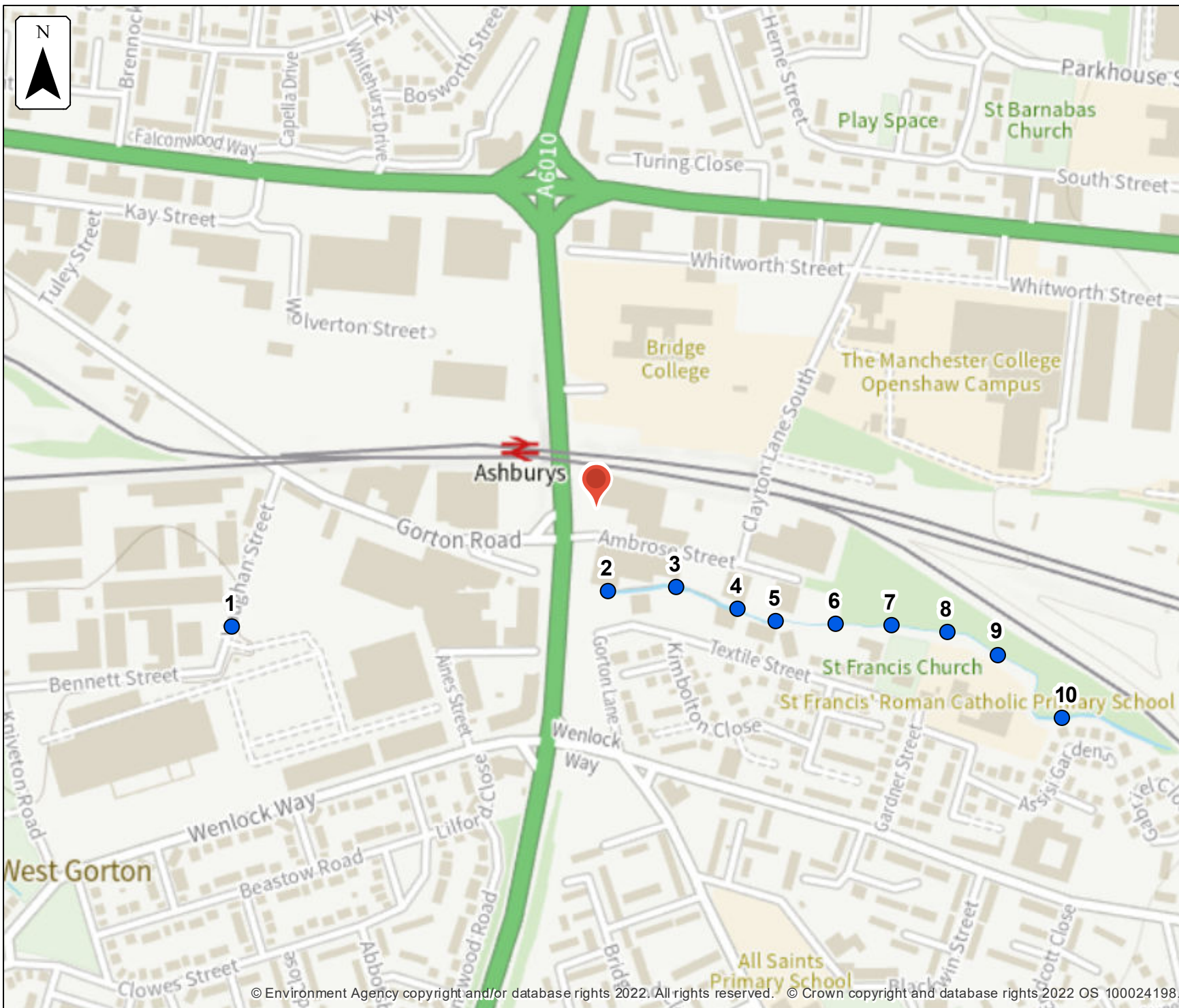
No defences exist

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	952459	386888	397082	46.25	0.66	46.57	1.24	46.80	1.55	47.95	1.81	49.66	2.54	50.23	5.15
2	952461	387253	397116	49.31	2.68	49.66	4.52	49.84	5.58	49.93	6.10	50.82	8.26		
3	952460	387319	397120	49.39	2.68	49.69	4.52	49.87	5.58	49.95	6.10	50.84	9.79		
4	952445	387378	397099	49.85	1.47	49.93	2.26	49.98	2.59	50.02	2.83	50.84	4.15	52.0	10.80
5	952450	387416	397088	51.35	1.49	51.49	2.36	51.55	2.60	51.61	3.29	51.76	5.12	52.0	7.21
6	952455	387474	397085	51.74	1.44	51.90	2.42	51.96	2.96	52.01	3.40	52.17	5.08	52.49	10.36
7	952466	387528	397084	52.04	1.43	52.21	2.38	52.28	2.93	52.34	3.38	52.51	4.90	52.95	10.12
8	952442	387582	397077	52.36	1.43	52.52	2.37	52.59	2.92	52.65	3.38	52.81	4.89	53.25	10.11
9	952463	387631	397055	52.65	1.43	52.79	2.37	52.85	2.92	52.90	3.38	53.05	4.88	53.48	10.14
10	952454	387693	396994	53.31	1.43	53.44	2.37	53.50	2.92	53.55	3.38	53.68	4.89	53.97	10.34

Data in this table comes from the Corn Brook 2017 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.



No defences exist climate change modelled fluvial node locations

Location (easting/northing)
387241/397198

Scale
1:5,000

Created
20 Sep 2022

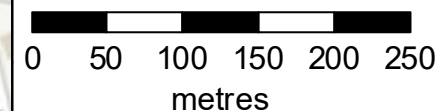
Model name
Corn Brook 2017



Selected location



Modelled location



Modelled node locations data

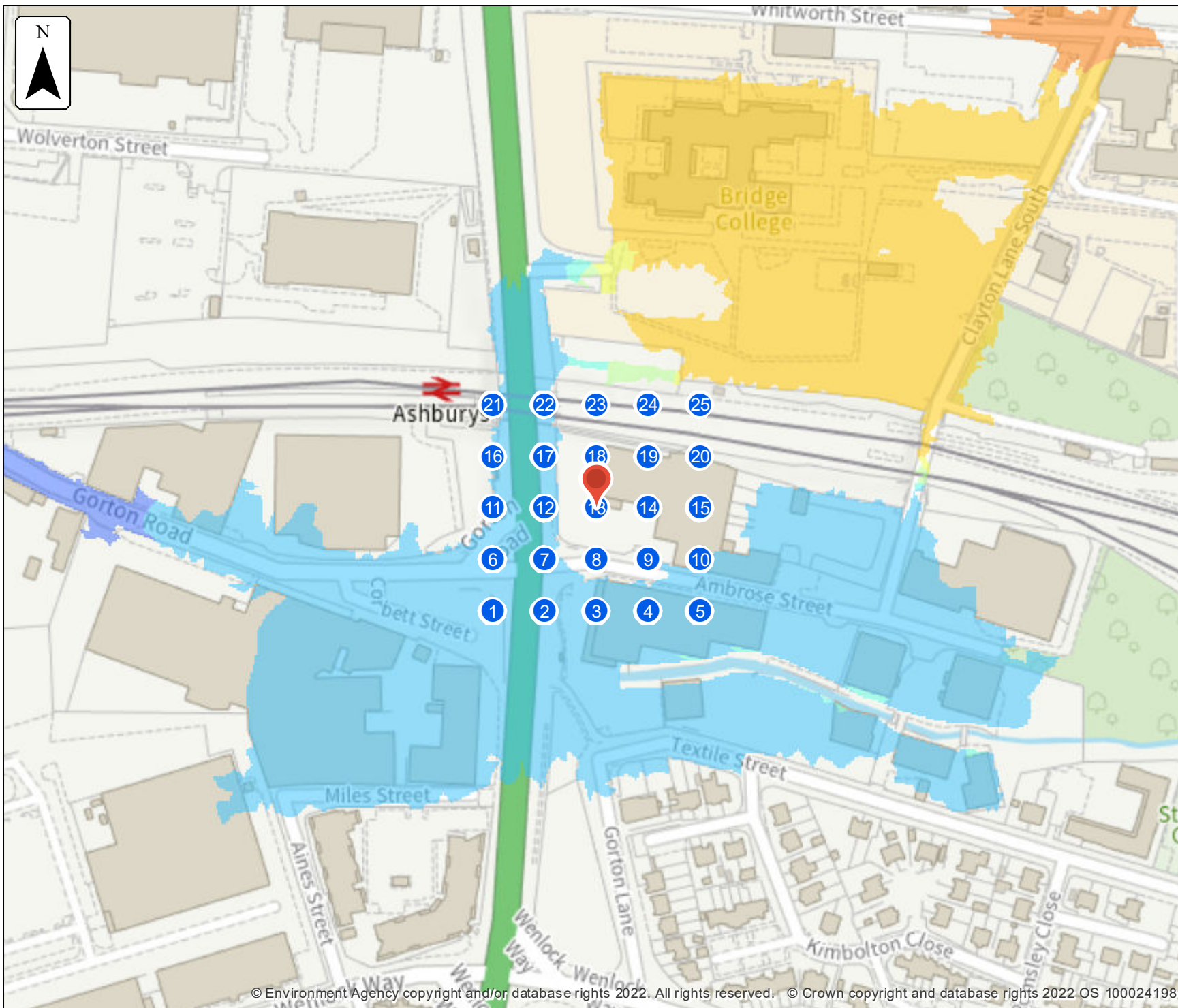
No defences exist climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+30%)		1.0% AEP (+35%)		1.0% AEP (+70%)		0.1% AEP (+30%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	952459	386888	397082	49.54	2.35	49.61	2.44	49.89	3.08	50.43	6.69
2	952461	387253	397116	50.57	7.77	50.70	8.03				
3	952460	387319	397120	50.58	8.07	50.73	8.78				
4	952445	387378	397099	50.60	3.92	50.73	4.11	51.46	7.15	52.10	13.13
5	952450	387416	397088	51.74	4.76	51.75	4.93	51.79	5.14	52.16	8.49
6	952455	387474	397085	52.14	4.66	52.15	4.85	52.32	6.64	52.57	12.56
7	952466	387528	397084	52.47	4.50	52.49	4.68	52.68	6.51	53.03	12.37
8	952442	387582	397077	52.77	4.49	52.79	4.68	52.95	6.52	53.35	12.29
9	952463	387631	397055	53.01	4.49	53.03	4.67	53.21	6.49	53.59	12.20
10	952454	387693	396994	53.64	4.49	53.66	4.67	53.80	6.55	54.04	12.61

Data in this table comes from the Corn Brook 2017 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.



No defences exist modelled fluvial extent and height

Location (easting/northing)
387241/397198

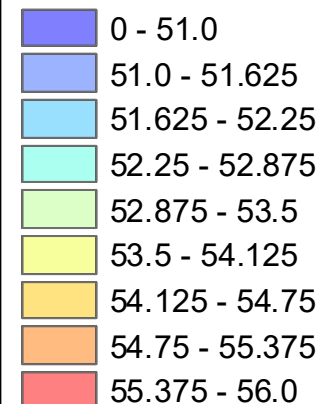
Scale Created
1:2,500 20 Sep 2022

Model name
Corn Brook 2017

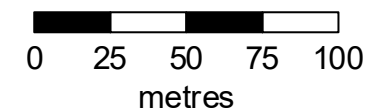
 Selected location

 Main river

Modelled 2D grid
Water level in mAOD



This map shows the
0.1% AEP height data



Sample point data

No defences exist

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	387191	397148	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.81	51.76
2	387216	397148	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.66	51.77
3	387241	397148	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.51	51.78
4	387266	397148	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.43	51.78
5	387291	397148	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.22	51.78
6	387191	397173	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.82	51.77
7	387216	397173	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.31	51.77
8	387241	397173	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	387266	397173	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	387291	397173	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.10	51.81
11	387191	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.42	51.77
12	387216	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.57	51.77
13	387241	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	387266	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	387291	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	387191	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.23	51.78

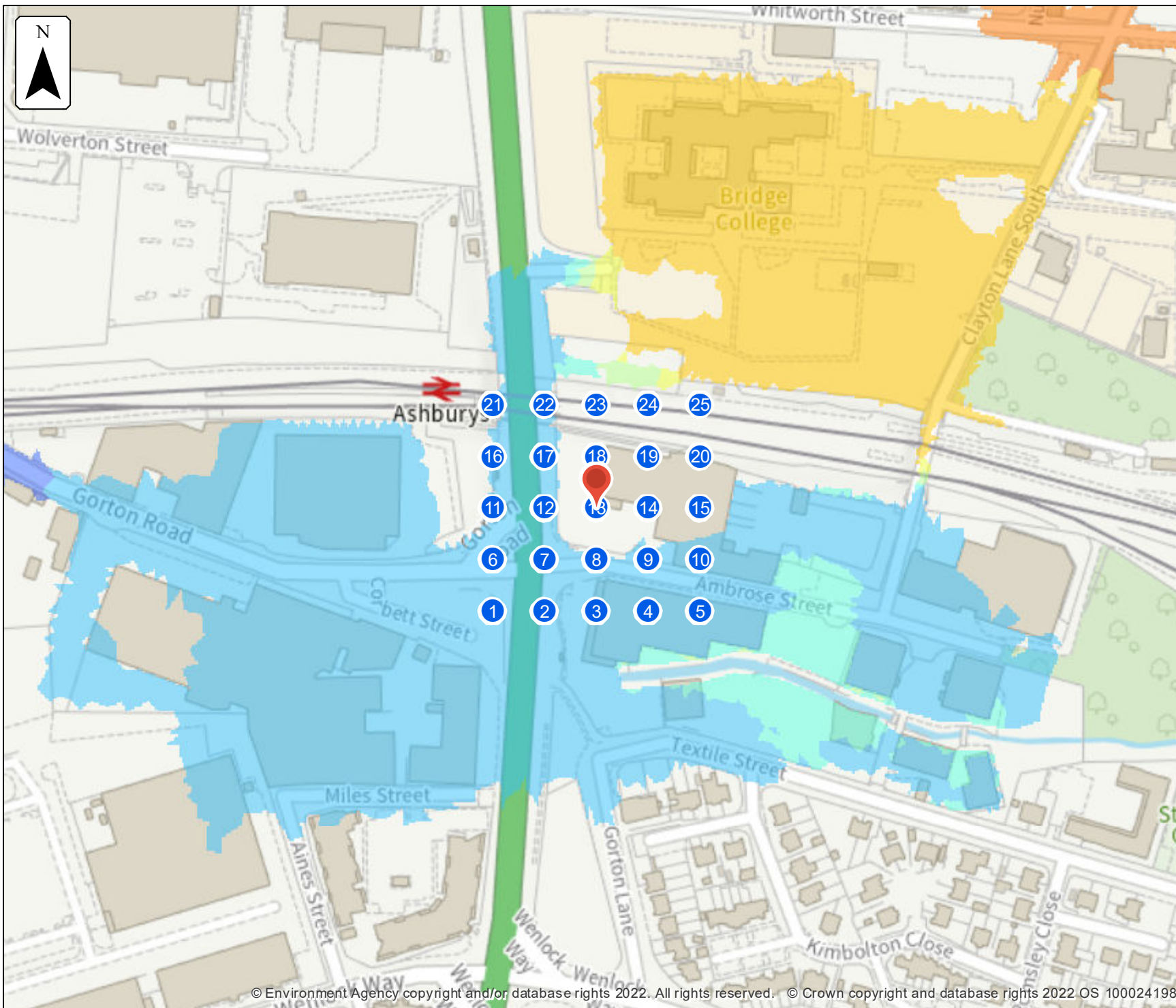
Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	387216	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	1.23	51.78
18	387241	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	387266	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	387291	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	387191	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	387216	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	1.47	51.78
23	387241	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	387266	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	387291	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Corn Brook 2017 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.



No defences exist climate change modelled fluvial extent and height

Location (easting/northing)
387241/397198

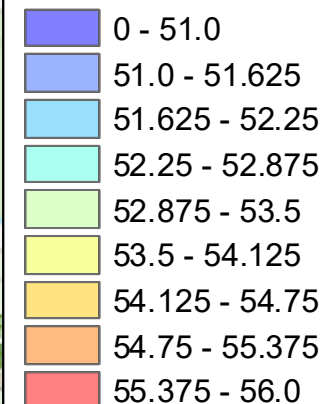
Scale Created
1:2,500 20 Sep 2022

Model name
Corn Brook 2017

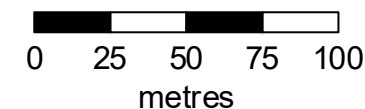
 Selected location

 Main river

Modelled 2D grid
Water level in mAOD



This map shows the
0.1% AEP +30% height data



Sample point data

No defences exist climate change

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	387191	397148	NoData	NoData	NoData	NoData	NoData	NoData	1.08	52.03
2	387216	397148	NoData	NoData	NoData	NoData	NoData	NoData	0.86	52.03
3	387241	397148	NoData	NoData	NoData	NoData	NoData	NoData	0.79	52.05
4	387266	397148	NoData	NoData	NoData	NoData	NoData	NoData	0.70	52.05
5	387291	397148	NoData	NoData	NoData	NoData	NoData	NoData	0.50	52.05
6	387191	397173	NoData	NoData	NoData	NoData	NoData	NoData	1.08	52.03
7	387216	397173	NoData	NoData	NoData	NoData	NoData	NoData	0.58	52.03
8	387241	397173	NoData	NoData	NoData	NoData	NoData	NoData	0.18	52.04
9	387266	397173	NoData	NoData	NoData	NoData	NoData	NoData	0.21	52.09
10	387291	397173	NoData	NoData	NoData	NoData	NoData	NoData	0.35	52.06
11	387191	397198	NoData	NoData	NoData	NoData	NoData	NoData	1.05	52.03
12	387216	397198	NoData	NoData	NoData	NoData	NoData	NoData	0.83	52.04
13	387241	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	387266	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	387291	397198	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	387191	397223	NoData	NoData	NoData	NoData	NoData	NoData	1.28	52.04

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	387216	397223	NoData	NoData	NoData	NoData	NoData	NoData	1.49	52.04
18	387241	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	387266	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	387291	397223	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	387191	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	387216	397248	NoData	NoData	NoData	NoData	NoData	NoData	1.73	52.04
23	387241	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	387266	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	387291	397248	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Corn Brook 2017 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.

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

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 F – United Utilities Pre Development Enquiry Response

Paul Graveney

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 27 October 2022 11:40
To: Paul Graveney
Subject: PDE for: Ambrose Street UU Ref. 02951448

Good morning Paul,

Pre Development Enquiry for: Ambrose Street UU Reference Number : 02951448

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 910*970mm public combined sewer within Ambrose Street located to the South of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

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

This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**

4. to a combined sewer.

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the 1100mm culverted watercourse located 30m East of the proposed site (the depth according to our records is 2.67m, also the WC outfall is very close and doesn't look very deep).

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge

to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 900*1000mm public combined sewer within Pottery Lane located Southwest of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 21l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

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

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

Many thanks and kind regards,



Mohammed Aljafarawi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

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

Visit: [unitedutilities.com/wow](https://www.unitedutilities.com/wow)



The information contained in this e-mail is intended only for the individual to whom it is addressed. It may contain legally privileged or confidential information or otherwise be exempt from disclosure. If you have received this Message in error or there are any problems, please notify the sender immediately and delete the message from your computer. You must not use, disclose, copy or alter this message for any unauthorised purpose. Neither United Utilities Group PLC nor any of its subsidiaries will be liable for any direct, special, indirect or consequential damages as a result of any virus being passed on, or arising from the alteration of the contents of this message by a third party.

United Utilities Group PLC, Haweswater House, Lingley Mere
Business Park, Lingley Green Avenue, Great Sankey,
Warrington, WA5 3LP
Registered in England and Wales. Registered No 6559020

www.unitedutilities.com
www.unitedutilities.com/subsidiaries