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FLOOD RISK ASSESSMENT
Martin Harris Music Block, Bridgeford Street, Manchester, M15 6FH

Report prepared on behalf of University of Manchester

01/07/22

Rev. 01

Clancy Consulting Limited
19 Upper King Street
Norwich
Norfolk
NR3 1RB

enquiries@clancy.co.uk
www.clancy.co.uk

FLOOD RISK ASSESSMENT & SUDS STRATEGY

Revision List

REVISION	REASON FOR ISSUE	DATE OF ISSUE
01	First Issue – Draft For Comment	1st July 2022

Prepared by: **Charlie Neville EngTech MICE**
for and on behalf of CLANCY CONSULTING LTD

Checked by: **Charles Hardingham B.Eng.(Hons)**
for and on behalf of CLANCY CONSULTING LTD

Approved by: **Lee Philbrock B.Eng. (Hons), C.Eng., M.I.Struct.E Director**
for and on behalf of CLANCY CONSULTING LTD

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1.0 Introduction

1.1 General

1.1.1 This report relates to a planning application for the development of a brownfield site off Bridgeford Street, Manchester for the proposed development of a new music teaching block.

1.1.2 This report sets out the results of a flood risk assessment required in support of a planning application for this development. The assessment has been carried out in accordance with the general principles set out in National Planning Policy Framework, Technical Guidance to the National Planning Policy Framework and Flood Risk and Coastal Change Planning Practice Guidance.

1.1.3 This report is prepared solely for the benefit of The University of Manchester. This report may not be assigned without prior written permission from Clancy Consulting Ltd.

1.2 Background Information

1.2.1 In 2001 the Department for Transport, Local Government and the Regions (DTLR) published Planning Policy Guidance Note 25 (PPG25), which explains how flood risk should be taken into consideration during the planning and development process.

1.2.2 PPG25 was replaced by Planning Policy Statement 25: Development and Flood Risk published in March 2010. This Policy Statement was introduced to place more emphasis on the increased flood risk from climate change.

1.2.3 In March 2012, the Government released the National Planning Policy Framework (NPPF) aiming to make the planning system less complex and more accessible, to protect the environment and promote sustainable growth.

1.2.4 NPPF accompanied with the Technical Guidance superseded PPS25 although the principles set out in the new publication remain similar in terms of the flood risk aspect.

1.2.5 The flood risk Practice Guide was published online in March 2014 with the latest update in August 2021.

1.2.6 In July 2018 the NPPF was updated. This update has highlighted the need for further awareness of flood risk issues for new developments. This has since been revised in February 2021 to include minor clarifications.

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2.0 Structure of the Report

2.1 The report has been structured to follow the general principles set out in the Technical Guidance published in March 2014 along with subsequent revisions.

2.2 The methodology for this FRA has comprised a desktop study making reference to the Environment Agency (EA) Mapping, Manchester City Council Strategic Flood Risk Assessment (SFRA) and Manchester City Council LLFA Guidance with relevant plans including plans showing the location of local sewers.

2.3 Sources of information

- Flood maps from the Environment Agency published online
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA
- United Utilities Asset Data
- British Geological Survey / Magic Map
- Existing site records
- Government Website Flood Risk Assessment Guidance

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3.0 Site Description

3.1 Location

3.1.1 The site is located detailed as below.

OS X (Eastings)	384419
OS Y (Northings)	396599
Nearest Post Code	M15 6FH

Table 1 – Site Details

Figure 1- Existing Aerial Plan (Google Mapping)

Figure 2 - Site Location (OS)

3.2 Existing Site Layout and Topography

3.2.1 The Existing site comprises a brownfield site of approximately 0.012 hectares which was formerly used as a car parking area.

3.2.2 The site is accessible via Bridgeford Street to the North of the development area.

3.2.3 A topographic survey has been undertaken and is included in Appendix C. The ground levels are fairly consistent with a slight slope down from the North-East Boundary at approximately 36.52m AOD to 36.42m AO in the North-West Corner.

3.3 Geology

3.3.1 The British Geological Survey's (BGS) online geological maps indicates the site has superficial deposits of Glaciofluvial Sheets and Devensian comprising, Sand and Gravel with Chester Formation bedrock comprising of Sandstone.

3.3.2 A desk study ground investigation has been carried out by Clancy Consulting in April 2021. The investigations confirmed the presence of sandstone and Diamicton deposits as well as some areas

of made ground. The body of the report (no appendices) has been included in appendix B for reference.

3.4 Hydrology

3.4.1 There are no watercourse or surface drainage features within the site. The nearest ordinary watercourse is highlighted on the Google Mapping as shown below. This mapping indicates that the nearest watercourse is the River Medlock, which is approximately 0.79km to the North of the development site.

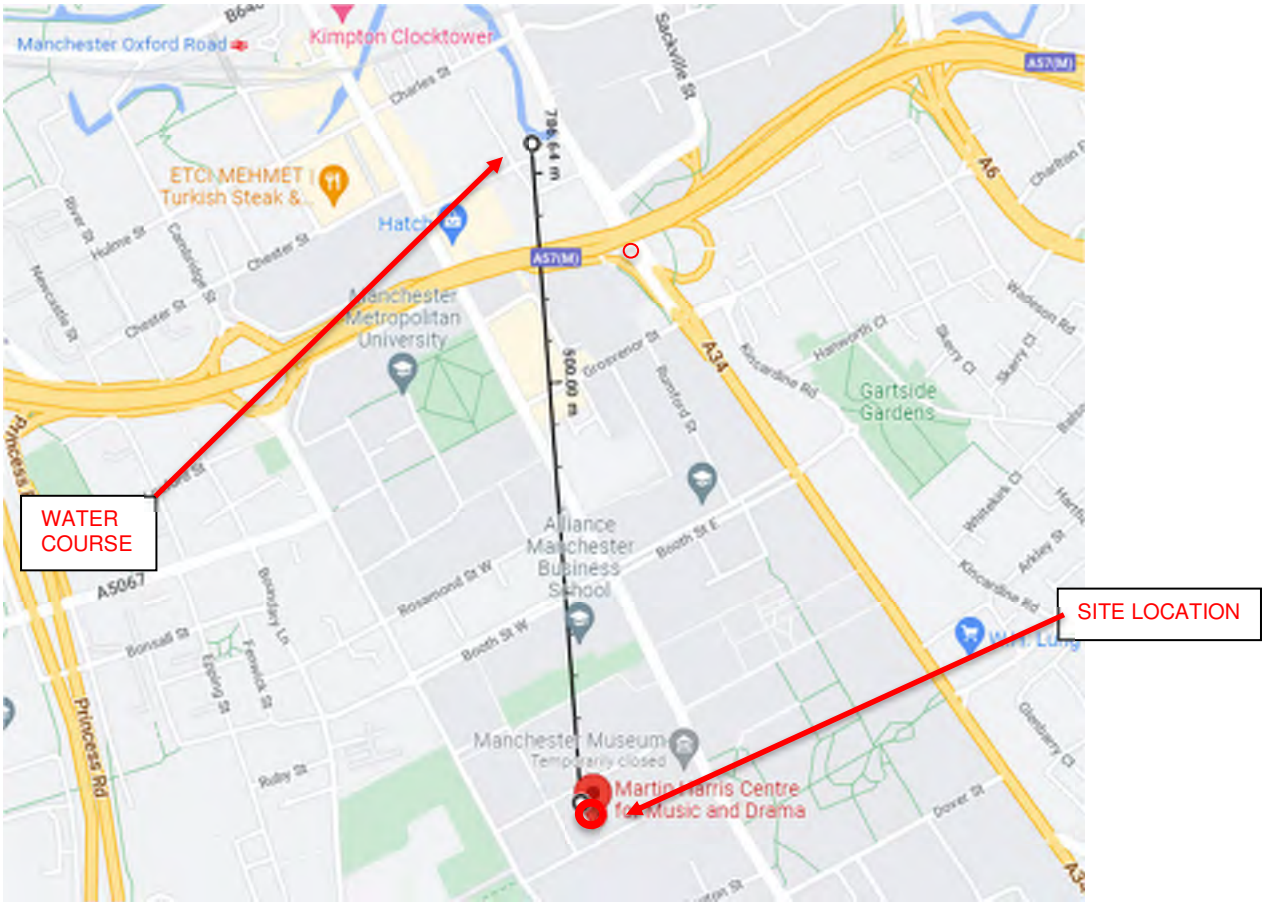


Figure 3 – Ordinary Water Courses (Google Maps)

3.5 Hydrogeology

3.5.1 The Devensian Till superficial layer beneath the site is classified by the EA as being an Undifferentiated Secondary Aquifer, while the Chester Formation below this is classified as being a Principal Aquifer. This means that there is potential across this area for a high level of water storage and transmission.

3.5.2 There are 15 records of licensed groundwater abstractions within 1km of the site as per the information provided by the EA, with the closest being 543m Northwest and the furthest 877m Southwest. Groundwater quality below the site has not been classified under an EA Local River Basin Management Plan.

3.5.3 The site is located within a zone 3 (total catchment) ground water source protection zone. Refer to the extract from Magic Map below. Zone 3 (total catchment) refers to an area in which all the groundwater has the potential to end up at an abstraction point.

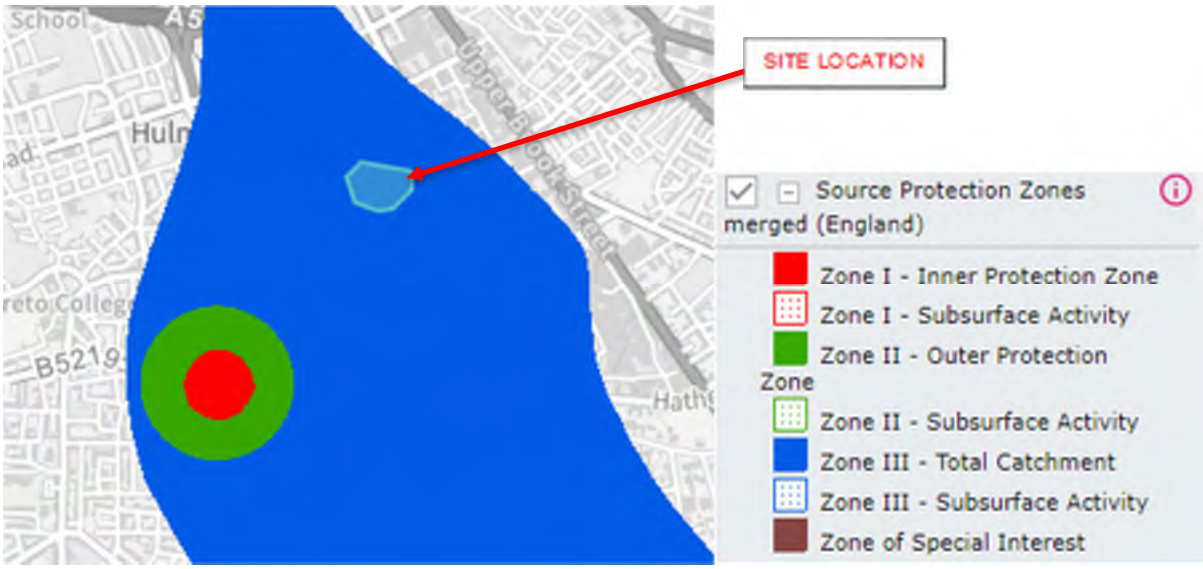


Figure 4 – Ground Water Source Protection. (Magic Maps)

4.0 Proposed Development

4.1 Description

4.1.1 The proposed development comprises a single new two storey modular construction music teaching block with approximately 120m^2 footprint. The Proposed development is serviced by an access road off Bridgeford Street. A proposed plan of the development can be found in Appendix A.

5.0 Flood Potential

5.1 Rivers and Sea.

5.1.1 The following zones define the levels of flood risk from Rivers and the Sea:

Zone 1: Low Probability
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability
This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability
This zone comprises land assessed as having between 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of
flooding from the sea (>0.5%) in any year.

Zone 3b: Functional Flood Plain
This zone comprises land where water must flow or be stored in times of flood. SFRA should identify this zone.

5.1.2 As part of its general obligations under the Water Resources Act 1991, The Environment Agency has carried out surveys of its existing defences against flooding and has published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling. In general terms, these maps give a good indication of the areas likely to be affected by flooding. More recently, the Environment Agency have published the 'Flood Map' on their website which is based on improved hydraulic modelling and detailed local data.

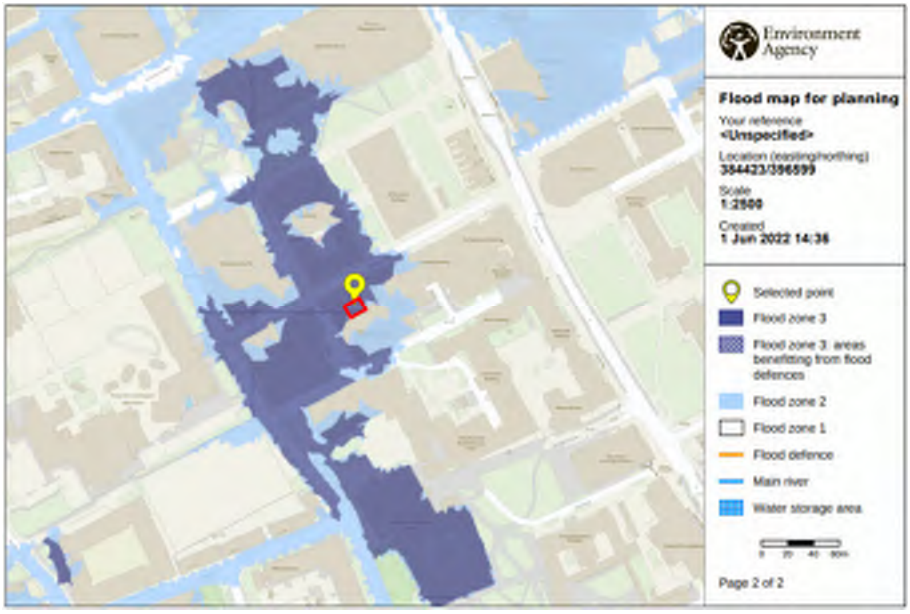


Figure 5 – EA Flood Map for Planning (Gov.uk)

5.1.3 The site is located within **Flood Zone 3** in terms of flooding from any nearby water course or the sea. This is due to its close proximity to a number of different water courses, with the River Irwell, Bridgewater Canal, Ashton Canal and River Medlock all within 2km of the site.

5.1.4 Flood Risk Vulnerability Classification.

	Flood Risk Vulnerability Classification				
Flood Zones	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test Required	✔	✔	✔
Zone 3a†	Exception Test Required†	✕	Exception Test Required	✔	✔
Zone 3b*	Exception Test Required*	✕	✕	✕	✔

Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' (Gov.uk)

Key:
✓ Development is appropriate
✗ Development should not be permitted

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

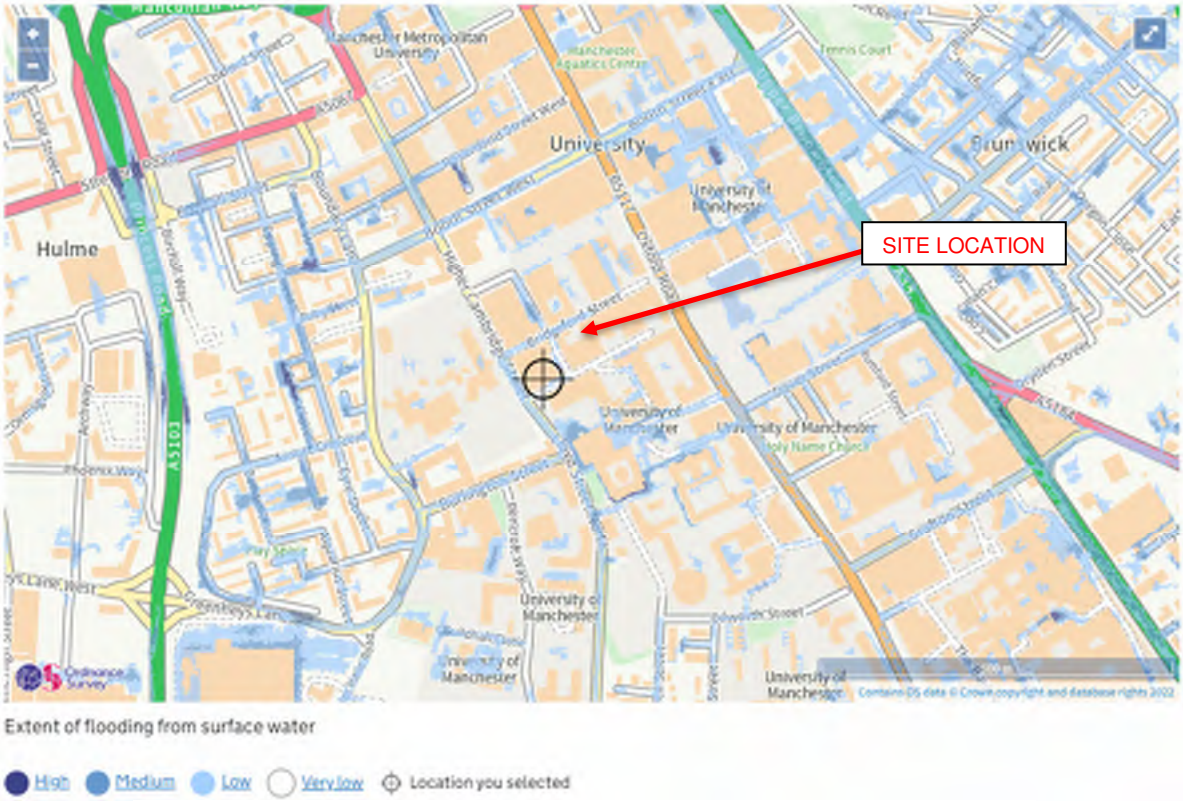
*" * " In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere.*

5.1.5 The NPPF (Technical Guidance) Table 3, Flood Risk Vulnerability and Flood Zone Compatibility matrix, indicates that "**More Vulnerable**" development proposals in **Flood Zone 3** are acceptable upon completion of an exception test.

5.2 Surface Water

5.2.1 During extreme rainfall events, or due to poor gully drainage maintenance, there will be times when gully capacity is exceeded which will lead to surface flow within the surrounding roads. Mapping for this form of flooding is shown on the Environment Agency website.



Risk Category	Definition
High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low	Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%)
Very Low	Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)

Figure 6 - Flood Risk from Surface Water (Gov.uk)

5.2.2 It can be seen from the flood mapping (Fig 6) that the whole of the site is at very low risk from surface water flooding. There is an area of low risk accumulating within Bridgeford Street just outside the entrance of the site.

5.2.3 The extreme event mapping provided by the Environment Agency included data ranging from a 1 in 1 year storm to a 1 in 1000-year storm plus climate change allowances. This data provides the level of the flood water that might accumulate at the low point of the site, from the EA modelling data the following maximum flooding levels are returned for the 1% AEP probability events:

1%AEP (+30% climate change) = 36.70mAOD
1%AEP (+35% climate change) = 36.70mAOD
1%AEP (+70% climate change) = 36.72mAOD

5.2.4 For the Irwell Management Catchment Area, a 1% AEP event for the 2070's epoch (development life to 2061-2125) the upper band climate change allowance recommended is +45% and as such the maximum flood level assumed for this report is 36.72mAOD which approximates to a 2070s epoch design life and exceeds the current climate change allowance recommendations.

5.2.5 The guidance from the government website suggests that in area of flood zone 3, for extra flood resistance and resilience measures the FFL must be 300mm above the predicted flood level or alternative flood prevention and protection measures included. Elevating the FFL would minimise the impact on the modular supplier's design requirements. As such it is proposed to have an FFL of 37.02mAOD for the new structure.

5.2.6 From the mapping, (Fig 8) it can be seen that the water accumulating on Bridgeford Street flows West down towards Higher Cambridge Street away from the site.

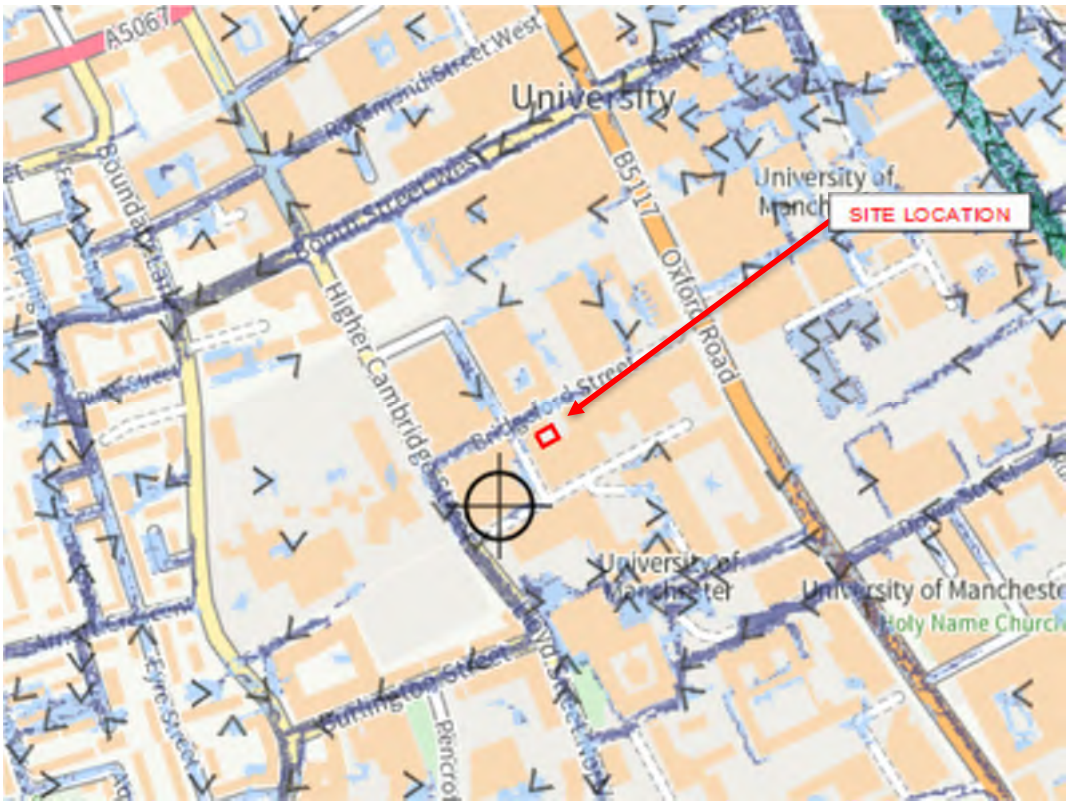


Figure 8 - Flood Risk from Surface Water – velocity / flow direction (Gov.uk) – Low risk.

5.2.7 From a review of the Topographical Survey for the site, it is assumed that the surface water is drained to various yard gullies positioned at the low points across the car park area. If there were to be any overland flood flow still finding its way onto the development site on the Western boundary of the car park there is a flow path between two of the existing buildings, which we assume would divert excess surface water away from and around the proposed building footprint into the highway to the West.

5.3 Ground Water

5.3.1 Reference has been made to the Magic Mapping tool. Mapping has been altered to include areas of vulnerability to ground water flooding. The development site shown to be at low-medium flood risk.

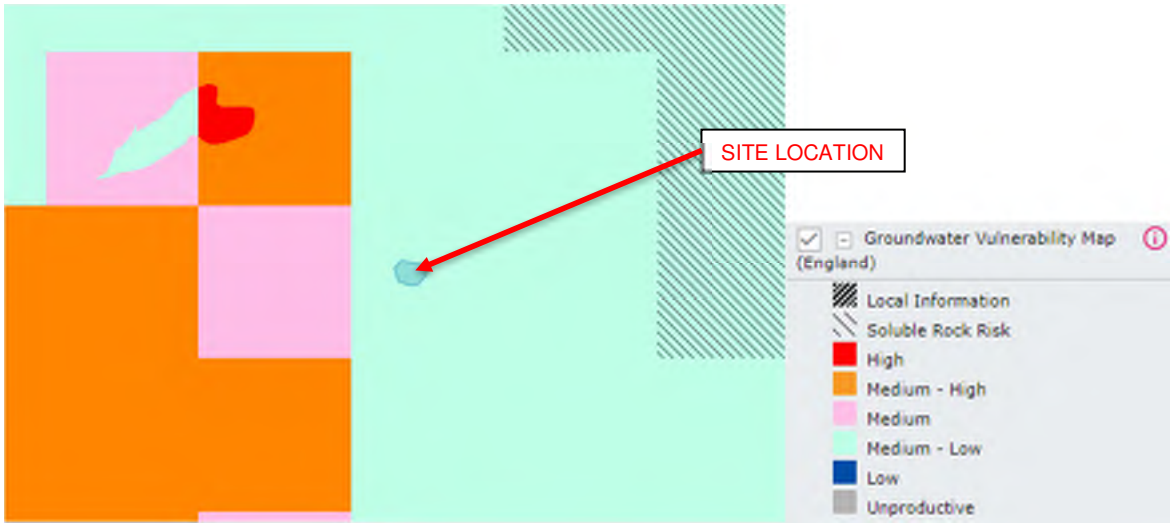


Figure 9 – Magic mapping for vulnerability to ground water flooding.

5.3.2 A ground investigation was carried out at a site roughly 250m from the Martin Harris Music Block in November 2011 (L&AD2002 Ltd – Exploratory Soil Survey Report Boundary Lodge, Manchester). This investigation found that there were permeable soils of sand and gravel present on site, with groundwater being recorded in one of the boreholes also at a depth of 7.57m. Groundwater flooding risk is therefore considered **low**.

5.4 Artificial Sources

5.4.1 Artificial sources of flooding are potentially from man-made structures and infrastructure. The Environment Agency have modelled the potential effect of flooding from failures in retaining structures containing reservoirs. The blue area on the map below indicates potential flooding (figure 10).

5.4.2 It should be noted that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. As reservoirs are significant items of infrastructure, regular inspections are carried out and maintenance tasks undertaken by reservoir panel engineers as a priority. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.

5.4.3 The risk of flooding from reservoirs at this site is **low**.

Figure 10 – Extent of Flooding from Reservoirs (Gov.uk)

5.5 Existing Historical Flood Information

5.5.1 Reference has been made to the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA. There are no specific recorded events of flooding at the development site. However, it does note various flooding events in conjunction with the River Irwell, Bridgewater Canal and the Manchester Ship Canal, which are all within around 2.5km Northwest of the site.

5.5.2 For surface water flooding, it is recognised that this is an issue in some areas around the site in the Manchester SFRA but there are no details of specific incidents and locations.

5.6 Exception Test

5.6.1 As per UK government guidance, an exception test requires the development to demonstrate the following two characteristics: that the sustainability benefits of the development to the community outweigh the flood risk, the development will be safe for its lifetime taking into account the vulnerability of its users and that it won't increase flood risk elsewhere. This development will provide an increase to capacity and quality of the musical teaching facilities at Manchester University, in turn helping to improve the standard of education received by the local community. This will also help to draw in more students to the university as a whole.

5.6.2 The development is an area that is vulnerable to fluvial flooding, however this factor has been mitigated by the design through raising the finished floor level by 300mm. As a result of this, the floor level is now above the proposed flood level that is detailed by the EA to occur during extreme storms events, with the specific event chosen (1 in 100 +70% CC) adhering to the 2070s epoch upper band climate change allowance figure (1 in 100 + 45%). Therefore, showing the structure will be able to withstand flooding for the entirety of its predicted 100-year design life.

6.0 Drainage

6.1 Existing Drainage

6.1.1 United Utilities Sewers.

6.1.1.1 There are no public sewers running through the site.

6.1.1.2 Flooding could occur if the on-site drainage system becomes blocked or a rainfall event exceeds the design capacity.

6.1.1.3 For the existing drainage on site, it is known that a 600mm diameter public combined system runs through Bridgeford Street, the road adjacent to the site. (See figure 11 below). There are 3 manholes on the site in the car park area and it is possible that these chambers could surcharge and result in flooding at the surface. As discussed above, this potential risk will be mitigated with the use of careful levels design within the landscaping to divert and potential flood water flows away from buildings. The floor level of the building has also been set at an appropriate level with the required freeboard to reduce the risk of flooding.

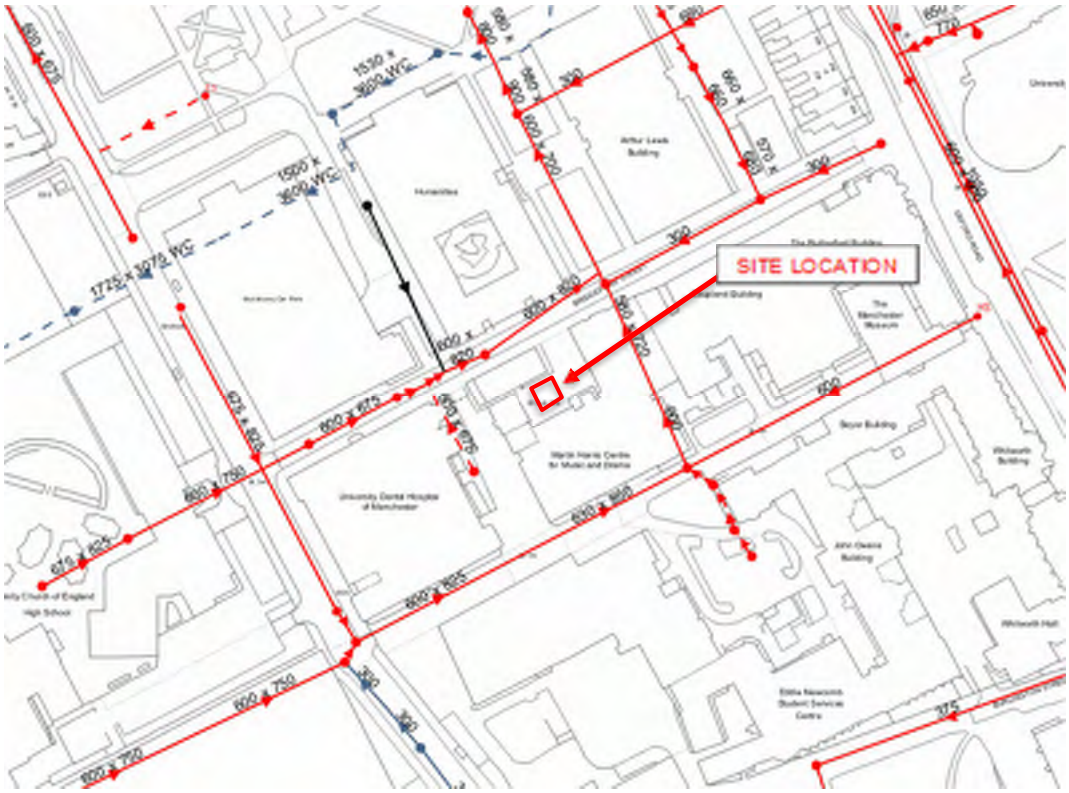


Fig 11 – United Utilities Asset Plan.

6.1.1.4 The ground levels in the car park slope towards a yard gully located towards the North of where the building footprint will be, so it is possible this area is currently being drained into this gully and being connected into a surrounding private network.

7.0 Flood Mitigation Measures

7.1 The site is at a low risk of flooding except for the following;

7.1.1 Rivers and Sea

7.1.1.1 Generally, the building has been designed and located on the site to be at the lowest possible risk of flooding and the building levels set such to provide the lowest risk to users of the building.

7.1.1.2 Floor levels have been elevated to satisfy the recommendations from the government website for vulnerable developments, in tandem with this we have also recommend the use of either steps or a ramp for access into the building (to be designed by architect once agreed).

7.1.1.3 There may be times when the development in not easily accessible by vehicles. In the unlikely event that this was to occur, users of the building will be advised to remain in the building until flood water subsides.

7.1.1.4 Should emergency services be required on site the potential maximum depth of water at the building entrance could be approximately 130mm (based on current mapping). Due to the ponding in this location, it is likely that the velocity of flows will be low and could be accessible to emergency services.

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03 + 0.5 = 0.53	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.13 + 0.5 = 0.63	0.15 + 1.0 = 1.15	0.20 + 1.0 = 1.20	0.25 + 1.0 = 1.25	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25
0.1	0.03 + 0.5 = 0.53	0.06 + 0.5 = 0.56	0.12 + 0.5 = 0.62	0.15 + 0.5 = 0.65	0.18 + 1.0 = 1.18	0.24 + 1.0 = 1.24	0.30 + 1.0 = 1.30	0.36 + 1.0 = 1.36	0.48 + 1.0 = 1.48	0.60 + 1.0 = 1.60	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50
0.3	0.04 + 0.5 = 0.54	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.19 + 0.5 = 0.69	0.23 + 1.0 = 1.23	0.30 + 1.0 = 1.30	0.38 + 1.0 = 1.38	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	1.13 + 1.0 = 2.13	1.50 + 1.0 = 2.50	1.88 + 1.0 = 2.88
0.5	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.25 + 0.5 = 0.75	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	2.50 + 1.0 = 3.50
1.0	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.38 + 0.5 = 0.88	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	2.25 + 1.0 = 3.25	3.00 + 1.0 = 4.00	3.75 + 1.0 = 4.75
1.5	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.50 + 0.5 = 1.00	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	2.00 + 1.0 = 3.00	3.00 + 1.0 = 4.00	4.00 + 1.0 = 5.00	5.00 + 1.0 = 6.00
2.0	0.13 + 0.5 = 0.63	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	0.63 + 0.5 = 1.13	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.60 + 0.5 = 1.10	0.75 + 0.5 = 1.25	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	1.80 + 1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18 + 0.5 = 0.68	0.35 + 0.5 = 0.85	0.70 + 0.5 = 1.20	0.88 + 0.5 = 1.38	1.05 + 1.0 = 2.05	1.40 + 1.0 = 2.40	1.75 + 1.0 = 2.75	3.30	3.80	4.50	6.25	8.00	9.75
3.5	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.80 + 0.5 = 1.30	1.00 + 0.5 = 1.50	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23 + 0.5 = 0.73	0.45 + 0.5 = 0.95	0.90 + 0.5 = 1.40	1.13 + 0.5 = 1.63	1.35 + 1.0 = 2.35	1.80 + 1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	1.00 + 0.5 = 1.50	1.25 + 0.5 = 1.75	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50
5.0	0.28 + 0.5 = 0.78	0.60 + 0.5 = 1.10	1.10 + 0.5 = 1.60	1.38 + 0.5 = 1.88	1.65 + 1.0 = 2.65	3.20	3.75	4.30	5.40	6.50	9.25	12.00	14.75

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.0		Danger for most – includes the general public
More than 2.0		Danger for all – includes the emergency services

8.0 Conclusions and Recommendations

8.1 This report gives details of the flood risk assessment and drainage design, which has been carried out in relation to the proposed educational development of the Martin Harris Music Block on land to the South of Bridgeford Street, Manchester.

8.2 The site can be considered at low-medium risk from all forms of flooding except for fluvial flooding which is a much higher risk in this area of Manchester. However, the layout of the development has been designed to locate the building in the lowest risk area of the site. The floor level of the building has also been designed to accommodate potential overland flow routes during extreme rainfall events.

8.3 Allowances have been made for climate increases in rainfall events and systems have been designed for extreme rainfall events.

8.4 The Proposed development meets NPPF and Local Policy requirements.

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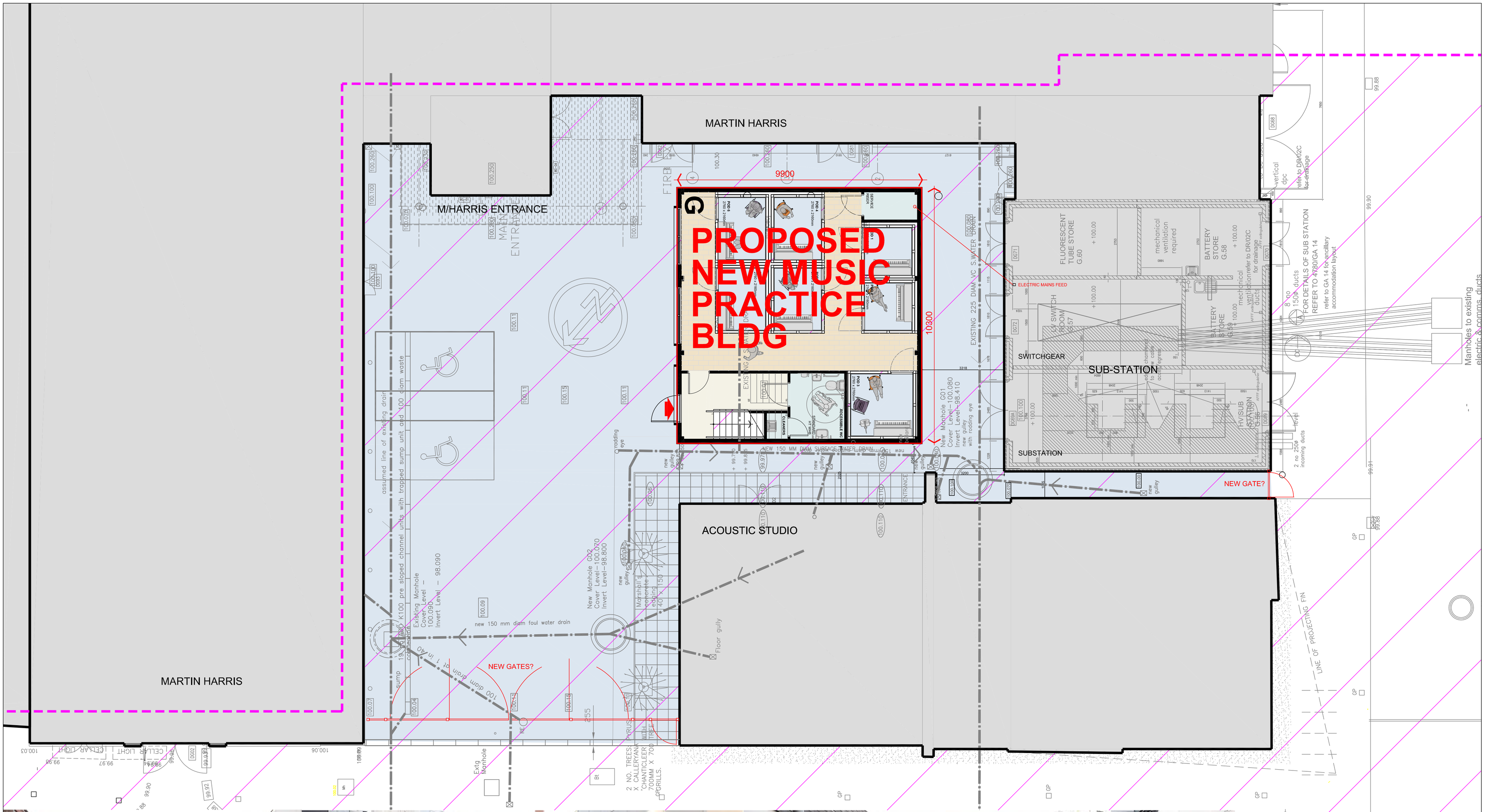
Appendix A – Development Proposals



REV	COMMENT	DATE

MANCHESTER 1824
The University of Manchester

Directorate of Estates
Beyer Building
The University of Manchester
Oxford Road
Manchester
M13 9PL

Tel. 0161 275 2625
Fax. 0161 275 3880

DESIGN SERVICES UNIT

DRAWING STATUS: PRELIMINARY

PROJECT NAME: MUSIC PRACTICE SPACE MODULAR BUILDING FOR M-PODS
PROJECT NO.: 7989

BUILDING NAME: MARTIN HARRIS
BUILDING NUMBER: 012AA

SUB-SITE NAME:

SITE NAME: SOUTH CAMPUS

TITLE: SKETCH SCHEME

DRAWING NO.: 7989-012AA-A002
ISSUE: P4

PROJECT MANAGER: DATE:
SCALE: 1/ @A1

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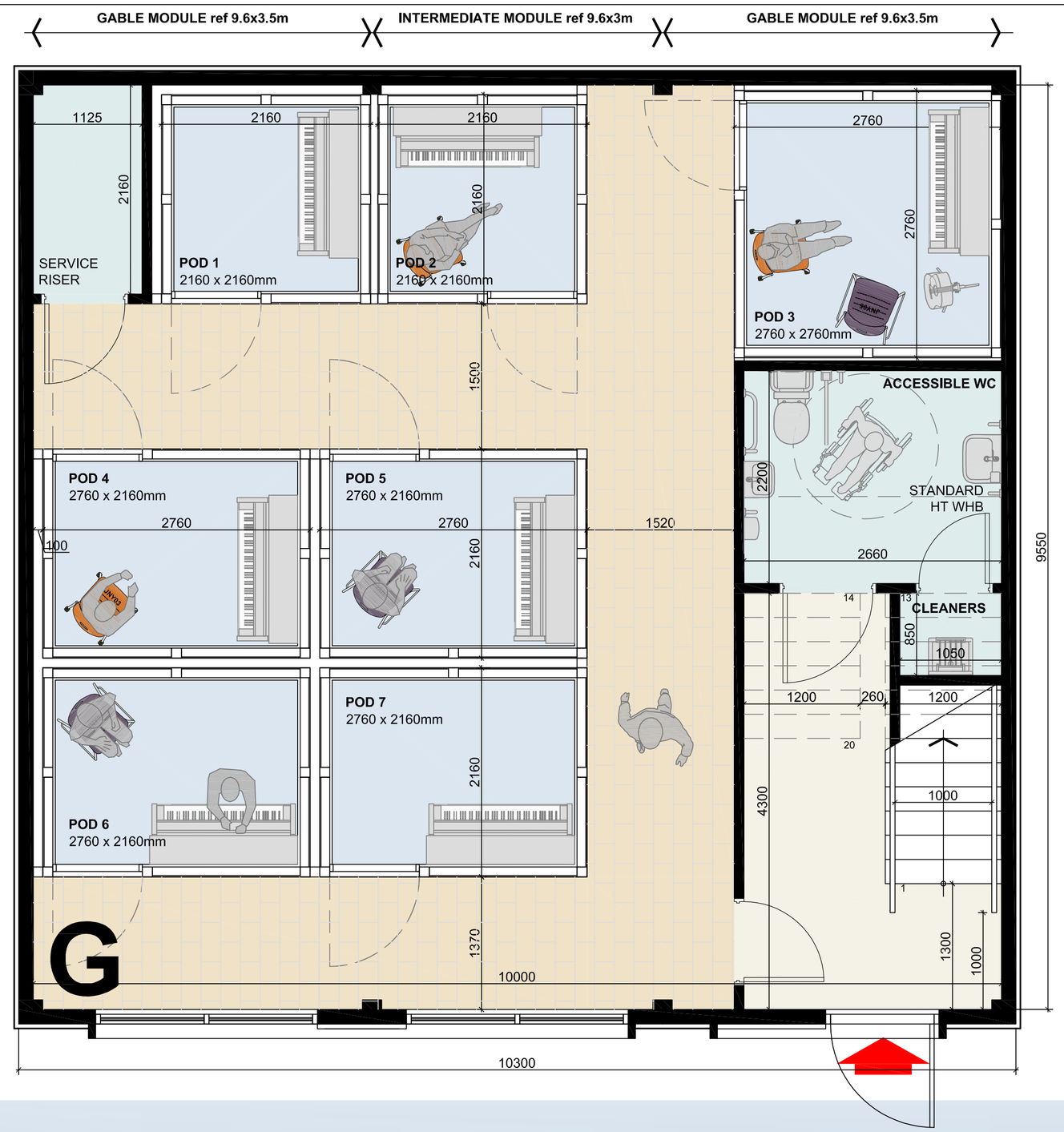

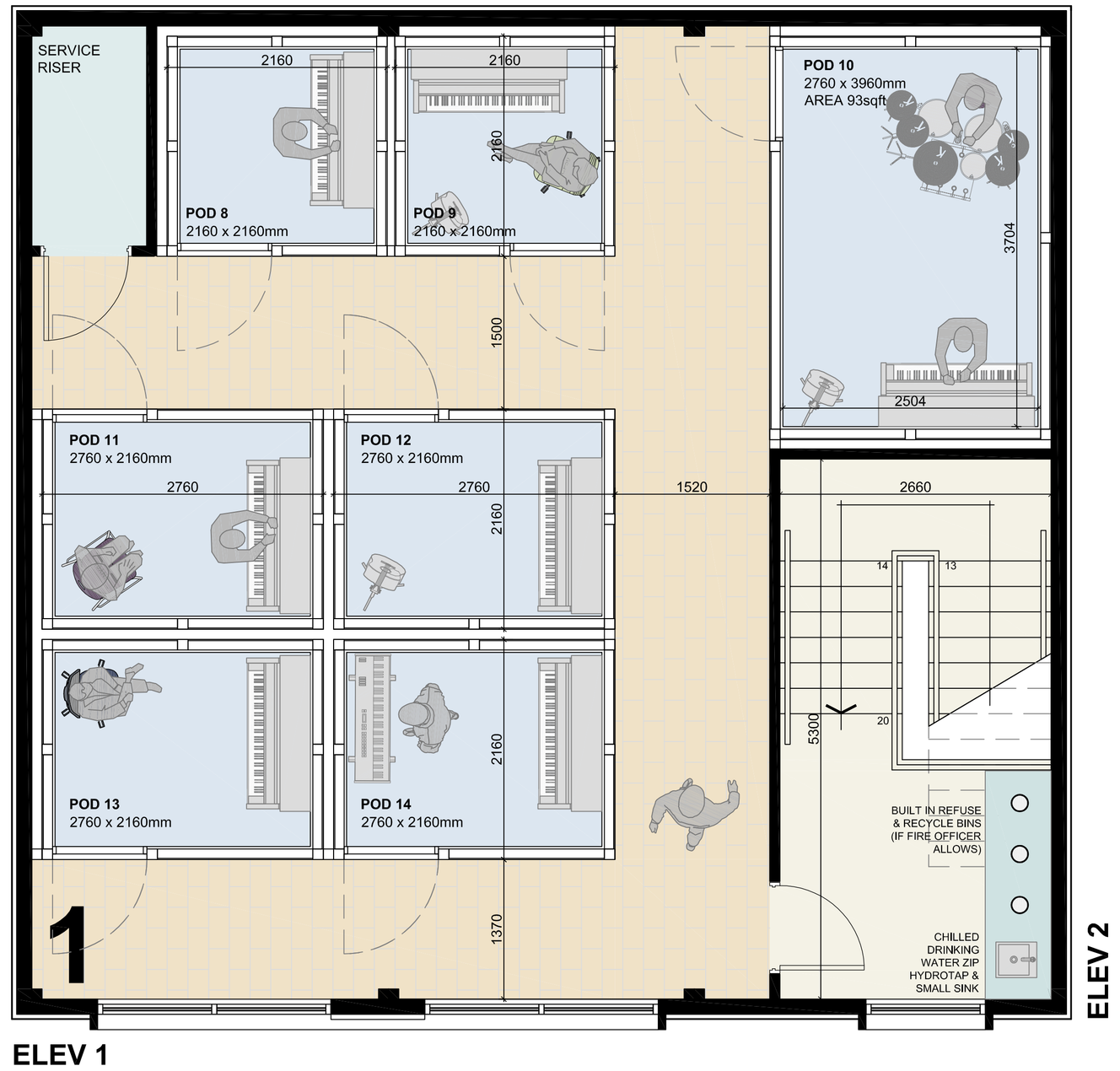

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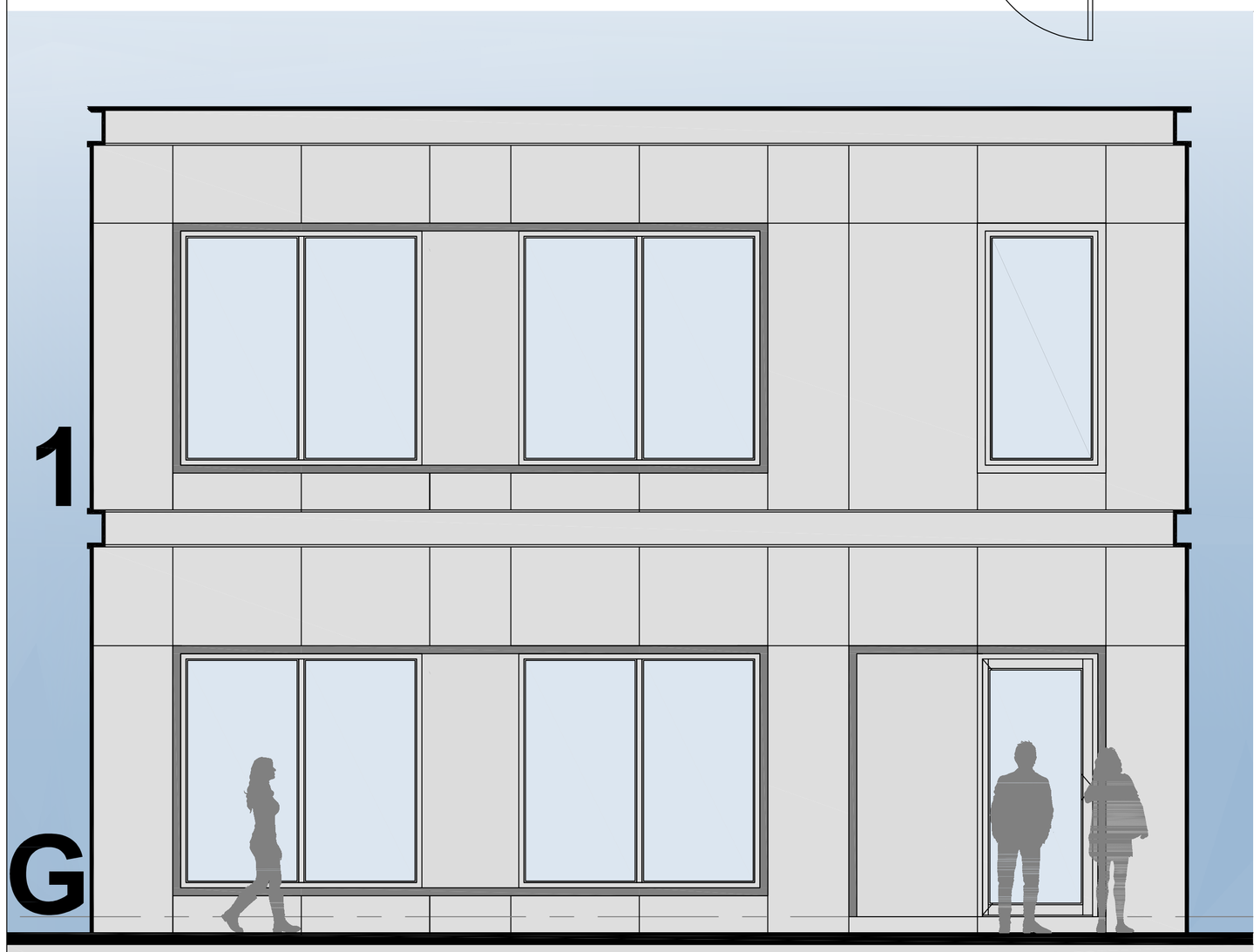

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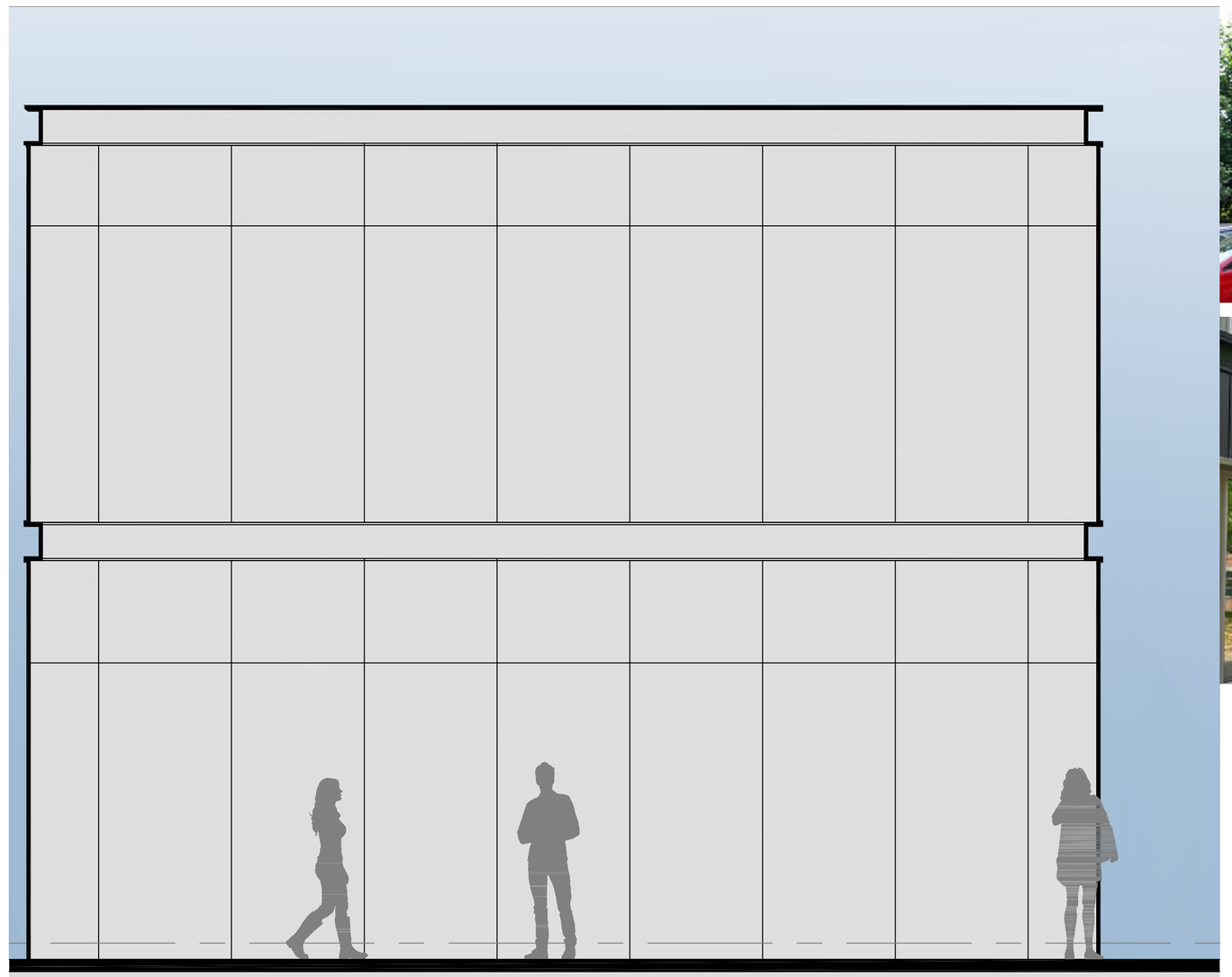

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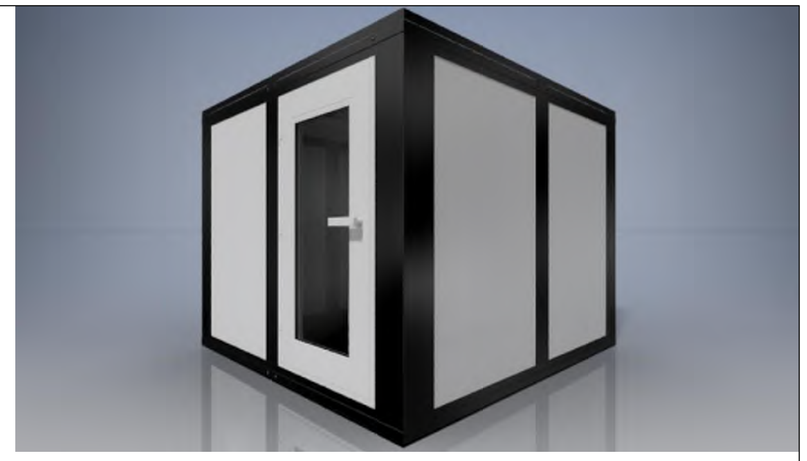


REV	COMMENT	DATE

The University of Manchester

MANCHESTER 1824

Directorate of Estates
Beyer Building
The University of Manchester
Oxford Road
Manchester
M13 9PL

Tel. 0161 275 2625
Fax. 0161 275 3880

DESIGN SERVICES UNIT

DRAWING STATUS: PRELIMINARY

PROJECT NAME: MUSIC PRACTICE SPACE MODULAR BUILDING FOR M-PODS

PROJECT NO.: 7989

BUILDING NAME: MARTIN HARRIS

BUILDING NUMBER: 012AA

SUB-SITE NAME:

SITE NAME: SOUTH CAMPUS

TITLE: SKETCH SCHEME

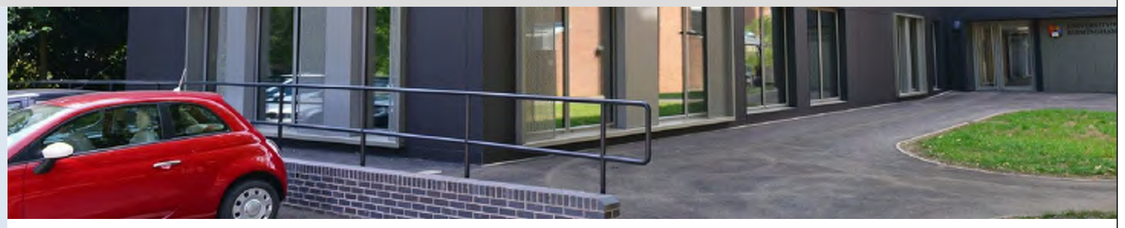
DRAWING NO.: 7989-012AA-A003

ISSUE: P5

PROJECT MANAGER: DATE:

SCALE: 1/ @A1

DRAWN: CHECKED: APPROVED:



REV	COMMENT	DATE

MANCHESTER 1824

The University of Manchester

Directorate of Estates
Beyer Building
The University of Manchester
Oxford Road
Manchester
M13 9PL

Tel. 0161 275 2625
Fax. 0161 275 3880

DESIGN SERVICES UNIT

DRAWING STATUS: PRELIMINARY

PROJECT NAME: MUSIC PRACTICE SPACE MODULAR BUILDING FOR M-PODS

PROJECT NO.: 7989

BUILDING NAME: MARTIN HARRIS

BUILDING NUMBER: 012AA

SUB-SITE NAME:

SITE NAME: SOUTH CAMPUS

TITLE: SKETCH SCHEME 2-STOREY OPTION

DRAWING NO.: 7989-012AA-A005

ISSUE: P2

PROJECT MANAGER:

DATE:

SCALE: 1/50@A1

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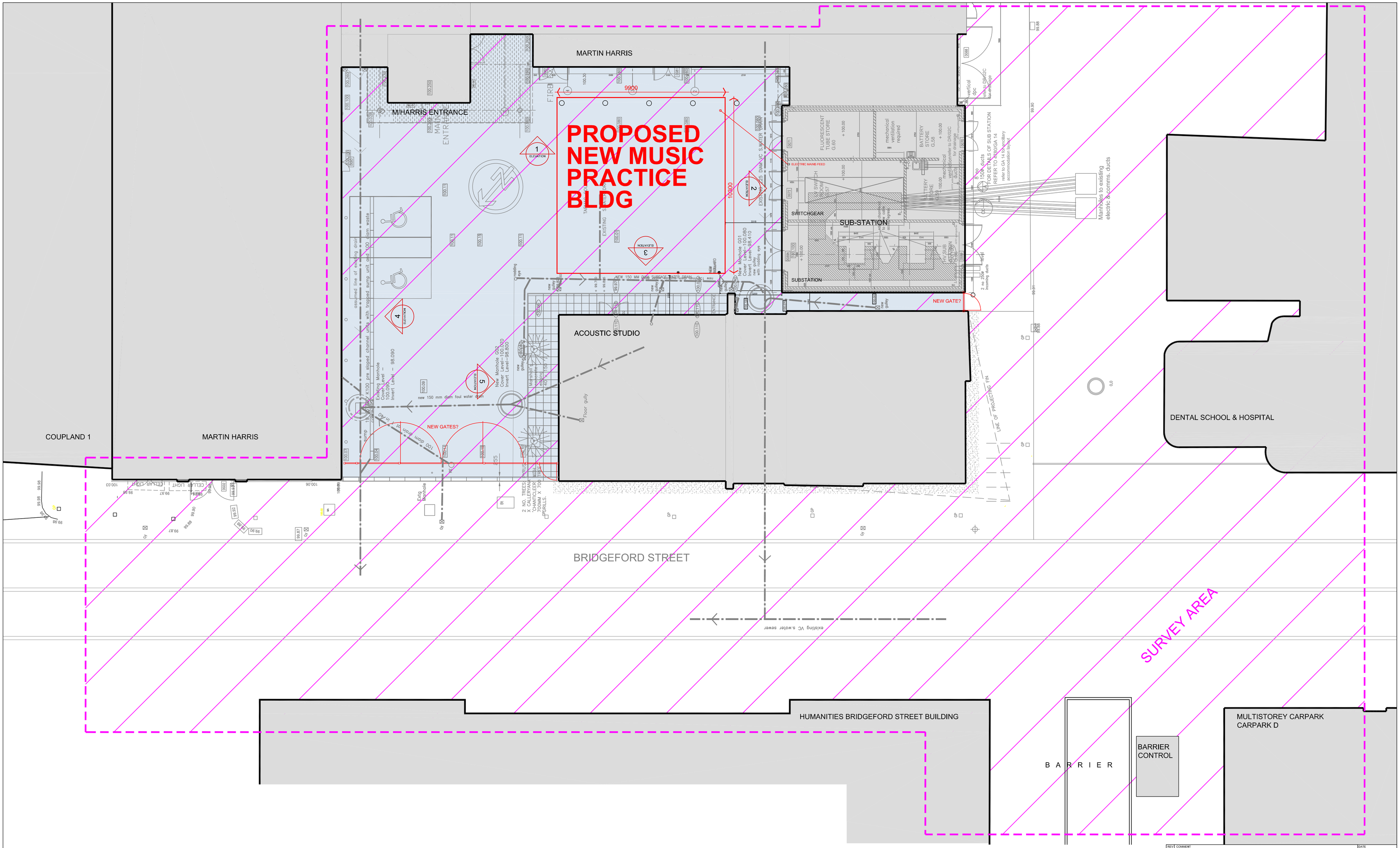

REV	COMMENT	DATE

The University of Manchester

MANCHESTER 1824

DESIGN SERVICES UNIT

DRAWING STATUS: PRELIMINARY

PROJECT NAME: MUSIC PRACTICE SPACE MODULAR BUILDING FOR M-PODS

PROJECT NO.: 7989

BUILDING NAME: MARTIN HARRIS

BUILDING NUMBER: 012AA

SUB-SITE NAME:

SITE NAME: SOUTH CAMPUS

TITLE: SITE PLAN / SURVEY AREA

DRAWING NO.: 7989-012AA-A006

ISSUE: P1

PROJECT MANAGER: DATE:

SCALE: 1/100@A1

DRAWN: CHECKED: APPROVED:

Directorate of Estates
Beyer Building
The University of Manchester
Oxford Road
Manchester
M13 9PL

Tel. 0161 275 2625
Fax. 0161 275 3880

Appendix B – Ground Investigation

Phase 1 Preliminary Risk Assessment New Music Block, Martin Harris Centre for Music and Drama, University of Manchester

Prepared for University of Manchester

April 2021

10/2084/001 Rev. 00

Ellie Brown
Geo-environmental Consultant
ellie.brown@clancy.co.uk
0161 613 6000

enquiries@clancy.co.uk
www.clancy.co.uk

Clancy Consulting Limited
Dunham Court,
2 Dunham Rd,
Altrincham,
WA14 4NX

Document Control Sheet

Issued by	Clancy Consulting Limited Dunham Court, 2 Dunham Rd, Altrincham, WA14 4NX	**Tel:** 0161 613 6000 **Email:** enquiries@clancy.co.uk **Website:** www.clancy.co.uk
Client	University of Manchester Oxford Rd, Manchester, M13 9PL	
Document	Phase 1 Preliminary Risk Assessment	
Project Name	New Music Block, Martin Harris Centre for Music and Drama	
Reference	10/2084/001/ Rev 00	
Date	April 2022	

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Document Origin

Revision	Date	Revision Description		Name
00	April 2022	Original	Prepared	Ellie Brown Geo-environmental Consultant ellie.brown@clancy.co.uk
			Checked	Desy Korai Associate desy.korai@clancy.co.uk
			Approved	Nick Riding Divisional Director nick.riding@clancy.co.uk

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Executive Summary

Client	The University of Manchester
Location	Martin Harris Centre for Music and Drama, The University of Manchester, Bridgeford Street, Manchester M13 9PL
Description	The site is located in a courtyard in the north of the Music and Drama Centre and is currently occupied by an area of hardstanding off Bridgeford Street. The site forms part of the University of Manchester campus and is surrounded by buildings associated with the University.
Development	It is proposed to develop the site with a two-storey music block within an existing courtyard of the Martin Harris Centre of Music and Drama.
Site History	The site comprised vacant land to the rear of residential dwellings in Manchester until the 1940's when the site became part of a depot. This was later removed and replaced with a dental hospital until the 2000's when the site was incorporated into the Drama and Music Centre. Surrounding land saw extensive residential development in the 1800's and early 1900's, with buildings associated with University of Manchester developed around the site throughout the 1900's. Industrial works were also developed around the site including a stone yard, depot, engineering works and other unidentified industrial type buildings.
Geology	British Geological Survey mapping indicates the site to be underlain Devensian Till, overlying the Chester Formation. Given the historical development of the site, Made Ground may also be present overlying natural soils.
Radon	The radon guidance on protective measures for new dwellings indicates that the site is in a 'low' probability radon area where less than 1% of homes are estimated to be at or above the Action Level. Radon gas protection measures are therefore not required in the construction of new dwellings or extensions.
Mining & Ground Stability	The site is located within a Coal Mining Reporting Area. However, a review of the Coal Authority online interactive map viewer indicates that there are no mine entries, abandoned mines or coal outcrops within 500m of the site. No BGS recorded mineral sites are indicated to be present within 500m of the site. Corn Brook, approximately 90m to the north of the site, was shown to have been infilled in the late 1800's. However, given its age and distance from the site, this is not considered to represent a significant risk to the proposed development.
Flood Risk	According to the Flood Map for Planning, available on the gov.uk website, the site is located within Flood Zone 3, whereby there is greater than 1% (1 in 100) chance of flooding from rivers or the sea occurring each year. The Flood Risk Extent map on the gov.uk website indicates that the site is within the extent of flooding in case of reservoir failure (Audenshaw reservoirs no.1, 2 and 3). If one is not already available, it is recommended that a Flood Risk Assessment is undertaken for the proposed development.

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Environmental Setting

The site is underlain by an Undifferentiated Secondary Aquifer and Principal Aquifer, relating to the Devensian Till and Chester Formation, respectively. The site is also located within Zone III (Total Catchment) of a SPZ. However, this is considered likely to be associated with the deeper Chester Formation Principal Aquifer, which is afforded a degree of protection by the overlying Devensian Till. Furthermore, the nearest groundwater abstraction is in excess of 500m from the site. On this basis, the site is not considered to represent a significant risk to groundwater resource receptors.

The nearest surface water feature is the River Medlock located 790m to the north. Given its distance, this watercourse is not considered to be at significant risk from potential contaminants of concern beneath the site.

UXO

Zetica Bomb Risk Mapping indicates the site to be in a moderate bombing density area during the Second World War. Therefore, further assessment of the risk posed by UXO is considered to be required.

Conclusions / Recommendations

A number of potential pollutant linkages have been identified, which may be active following the proposed redevelopment of the site. On the basis of the assessment above, the following additional works are recommended:

- Flood Risk Assessment should be completed for the site.
- A Detailed UXO Desk Study should be undertaken to clarify the potential risk posed by buried ordnance beneath the site.
- Carry out an intrusive site investigation to confirm ground conditions at the site.
- Installation of wells in boreholes to allow the assessment of potential risk to future site users posed by ground gases.
- Soil samples should be recovered from selected exploratory holes and tested for potential contaminants of concern. This should include pH, metals, asbestos screening, speciated PAH and speciated TPH.
- In-situ testing and geotechnical soil sampling should be carried out during intrusive investigation to provide adequate recommendations for foundation design.

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Site Location Plan
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Appendix II	Historical Maps
Appendix III	Zetica Bomb Risk Mapping
Appendix IV	Geological Maps
Appendix V	EA Groundwater Vulnerability & Flood Risk Maps
Appendix VI	Environmental Datasheets

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1.0 Introduction

1.1 Background

Clancy Consulting Limited has been instructed by University of Manchester to carry out a Phase 1 Preliminary Risk Assessment for a site located in a courtyard in the north of the Music and Drama Centre at the University of Manchester.

It is proposed to develop the site with a two-storey music block within an existing courtyard of the Martin Harris Centre of Music and Drama.

A proposed development plan is included in Appendix I.

1.2 Objectives

The objectives of this investigation are summarised below:

- Provide a review of the site's land use history by reference to ordnance survey maps of the area.
- Assess the environmental setting, geology, hydrology, hydrogeology, mining and subsidence history of the site and surrounding area.
- Consider the potential risk to end users of the site from unexploded ordnance (UXO).
- Consider the potential risk to end users of the site from hazardous ground gas.
- Consider potential geotechnical constraints for the proposed development.
- Develop a preliminary risk assessment and a detailed 'conceptual site model' with regard to potential contamination sources, pathways and receptors.
- Provide recommendations regarding the requirement for further investigations, if required, to satisfy the Local Planning Authority.

1.3 Limitations of the Study

Clancy Consulting Limited cannot be held responsible for any omissions, misrepresentation, errors or inaccuracies with the supplied third-party report information. The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information or improved practices and changes in legislation may require a reinterpretation of the report in whole or in part.

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2.0 Desk Study

2.1 General

Background information was sought from the following sources:

- Ordnance Survey historical maps (selected copies included in Appendix II).
- Zetica Bomb Risk Mapping (Appendix III).
- British Geological Survey (BGS) sheets (Appendix IV).
- Environment Agency site sensitivity & flood risk maps (Appendix V).
- Environmental datasheets (Appendix VI).

2.2 Site Setting and Description

The site is located at the Martin Harris Centre for Music and Drama, The University of Manchester, Bridgeford Street, Manchester M13 9PL, approximately 1.70km to the south of Manchester city centre at Ordnance Survey (OS) Coordinates 384420, 396600. The site is located within a courtyard to the north of the Centre. A site location plan is included in Appendix I.

The site is accessed from Bridgeford Street to the north and is located within the main Manchester University campus.

2.3 Site History

In order to investigate the development history and previous land uses at the site and surrounding area, historical OS maps were examined. Copies of the maps are presented in Appendix II.

Table 1 below is not intended to provide a comprehensive review of all the changes which have occurred at the site and instead provides a summary of the most salient points relating to the development history of the site. The most significant historical land uses are highlighted in bold text for ease of reference.

Table 1 – Site History

Date(s)	Site	Surrounding Land
1843 to 1851	The site comprised an area of vacant land to the rear of **residential buildings** located off Eagle Street, Manchester.	The surrounding land comprised a predominantly **residential area** of Manchester. **Corn Brook** was located approximately 90m to the northwest of the site and a bowling green was situated approximately 100m to the northeast, beyond which a carriage manufacturer was located. An **engineering works** was present approximately 100m to the south. Approximately 150m to the east of the site a **tramline** was present, continuing down Coupland Street to the south of the site.
1891 to 1908	**Residential buildings** had been constructed along Chatham Street, which bound the site to the west.	In the place of the bowling green to the northeast, **Corporation Stone Yard** was located. Beyond this to the east, two **timber yards** were situated. **Corn Brook** was no longer indicated to be present and had likely been **infilled or culverted**. Approximately 100m north of the site, a church and two schools were shown to be present. Approximately 50m to the south, **Manchester University Owens College** building was located, with the **Eagle brewery** bounding it to the west. There was further **residential development** of Manchester to the north, east, south and west.
1932 to 1933	No significant changes.	The residential buildings located to the south and east of the site were no longer present, with **industrial buildings** located in their place, including a **chimney** approximately 30m to the

Date(s)	Site	Surrounding Land
		northeast. Approximately 100m northeast of the site, a **dental hospital** was situated. The **carriage manufacturer** works to the east was shown to have been replaced by a **shopfitters works**.
1948 to 1949	An **industrial building** was shown to have been constructed to the south and extending onto the southern side of the site. The rest of the site was covered by **hardstanding** to the north and the existing **residential buildings** to the west.	The **dental hospital** to the northeast was shown to have been relocated in the place of a block of residential buildings, situated off Bridge Street to the west. **Eagle Brewery** to south was no longer present. Buildings associated with the University were present in its place, including a **tank**. Where the school had been located to the north of the site, **Eagle Works** was located. Approximately 200m to the east the **shopfitters works** was no longer indicated to be present, with a **wire works** present in its place. Additional works including a **clothing and joinery works** were located to the south. The **tramline** leading from Oxford Road to the south of the site was no longer present.
1952 to 1961	No significant changes.	The **clothing and joinery works** to the east were no longer present, with a large building associated with the University shown in their place. The **dental hospital** to the west was shown to have expanded.
1961 to 1970	The industrial building on site was labelled as a **depot**.	The **wire works** to the east was shown to have become a **laboratory**.
1974 to 2000	The **depot and residential buildings** situated within the site boundary were shown to have been removed, with the area indicated to be part of the **dental hospital**. Along the southern site boundary an **electrical substation** was located.	The **residential buildings, works, school and church** to the north were shown to have been removed, with a **car park and buildings** associated with the **University of Manchester** present in their place. To the west, residential buildings were absent, with St Ignatius School and tennis courts located instead.
2003 to 2022	The site was shown in its current configuration within the **Martin Harris Drama and Music Centre** and comprised a courtyard covered by hardstanding to the north of the Centre.	The **dental hospital** was shown to have been replaced by the Drama and Music Centre. The **car park** to the north of the site was no longer present, with buildings associated with the University present in its place.

2.4 UXO Risk Assessment

Zetica Bomb Risk Mapping indicates the site to be in an area of moderate bombing density during the Second World War. Further assessment of the risk posed by UXO is therefore recommended.

Zetica bomb risk mapping for the site is included in Appendix III.

2.5 Geology

The 1:50,000 geological map for the area (Map Sheet No 85, Manchester) indicates that the superficial deposits underlying the site comprise Devensian Till. This is underlain by bedrock deposits of the Chester Formation.

Given the development history of the site, Made Ground may also be present overlying natural strata. No previous site investigation information has been reviewed in order to confirm this. However, a historical BGS borehole record located approximately 120m east of the site indicates the presence of Made Ground to a depth of approximately 1.20m bgl.

Copies of the geological plans are provided in Appendix IV.

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2.6 Mining and Ground Stability

The site is located within a Coal Mining Reporting Area. However, a review of the Coal Authority online interactive map viewer indicates that there are no mine entries, abandoned mines or coal outcrops within 500m of the site.

The environmental database report indicates that the site represents a very low risk with regard to ground stability issues relating to ground compressible ground, ground dissolution, collapsible ground, landslides, shrinking/swelling clay and running sand.

No BGS recorded mineral sites are indicated to be present within 500m of the site.

2.7 Hydrogeology

The Devensian Till, indicated to be present beneath the site, is classified by the EA as an Undifferentiated Secondary Aquifer. These are layers that have varying permeability characteristics in different areas.

The Chester Formation, indicated to be present beneath the Devensian Till, is classified by the EA as a Principal Aquifer. These are rock layers that have high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage and transmission and may support water supply and/or river base flow on a strategic scale.

According to EA data, the site is located within Zone III (Total Catchment) of a groundwater Source Protection Zone (SPZ). Information provided by the EA indicates that there are 15 records of licensed groundwater abstractions within 1km of the site. These are located at distances ranging from approximately 543m northwest to 877m southwest of the site, associated with general use and heat pumps for schools and colleges and general cooling and process water for breweries.

Groundwater quality beneath the site has not been classified under an EA Local River Basin Management Plan.

2.8 Hydrology

The River Medlock is present approximately 790m to the north of the site. The chemical quality of this surface water feature has been classified as ‘fail’ under the EA River Basin Management Plan for the area.

There are no records of licensed surface water abstractions indicated to be present within 1km of the site.

There are no records of discharge consents within 500m of the site.

There are no records of significant or major incidents to controlled waters recorded within 500m of the site.

2.9 Soil Geochemistry

According to the BGS National Geoscience Information Service, the following background soil concentrations can be expected within natural soils at the site:

- Arsenic – 35-45 mg/kg
- Cadmium - <1.8 mg/kg
- Chromium – 90-120 mg/kg
- Lead – 300-600 mg/kg
- Nickel – 30-45 mg/kg

The concentrations of lead indicated above are in excess of assessment criteria protective of residential site users.

It should be noted that the soil geochemistry has been estimated solely on the basis of published geology and not empirical data.

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2.10 Flood Risk

According to the Flood Map for Planning, available on the gov.uk website, the site is located within Flood Zone 3, whereby there is greater than 1% (1 in 100) chance of flooding from rivers or the sea occurring each year.

The Flood Risk Extent map on the gov.uk website indicates that the site is within the extent of flooding in case of reservoir failure (Audenshaw reservoirs no.1, 2 and 3).

The environmental database indicates that there is a very low risk of surface water (pluvial) flooding to occur at the site.

The environmental database report indicates that there is limited potential for groundwater flooding to occur at the ground surface.

The site may be located within a critical drainage area. The appointed drainage engineer should consult with the Lead Local Flood Authority (LLFA) to confirm this.

If one is not already available, it is recommended that a Flood Risk Assessment is undertaken for the proposed development.

Copies of the site sensitivity and flood risk maps are included in Appendix V.

2.11 Radon Risk Potential

The radon guidance on protective measures for new dwellings indicates that the site is in a 'low' probability radon area where less than 1% of homes are estimated to be at or above the Action Level.

Radon gas protection measures are therefore not necessary in the construction of new dwellings or extensions.

2.12 Landfill Sites

No current or former landfill or waste management sites are indicated to be present within 500m of the site.

A potential area of infilled land associated with a former river or stream is located 93m to the northwest. Other areas of potentially infilled former ponds, rivers or streams are located between 205m northeast and 645m west of the site. However, given their age and distance from the site, these are not considered to represent a significant risk to the proposed development.

2.13 Industrial Land Uses

There is no active Local Authority Pollution Prevention and Control permits recorded within 500m of the site.

There is one registered radioactive substance license located 235m to the northeast of the site and registered to Victoria University of Manchester. The registration is for the keeping, use and disposal of radioactive materials, with authorisation first granted in 1991 and since listed as revoked or cancelled. Other authorised registrations are located 289m to the northeast associated with the University of Manchester and 445m to the east with Manchester Incubator Co Ltd for the keeping, use and disposal of radioactive materials.

There are 14 active Contemporary Trade Directory entries recorded within 500m of the site. These relate to a petrol filling station, laboratories, printers, temperature monitoring systems manufacturers, MOT testing centres, distribution services, medical equipment maintenance and repairs, coating specialists, dry cleaners and car dealers.

Full details of the waste management and industrial land uses are detailed in the environmental database presented in Appendix VI.

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2.14 Sensitive Land Uses

Natural England data indicates that there are no ecologically sensitive sites indicated within 500m of the site that constitute environmental receptors as defined within Table 1 of the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012).

2.15 Potential Geotechnical Constraints

Made Ground beneath the site would not form a suitable bearing stratum for traditional foundations. The underlying Devensian Till would likely support strip or pad foundations for light to moderate loads if present at relatively shallow depth. If the thickness of Made Ground is significant of if underlying natural soils were of low strength, piled foundation terminating in the deeper Chester Formation would likely be required. A geotechnical site investigation would be required to confirm a suitable foundation solution for the proposed development.

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3.0 Phase 1 Risk Assessment

3.1 General

The “suitable for use” approach is adopted for the assessment of contaminated land and remedial measures are only undertaken where unacceptable risk to human health or the environment can be proven when taking into account the proposed use of the site and environmental setting.

A risk assessment process should be carried out to determine potential hazards to human health and the environment and be based on the “source” “pathway” “receptor” principal. For a potential risk to be present there must be a viable pollutant linkage whereby a contamination source may impact upon a receptor. The absence of one or more of these key components (source, pathway or receptor) prohibits a viable pollution linkage being formed.

3.2 Preliminary Conceptual Site Model

In accordance with the ‘Land Contamination Risk Management’ (LCRM) guidance on the gov.uk website (updated October 2020) and BSI 10175 “Code of Practice for Investigation of Potentially Contaminated Land” (2011), a Preliminary Conceptual Site Model was developed to identify potential contamination sources, migration pathways and receptors within the study area.

3.3 Potential Contaminant Sources

The site has been developed since the 1940’s and therefore, Made Ground may be present on and adjacent to the site, which could represent a potential source of contaminants of concern.

Historical surrounding land use was mixed residential, commercial and industrial in nature. Current surrounding land use is predominantly educational in nature. Potential contaminants associated with commercial and industrial land uses include metals, asbestos, total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH).

Made Ground beneath the site and surrounding area (if present) may represent a potential source of ground gases. Given the age and distance to recorded areas of infilled land summarized in Section 2.12, these are not considered to pose a significant risk to the proposed development.

The following potential sources of contamination have been identified at the site:

- Potential Made Ground and contamination associated with historic construction and demolition at the site (residential buildings, depot, dental hospital).
- Migration of potential contamination associated with historic land uses around the site, including a former works, construction of residential properties and nearby industrial land uses.
- Potential generation of hazardous ground gases associated with deep Made Ground and putrescible materials present at the site.

3.4 Potential Pathways

The site is proposed to be developed with a new two-storey music block. The following potential pathways are considered applicable at the site:

- Inhalation (dust / vapors)
- Ingestion
- Vertical / lateral migration (of both contamination and potentially hazardous ground gases)

3.5 Potential Receptors

Potential human health receptors include future site users and neighboring educational site users, whilst the proposed new buildings at the site are also be considered as receptors.

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The underlying Principal Aquifer is considered to be the main environmental receptor of concern.

Given the distance to the nearest surface watercourse (the River Medlock 790m north), this is not considered to be at significant risk rom potential contaminants of concern beneath the site.

3.6 Preliminary Risk Assessment

A preliminary risk assessment can be carried out using guidance outlined in Section 6.3 of CIRIA Document C552 "Contaminated Land Risk Assessment – A Guide to Good Practice" (2001). For a risk to be present there must be a viable pollutant linkage whereby a contamination source can impact on a receptor via a pathway. To carry out the risk assessment an estimate must be made of the potential severity of the risk and the likelihood of the risk occurring. The following Tables set out the criteria for this principal.

Table 2 - Severity of Risk

Severity	Description
Severe	Acute risk to human health likely to result in 'significant harm' i.e. very high concentrations of contamination or ground gases. Catastrophic damage to building i.e. by explosion from high gassing sites or VOC concentrations. Major pollution of controlled waters i.e. surface watercourses and Principal aquifers, source protection zones. Short term damage to ecosystems.
Medium	Long term risk to human health likely to result in 'significant harm' i.e. elevated concentrations of contaminants or ground gases. Pollution of sensitive controlled watercourses i.e. Principal or Secondary Aquifers. Significant effects on sensitive ecosystems or species.
Mild	Pollution of non-sensitive waters i.e. smaller surface watercourses or unproductive strata. Significant damage to crops, buildings, structures or services i.e. by explosion from sites with medium gassing potential, elevated concentrations of contaminants.
Minor	Non-permanent human health effects i.e. requirement for protective equipment during site works to mitigate health effects. Damage to non-sensitive ecosystems or species. Minor damage to buildings, structures or services.

Table 3 - Probability of Risk Occurring

Probability	Description
High Likelihood	Pollutant linkage may be present that appears very likely in the short term and risk is almost certain to occur in long term or evidence of harm to receptor exists.
Likely	Pollutant linkage may be present and is likely that the risk will occur over the long term.
Low Likelihood	Pollutant linkage may be present and there is a possibility of the risk occurring although no certainty that it will do so.
Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur even in the long term are improbable.

Table 4 - Comparison of Risk & Probability

Probability	Severity			
	Severe	Medium	Mild	Minor
High Likelihood	Very High	High	Moderate	Moderate/Low
Likely	High	Moderate	Moderate/Low	Low
Low Likelihood	Moderate	Moderate/Low	Low	Very Low
Unlikely	Moderate/Low	Low	Very Low	Very Low

A summary of potential pollutant linkages and perceived risks for this site are outlined in the Table below:

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Table 5 - Pollutant Linkages & Perceived Risk

Sources of Contamination	Pathways	Receptors	Severity	Probability	Risk	Justification	Further Action Required
On site: Made Ground and contamination associated with historical commercial and industrial land use.	Inhalation and dermal contact of soil	Future site users	**Medium** Long term risk to human health	**Unlikely**	**Low**	Contaminants of concern may be present beneath the site, associated with the Made Ground and former commercial and industrial land use. However, given the continued coverage of the site with hardstanding it is considered that no contaminant pathways will remain active following the redevelopment.	Site investigation to confirm the contamination status of shallow soils beneath the site.
		Construction workers during development	**Minor** Non-permanent human health effects i.e. requirement for protective equipment during site works to mitigate health effects	**Low Likelihood**	**Very Low**	If construction workers come into contact with potential contaminated soils during the construction phase, such contact would be short term, limiting potential exposure. Construction workers are expected to undertake good working practices including regular hand washing and other hygiene techniques which would reduce the likelihood of long-term exposure to any contamination.	
	Acidic ground conditions affecting future site buildings	Building infrastructure	**Minor** Minor damage to buildings	**Low Likelihood**	**Very Low**	Made Ground and natural soils beneath the site may contain elevated concentrations of sulphates and low pH. Chemical testing for water soluble sulphate and pH should be undertaken to inform concrete classification.	
	Vertical and lateral migration	Neighbouring commercial properties	**Medium** Long term risk to human health	**Unlikely**	**Low**	Neighbouring land use is predominantly educational in nature. It is considered unlikely that contamination would be present in sufficient concentrations beneath the site to adversely affect neighbouring site users.	
		Controlled waters	**Mild** Pollution of non-sensitive controlled water receptors	**Low Likelihood**	**Low**	The site is underlain by an Undifferentiated Secondary Aquifer and Principal Aquifer, relating to the Devensian Till and Chester Formation, respectively. The site is also located within Zone III (Total Catchment) of a SPZ. However, this is considered likely to be associated with the deeper Chester Formation Principal Aquifer, which is afforded a degree of protection by the overlying Devensian Till. Furthermore, the nearest groundwater abstraction is in excess of 500m from the site. On this basis, the site is not considered to represent a significant risk to groundwater resource receptors. The nearest surface water feature is the River Medlock located 790m to the north. Given its distance, this watercourse is not considered to be at significant risk from potential contaminants of concern beneath the site.	
Off site: Made Ground and industrial buildings	Lateral migration onto site with subsequent dermal contact of soils	Future site users	**Medium** Long term risk to human health	**Unlikely**	**Low**	Contamination may migrate onto site from off-site sources associated with historical commercial/industrial land use. However, given the continued coverage of the site with hardstanding it is considered that no contaminant pathways will remain active following the redevelopment.	
Potential hazardous ground gas and vapours from Made Ground	Migration of ground gas	Future site users	**Severe** Acute risk to human health (asphyxiation)	**Low Likelihood**	**Moderate**	Made Ground beneath the site may represent potentially significant sources of ground gas.	Monitoring wells should be installed as part of the site investigation and monitoring undertaken to assess the risk posed by ground gases.
		Building Infrastructure	**Severe** Significant damage to buildings (explosion)	**Low Likelihood**	**Moderate**		

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4.0 Conclusions and Recommendations

Clancy Consulting Limited was instructed by University of Manchester to carry out a Phase 1 Preliminary Risk Assessment for a site located in a courtyard in the north of the Music and Drama Centre at the University of Manchester. It is proposed to develop the site with a two-storey music block within an existing courtyard of the Martin Harris Centre of Music and Drama.

The site comprised vacant land to the rear of residential dwellings in Manchester until the 1940's when the site became part of a depot. This was later removed and replaced with a dental hospital until the 2000's when the site was incorporated into the Drama and Music Centre.

Surrounding land saw extensive residential development in the 1800's and early 1900's, with buildings associated with University of Manchester developed around the site throughout the 1900's. Industrial works were also developed around the site including a stone yard, depot, engineering works and other unidentified industrial type buildings.

British Geological Survey mapping indicates the site to be underlain Devensian Till, overlying the Chester Formation. Given the historical development of the site, Made Ground may also be present overlying natural soils.

According to the Flood Map for Planning, available on the gov.uk website, the site is located within Flood Zone 3, whereby there is greater than 1% (1 in 100) chance of flooding from rivers or the sea occurring each year. The Flood Risk Extent map on the gov.uk website indicates that the site is within the extent of flooding in case of reservoir failure (Audenshaw reservoirs no.1, 2 and 3). If one is not already available, it is recommended that a Flood Risk Assessment is undertaken for the proposed development.

The River Medlock is present approximately 790m to the north of the site.

Zetica Bomb Risk Mapping indicates the site to be in a moderate bombing density area during the Second World War. Therefore, further assessment of the risk posed by UXO is considered to be required.

The site is underlain by an Undifferentiated Secondary Aquifer and Principal Aquifer, relating to the Devensian Till and Chester Formation, respectively. The site is also located within Zone III (Total Catchment) of a SPZ. However, this is considered likely to be associated with the deeper Chester Formation Principal Aquifer, which is afforded a degree of protection by the overlying Devensian Till. Furthermore, the nearest groundwater abstraction is in excess of 500m from the site. On this basis, the site is not considered to represent a significant risk to groundwater resource receptors.

The nearest surface water feature is the River Medlock located 790m to the north. Given its distance, this watercourse is not considered to be at significant risk from potential contaminants of concern beneath the site.

A number of potential pollutant linkages have been identified, which may be active following the proposed redevelopment of the site. On the basis of the assessment above, the following additional works are recommended:

- Flood Risk Assessment should be completed for the site.
- A Detailed UXO Desk Study should be undertaken to clarify the potential risk posed by buried ordnance beneath the site.
- Carry out an intrusive site investigation to confirm ground conditions at the site.
- Installation of wells in boreholes to allow the assessment of potential risk to future site users posed by ground gases.
- Soil samples should be recovered from selected exploratory holes and tested for potential contaminants of concern. This should include pH, metals, asbestos screening, speciated PAH and speciated TPH.
- In-situ testing and geotechnical soil sampling should be carried out during intrusive investigation to provide adequate recommendations for foundation design.

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- In-situ testing and geotechnical soil sampling should be carried out during intrusive investigation to provide adequate recommendations for foundation design.

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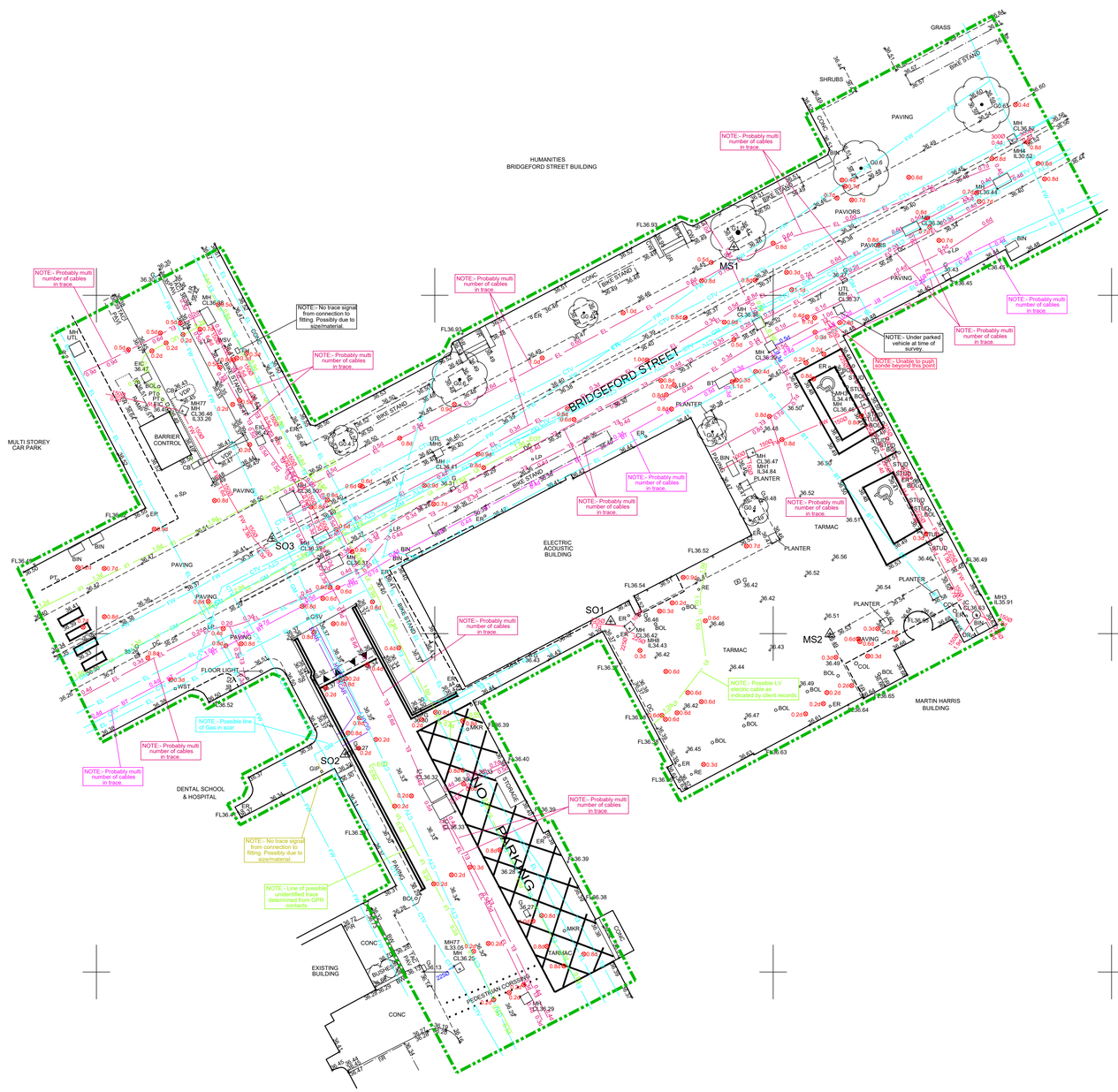
Appendix C – Topo and Utilities



SW	STORM WATER SEWERS	
FW	FOUL WATER SEWERS	
WM	WATER MAIN	
GM	GAS MAIN	
EL	ELECTRIC CABLES	
DUCT	CABLE DUCTING	
BT	BT (UNDERGROUND)	
	CABLE TV	
CCTV	CLOSED CIRCUIT TV	
UI	UNIDENTIFIED FEATURE	
UP	UNIDENTIFIED PIPE	
UC	UNIDENTIFIED CABLE	
UNPR	UNPROVEN FEATURE	
SW	END OF TRACE	
FW	LATERAL CONNECTIONS	
	EXTENT OF SURVEY BY SURVEY OPERATIONS LTD.	
FW SW	CONNECTIVITY BETWEEN CHAMBERS FROM CCTV REPORT	
	COVER POSITION FROM CCTV REPORT - NOT SURVEYED ON TOPOGRAPHICAL SURVEY.	
0.0d	BURIED FEATURE FOUND USING RADAR	

UNIDENTIFIED - A buried feature or utility that has been located, but we are unable to state what it is.

UNPROVEN - The assumed location of a reported feature or utility, usually taken from records, but not found during the utility trace (due to various conditions).

CAUTION - Electric pot ended cables, even when they are live, are unable to be detected or traced.

UNDERGROUND UTILITIES SERVICES DISCLAIMER

We have endeavoured to locate existing services using records provided by Statutory Authorities as a guide. Some apparatus were untraceable and details have therefore been taken from Utility Record Drawings, which may be of poor quality. Consequently we cannot guarantee accuracy of information taken from such records.

Where indicated, no allowance has been made for sub-surface entry into manholes, other chambers or confined spaces below ground level. Therefore any details relating to depths, sizes etc, are taken from the surface and as such will be approximate.

We have endeavoured to supply you with the most accurate data possible by using methods and equipment that are at the forefront of our industry. We have taken great care in the detection of pipework and buried features, but as with all methods of detecting underground or buried utilities the information provided is based on results obtained from electromagnetic techniques, and as such may be liable to distortion or errors beyond the reasonable control of the operator or his instruments.

It is the responsibility of the user under Health & Safety (HSG47) Guidelines to satisfy himself of the suspected location of any services prior to excavation of the services shown.

NOTE 1

This utility survey has been undertaken using:
A: Radiodetection RD4000 + RD4000 TID
B: Mala Geoscience Ground Probing Radar

NOTE 2

Power carrying features shown on this drawing are shown as an individual service line. This does not necessarily represent the number of cables actually present and it is possible that there could be multi numbers of cables including HV, LV and communications transmission cables following the same trace line. These could be at different depths, the trace signal from the deeper cables being masked by signal emitted from the shallower service above. Cable runs could also be present running parallel to the single line shown.

STANDARD REFERENCE & ABBREVIATIONS

(AR).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Belisha Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom IC
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Cirouit TV
CD.....Cable Duct
CEL.....Cellar Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CP.....Catch Pit
CRTW.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DSW.....Dry Stone Wall
ECP.....Electricity Cable Pit
EIC.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G*.*.....Girth (of tree)
G.....Gulley
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMKR.....Gas Marker
GST.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
Ht.....Height
HV.....High Voltage
I/R.....Iron Railing
IC.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
MG.....Multi-Girth
MH.....Manhole
MKR.....Marker
MP.....Mooring Point
MP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paling
OE.....Overhead Electric Wire
OP.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/G.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PP.....Petrol Pump
PT.....Post or Pillar
RE.....Rodding Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Sump Level
Sol.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIE.....Anchor Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TNC.....Tarmac
TP.....Telecommunications Pole
TPIT.....Trial Pit
TR.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (MH,IC etc)
UTS.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/W.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WST.....Water Stop Tap (domestic)
WSV.....Water Stop Valve (mains)

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N

Note:
The survey is plotted on a plane local Grid. Orientation to National Grid.
All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

SURVEY STATIONS

Name	Easting	Northing	Height
SO1	384413.00	396600.91	36.42
SO2	384393.37	396591.09	36.34
SO3	384387.99	396607.04	36.40
MS1	384422.10	396628.58	36.46
MS2	384429.20	396599.97	36.51

Utilities surveyed April 2022 and added to Survey Operations drawing no. 21L118

EL	UNPROVEN ELEC
BT	UNPROVEN BT
GM	UNPROVEN GAS
WM	UNPROVEN WATER
SW	UNPROVEN SURFACE
FW	UNPROVEN FOUL

All unproven lines without additional notes on drawing show the approximate location of a reported utility or feature as indicated on available stat records.

Revision - Date - Description
A - 03/05/22 - Drawing notes updated.

Survey Operations
Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk — www.survops.co.uk

Client
University of Manchester

Drawing Title
Utilities Survey of:
New Music Practice Building
Manchester

Scale(s)	1:200	Surveyor	ES
Date	Apr 22	Drawn	DS
Job Number	22C200	Checked	SO

Sheet Size & Drg Number & Revision
A1 22C200/001 A

Appendix D – Anglian Water

United Utilities
Water for the North West

How to contact us:

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

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Clancy Consulting Ltd

19
Upper King Street,
Norwich, Norfolk
NR3 1RB

FAO:

Your Ref: Martin Harris Music Block
Our Ref: UUPS-ORD-400763
Date: 20/06/2022

Dear Sirs

Location: Martin Harris Music Block

I acknowledge with thanks your request dated 01/06/2022 for information on the location of our services.

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

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

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

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

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

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

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Date: 20/06/2022

Extract from Map of Public Sewers

Printed By:
Property Searches

Martin Harris Music Block

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

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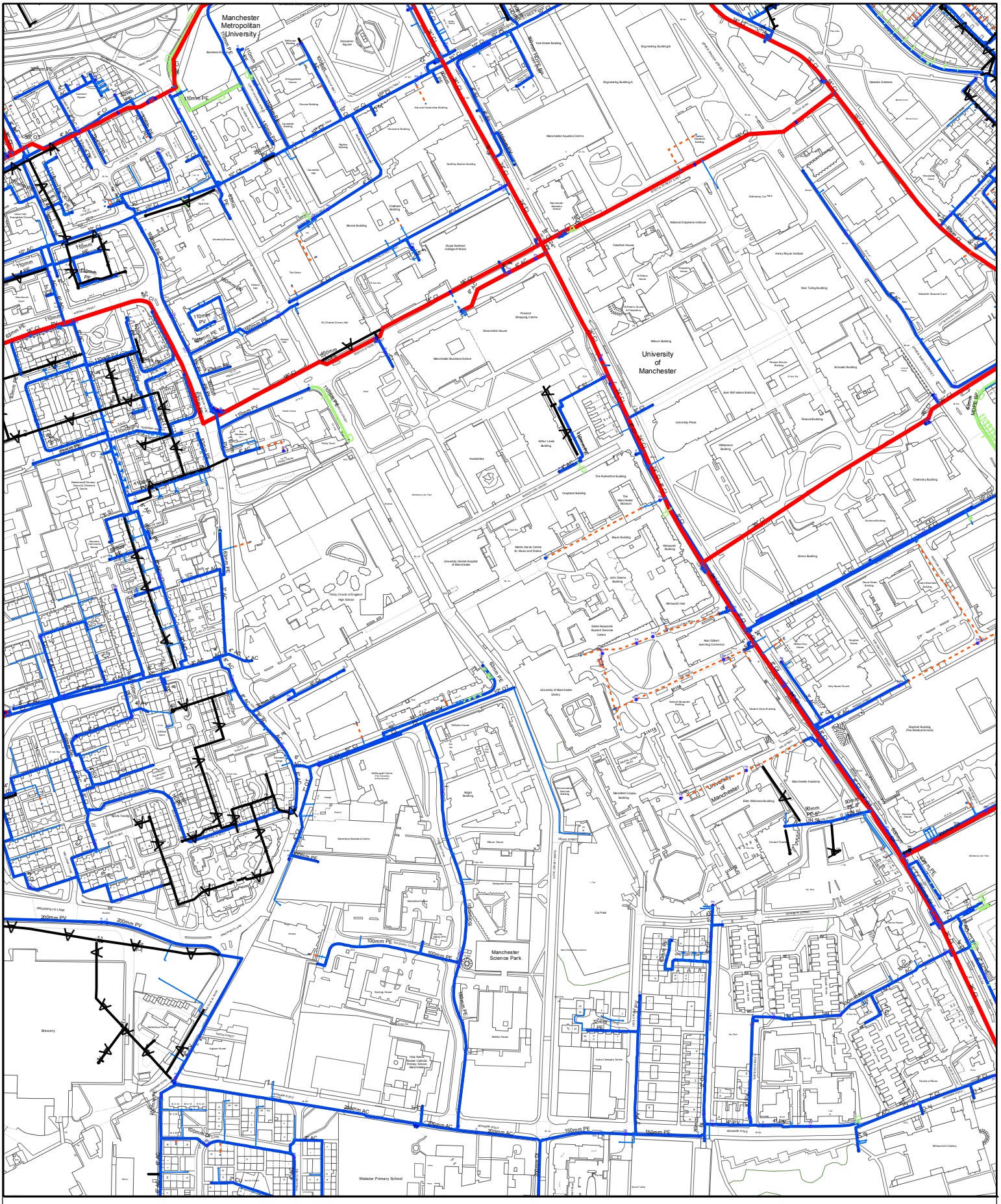
United Utilities
Water for the North West

Wastewater Symbology

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

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

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic



Date: 20/06/2022

Extract from Map Of Water Mains

Printed By:
Property Searches

Martin Harris Music Block

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

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United Utilities
Water for the North West

Clean Water Symbology

Proposed	Abandoned	Live	
			Distribution Main
			Trunk Main
			Comms Pipe
			Private Pipe
			Concessionary Service
			Raw Water
			LDTM Raw Water
			LDTM Treated Water

- Air Valve
- AC Valve, open
- AC Valve, closed
- CC Valve, open
- CC Valve, closed
- Non Return Valve
- Pressure Management Valve
- OMS Valve
- Stop Tap
- Flow Meter
- Domestic Meter
- Commercial Meter
- Pump
- Hydrant
- Fire Hydrant
- Anode
- Chlorination Point
- De-chlorination Point
- Strainer Point
- Access Point
- Hatch Box
- IP Point
- Sampling Station
- Logger Box

- Bore Hole
- Inlet Point
- Bulk Supply Point
- End Cap
- Site Termination
- Change of Characteristic
- Condition Report

Property Types

- Water Tower
- Valve House
- Booster Pumping Station
- Intake Pumping Station
- Water Treatment Works
- Supply Reservoir
- Service Reservoir
- Impounding Reservoir
- Pipe Bridge

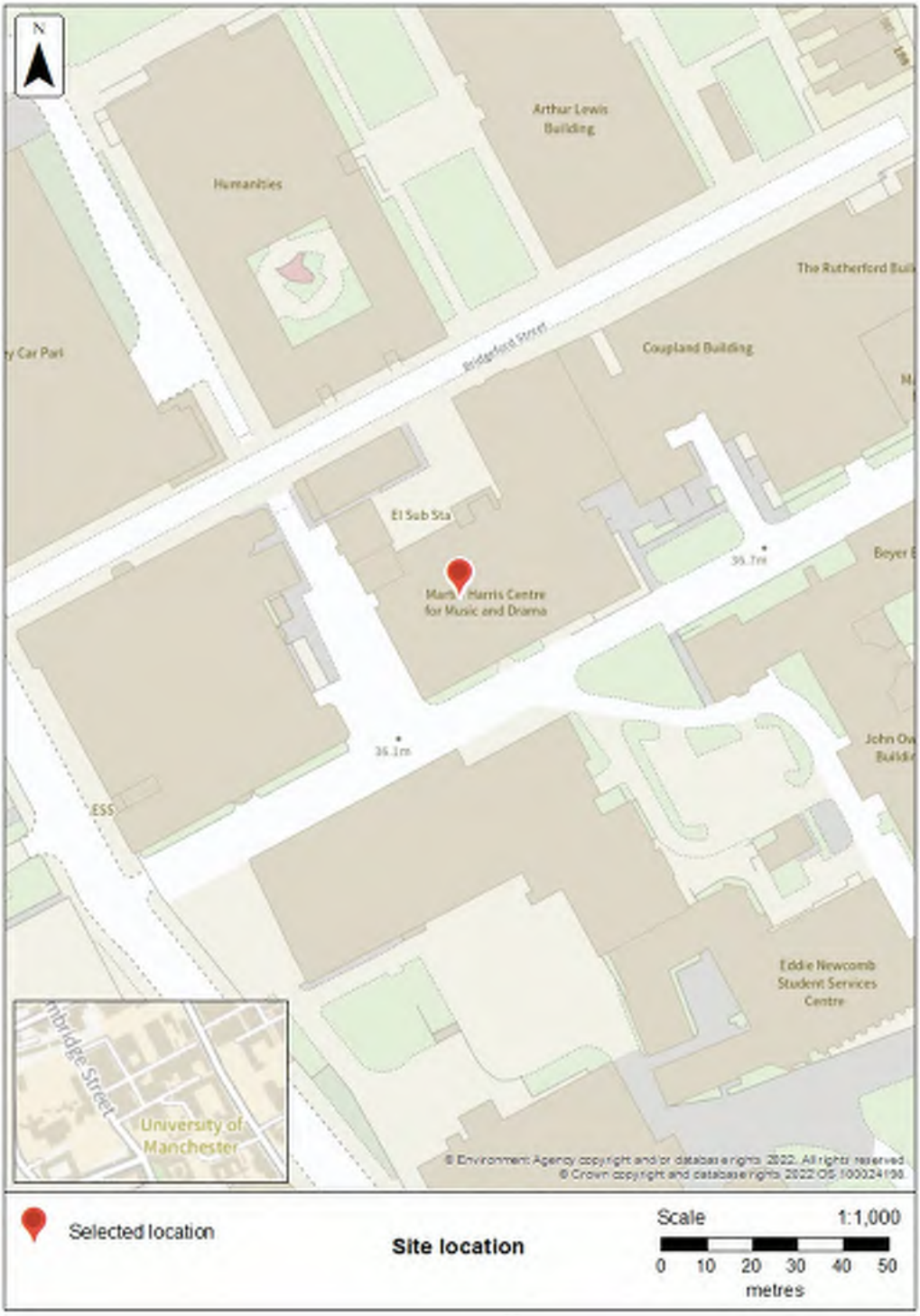
Symbology for proposed assets is the same as above, but shown in green
Symbology for abandoned assets is the same as above, but shown in black

Appendix E – Surface Water Flood Flows

Flood risk assessment data

Location of site: 384432 / 396578 (shown as easting and northing coordinates)
Document created on: 14 June 2022
This information was previously known as a product 4.
Customer reference number: GMMC262199SPW

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 floodng 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

Model name: Manchester Ship Canal 2018
Scenario(s): No defences exist fluvial, no defences exist climate change fluvial
Date: 1 May 2020

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

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring 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 2.

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

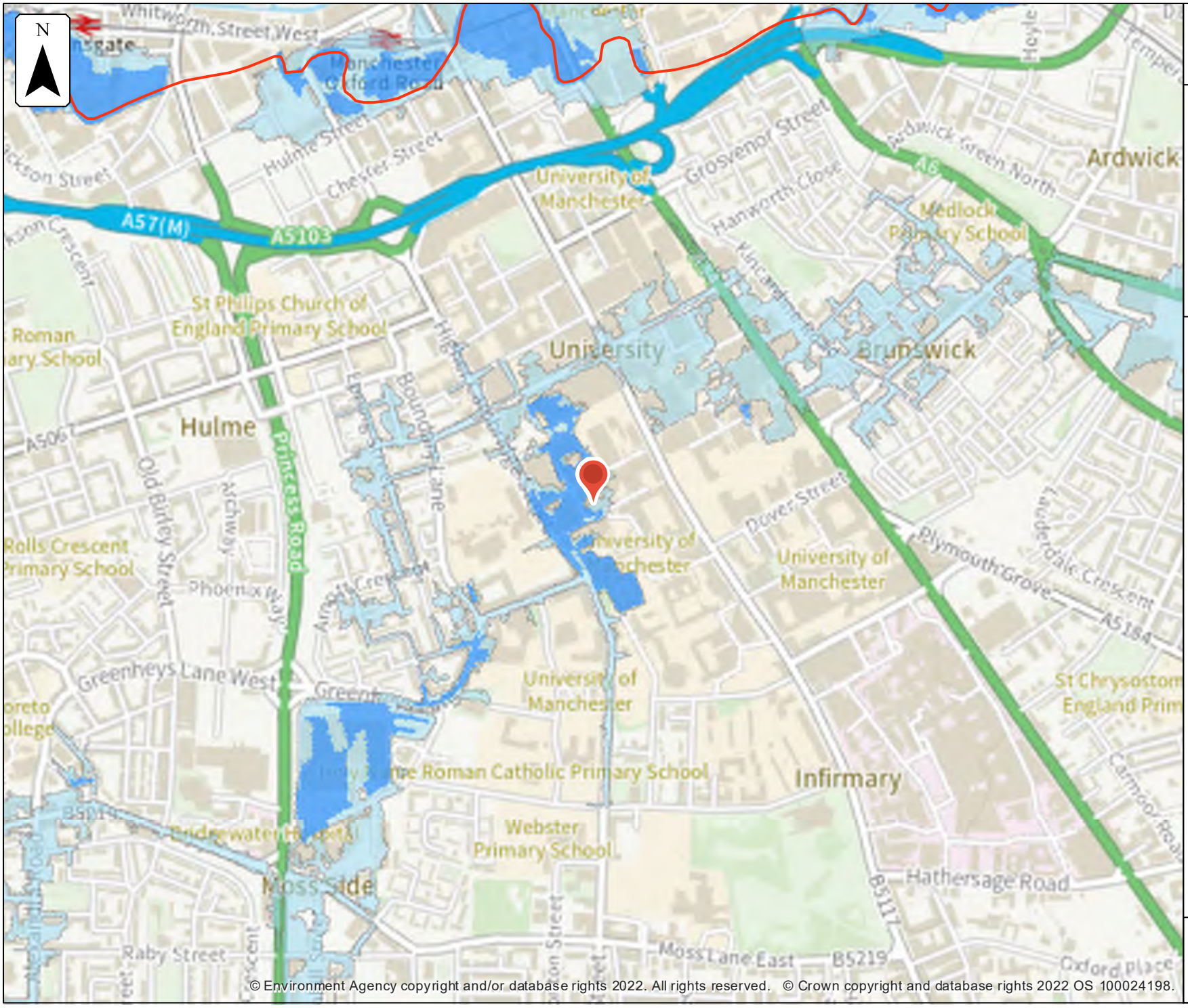
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- 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.



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Environment Agency

Flood map for planning

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Selected location

Main river

Flood zone 3

Flood zone 2

0 100 200 300 400 500
metres

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

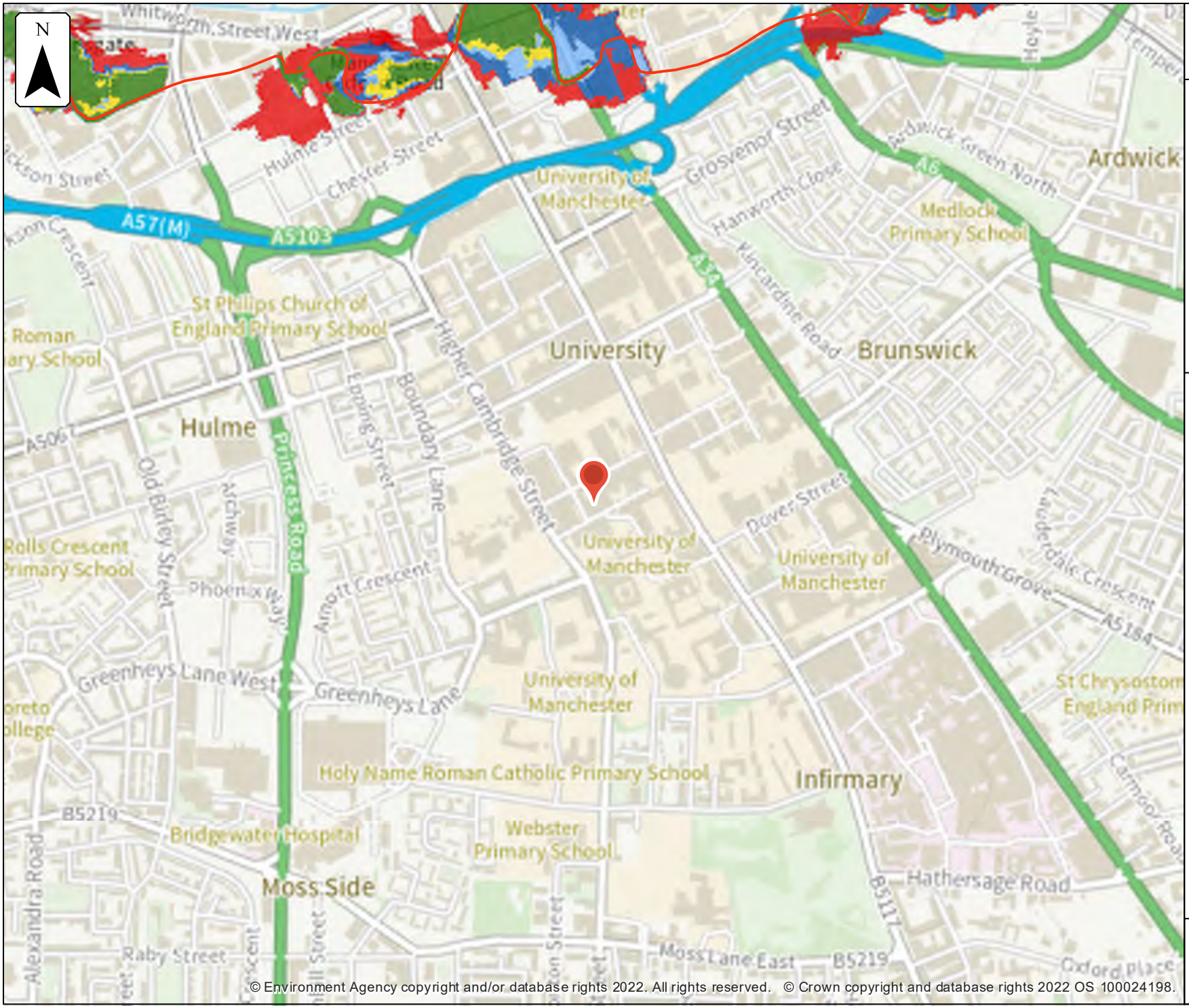
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

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



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Environment Agency

No defences exist modelled fluvial extent

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Manchester Ship Canal 2018

Selected location

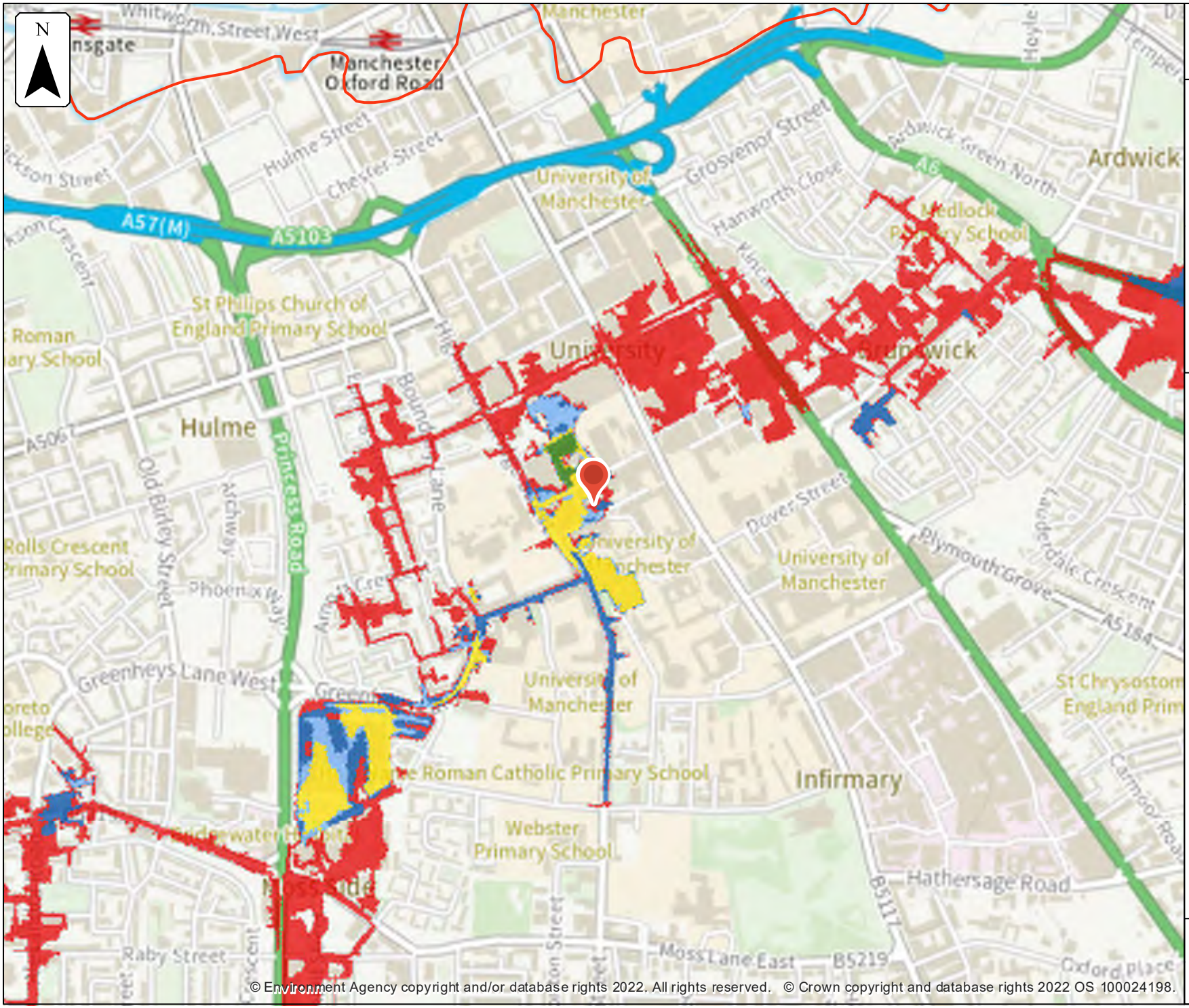
Main river

Modelled flood extent

- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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

0 100 200 300 400 500
metres



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Environment Agency

No defences exist modelled fluvial extent

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Corn Brook 2017

Selected location

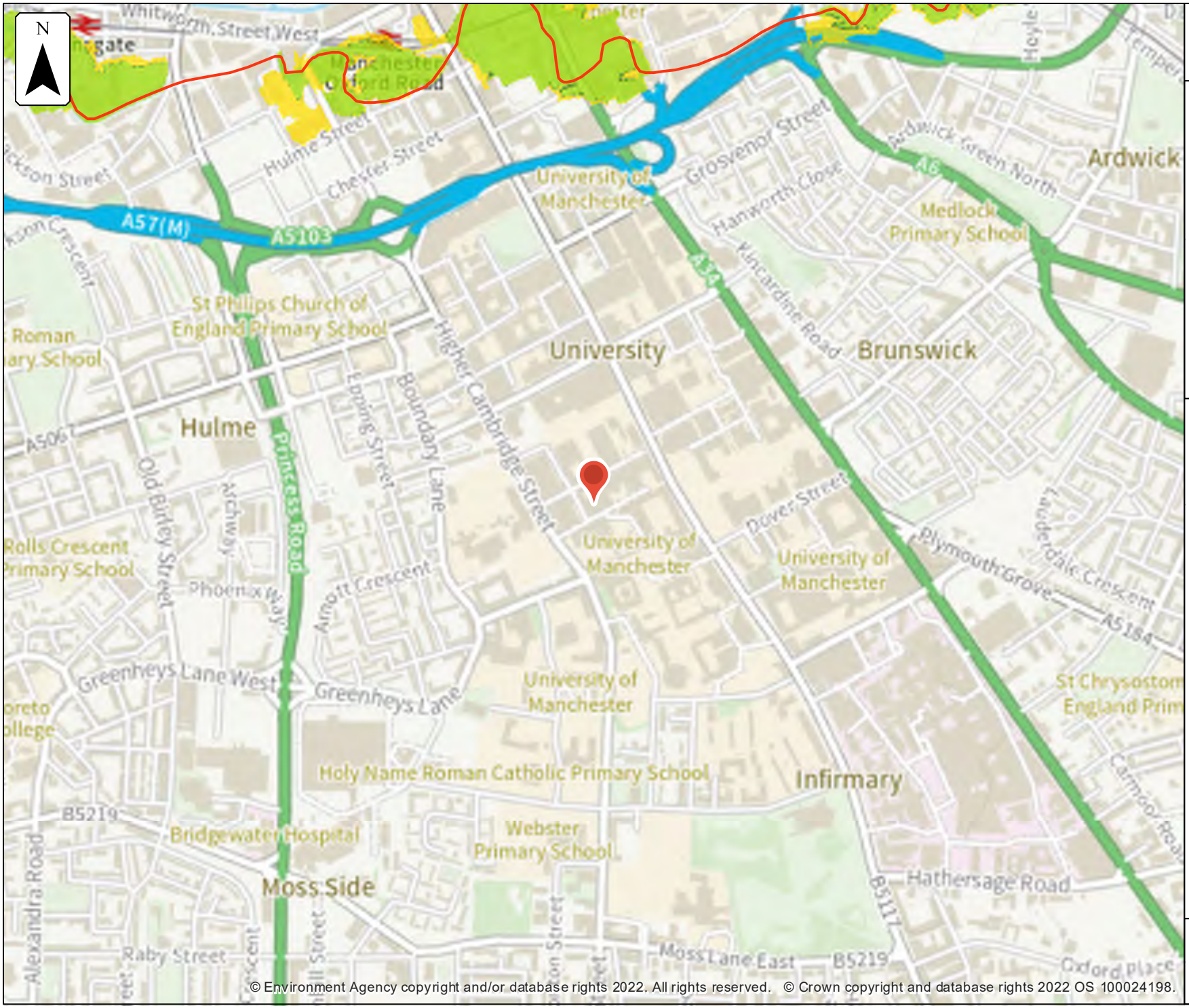
Main river

Modelled flood extent

- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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

0 100 200 300 400 500
metres



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Environment Agency

No defences exist climate change modelled fluvial extent

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Manchester Ship Canal 2018

Selected location

Main river

Modelled flood extent

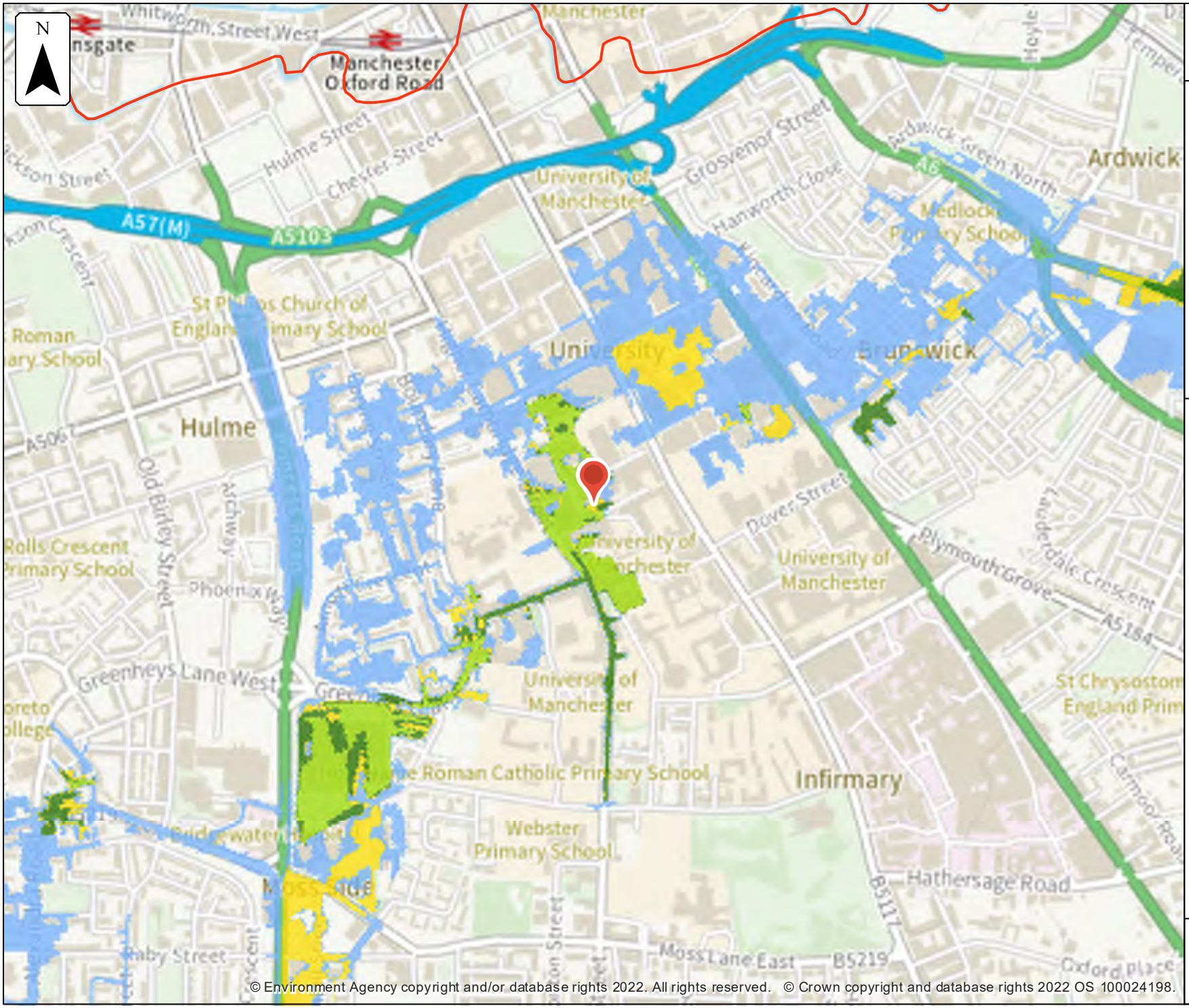
1.0% AEP (+30%)

1.0% AEP (+35%)

1.0% AEP (+70%)

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

0 100 200 300 400 500
metres



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Environment Agency

No defences exist climate change modelled fluvial extent

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Corn Brook 2017

Selected location

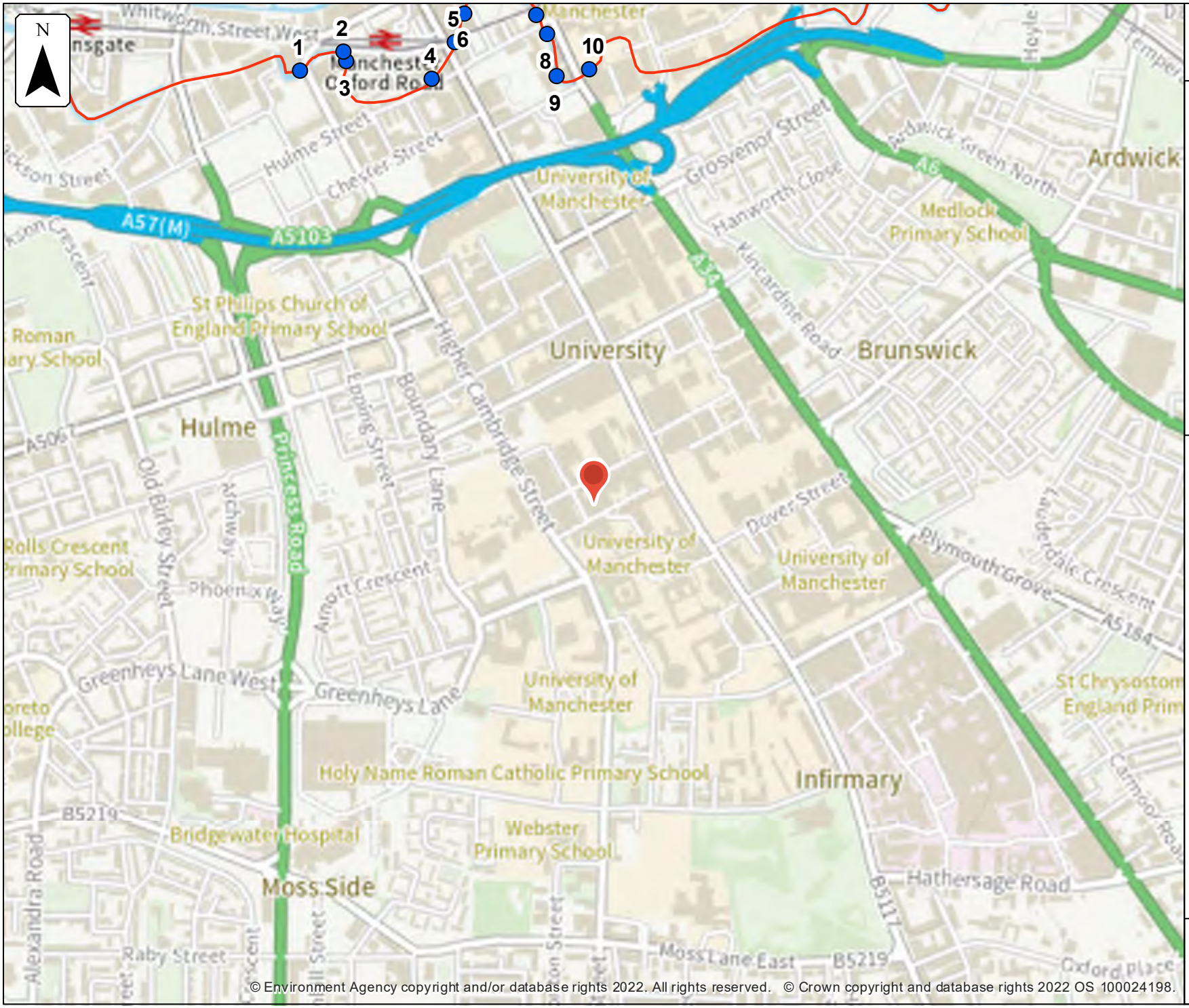
Main river

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



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Environment Agency

No defences exist modelled fluvial node locations

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Manchester Ship Canal 2018

Selected location

Modelled location

Main river

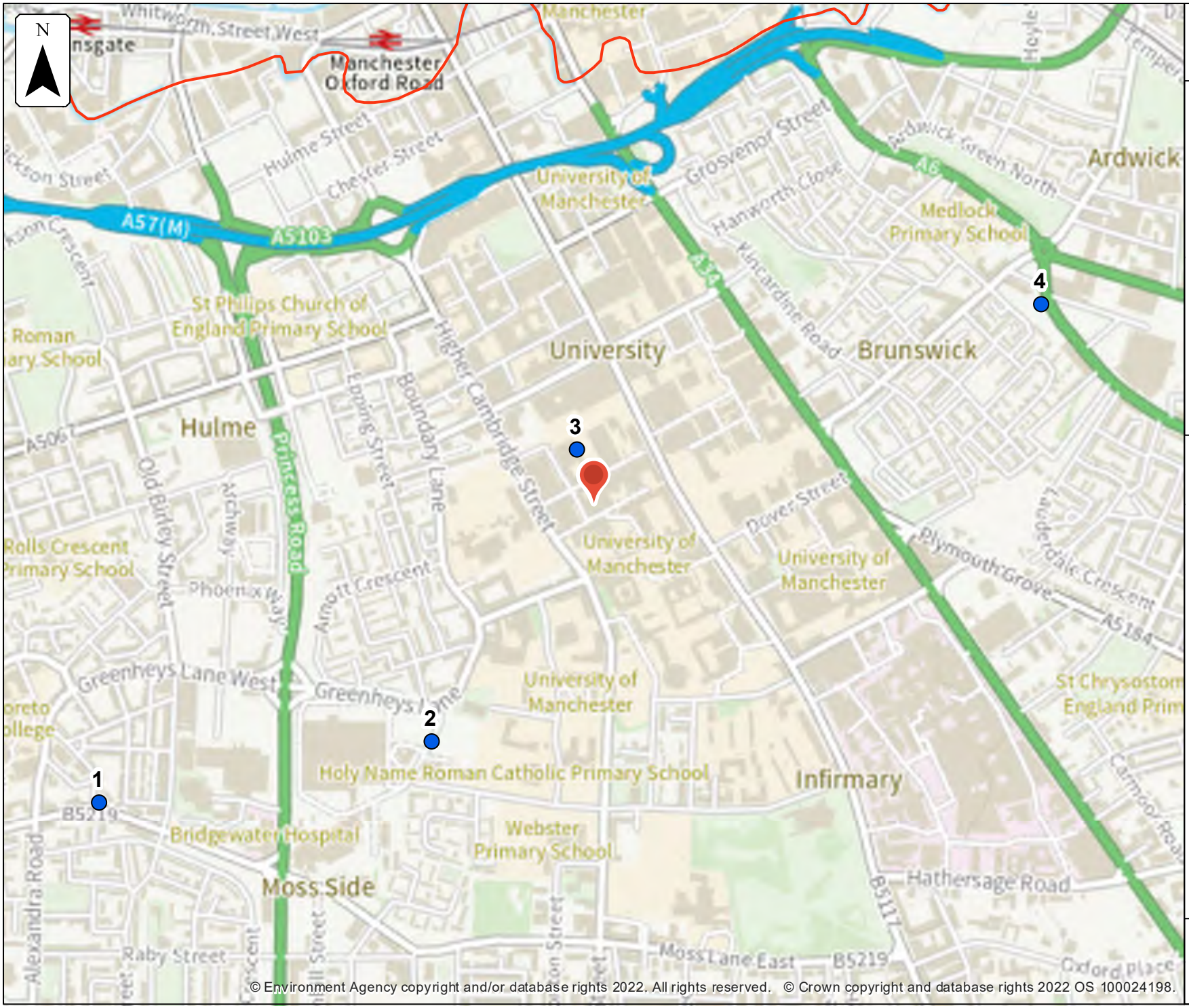
0 100 200 300 400 500
metres

Modelled node locations data

No defences exist

Label	Modelled location ID	Easting	Northing	4% 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	1177997	383859	397419	29.29	43.95	29.51	51.09	29.66	56.10	29.79	60.34	30.13	72.18	31.28	122.22
2	1177712	383944	397457	29.51	43.63	29.75	50.71	29.91	55.68	30.05	59.89	30.41	71.64	31.52	121.53
3	1177701	383951	397438	29.53	43.49	29.78	50.55	29.94	55.50	30.08	59.70	30.44	71.42	31.58	121.21
4	1178043	384117	397404	30.20	43.49	30.70	50.55	31.06	55.50	31.37	59.70	31.72	71.42	32.28	121.21
5	1177738	384161	397476	30.70	43.21	31.38	50.23	31.89	55.16	32.33	59.33	33.10	70.97	33.72	120.61
6	1177780	384179	397531	30.73	42.89	31.41	49.85	31.92	54.74	32.36	58.88	33.13	70.45	33.79	119.90
7	1177737	384320	397528	30.80	41.75	31.47	48.52	31.98	53.30	32.41	57.32	33.18	68.59	33.90	117.17
8	1177756	384343	397490	30.89	41.75	31.59	48.52	32.02	53.30	32.43	57.32	33.19	68.59	33.90	117.17
9	1177553	384361	397409	30.93	41.23	31.62	47.91	32.05	52.63	32.46	56.60	33.21	67.74	33.97	115.75
10	1177896	384423	397424	31.07	40.92	31.81	47.56	32.27	52.24	32.67	56.19	33.27	67.25	34.06	113.28

Data in this table comes from the Inland Modelling 2015-16: Manchester Ship Canal 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.



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Environment Agency

No defences exist modelled fluvial node locations

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Corn Brook 2017

Selected location

Modelled location

Main river

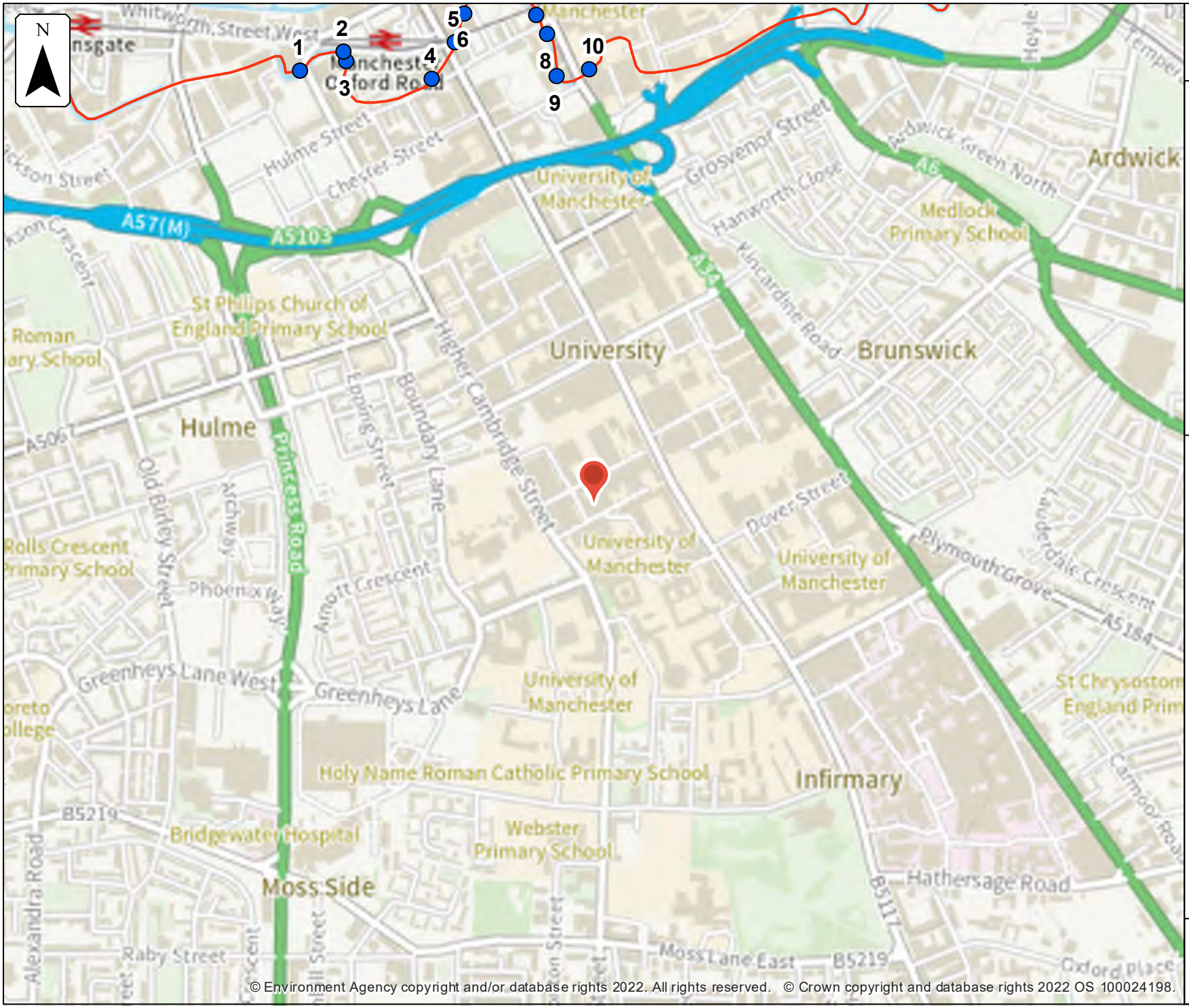
0 100 200 300 400 500
metres

Modelled node locations data

No defences exist

Label	Modelled location ID	Easting	Northing	4% 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	952452	383467	395993	31.01	0.58	31.93	1.03	32.43	1.32	32.58	1.57	32.84	2.24	33.28	4.60
2	952465	384116	396112	32.51	0.47	32.77	0.81	33.26	1.03	33.47	1.21	33.83	1.70	34.34	3.47
3	952467	384400	396681	35.77	0.67	36.89	1.20	37.13	1.56	37.27	1.84	37.41	2.65	37.66	5.49
4	952453	385305	396966	38.83	1.09	39.03	1.78	39.65	2.26	40.33	2.66	40.80	3.78	41.42	7.77

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.



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Environment Agency

No defences exist climate change modelled fluvial node locations

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Manchester Ship Canal 2018

Selected location

Modelled location

Main river

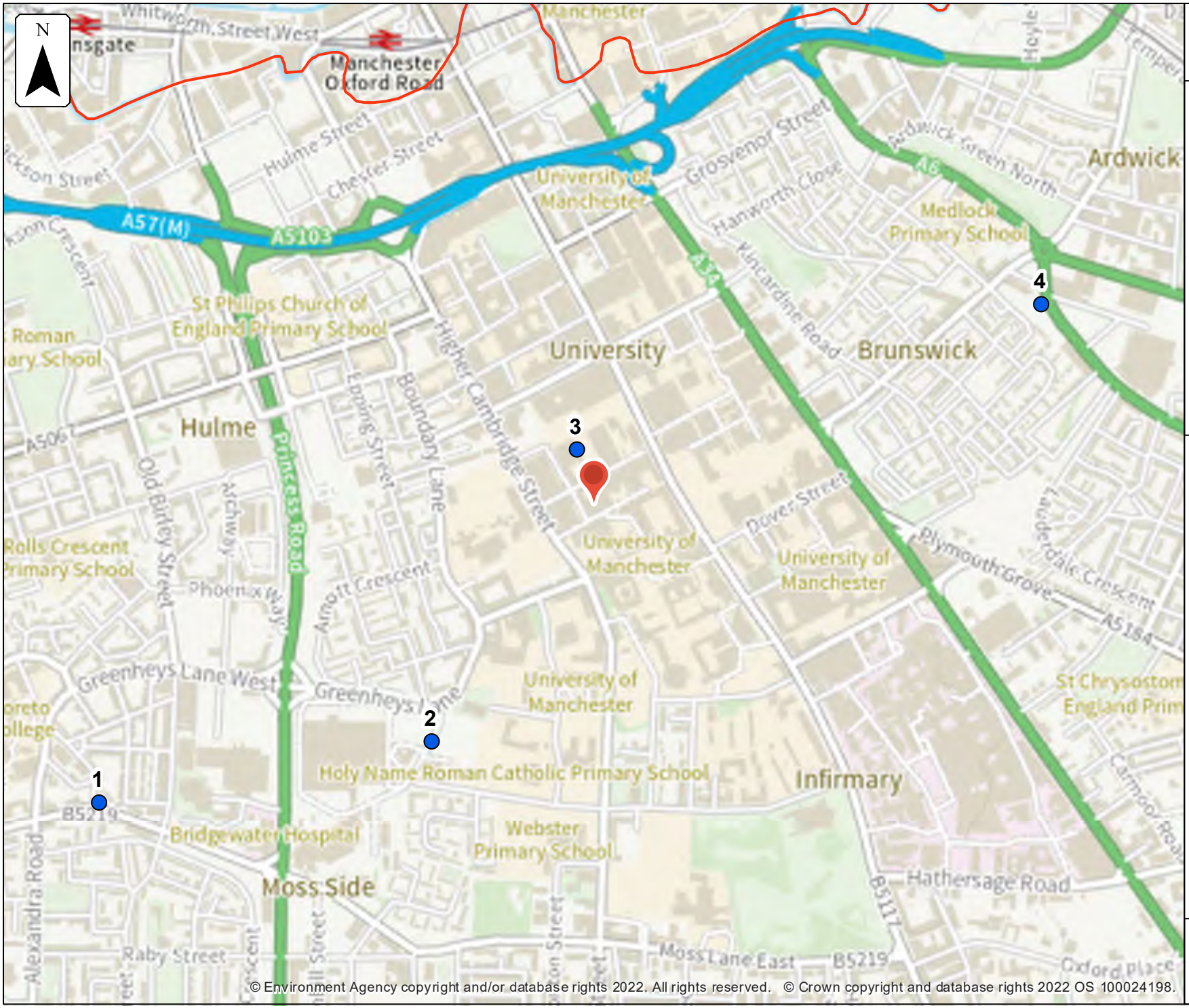
0 100 200 300 400 500
metres

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%)	
				Level	Flow	Level	Flow	Level	Flow
1	1177997	383859	397419	30.26	76.89	30.34	79.61	30.87	100.61
2	1177712	383944	397457	30.55	76.30	30.62	79.01	31.20	99.56
3	1177701	383951	397438	30.58	76.05	30.66	78.75	31.24	99.10
4	1178043	384117	397404	31.80	76.05	31.84	78.75	32.10	99.10
5	1177738	384161	397476	33.27	75.57	33.32	78.25	33.56	98.26
6	1177780	384179	397531	33.30	74.99	33.35	77.65	33.60	97.23
7	1177737	384320	397528	33.35	72.97	33.40	75.56	33.66	93.15
8	1177756	384343	397490	33.35	72.97	33.41	75.56	33.66	93.15
9	1177553	384361	397409	33.38	72.04	33.44	74.59	33.70	91.53
10	1177896	384423	397424	33.43	71.50	33.49	74.03	33.77	95.36

Data in this table comes from the Inland Modelling 2015-16: Manchester Ship Canal 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.



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Environment Agency

No defences exist climate change modelled fluvial node locations

Location (easting/northing)
384432/396578

Scale
1:10,000

Created
17 May 2022

Model name
Corn Brook 2017

Selected location

Modelled location

Main river

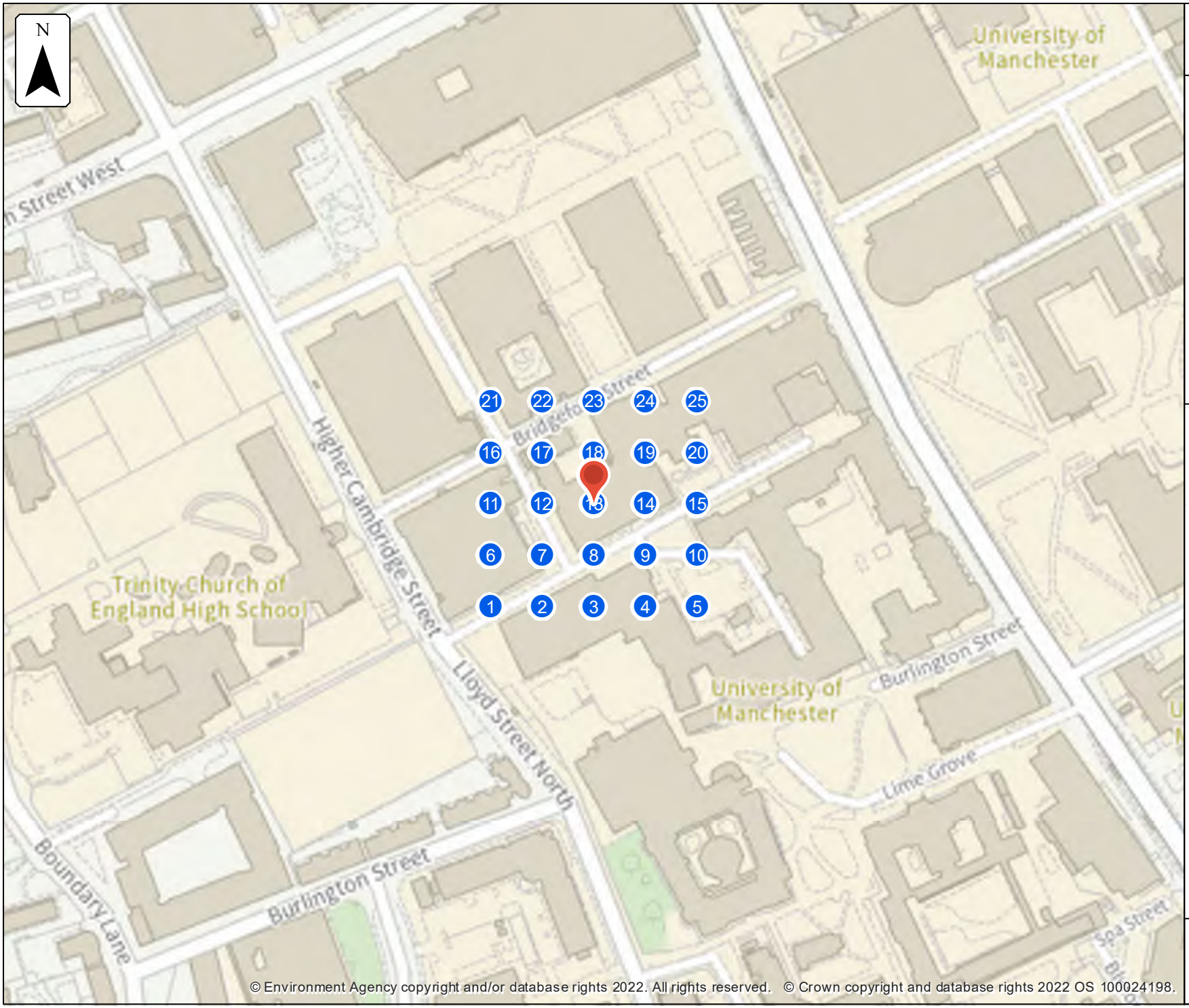
0 100 200 300 400 500
metres

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	952452	383467	395993	32.78	2.03	32.81	2.11	32.99	2.66	33.39	5.98
2	952465	384116	396112	33.75	1.57	33.79	1.63	34.02	2.05	34.46	4.51
3	952467	384400	396681	37.38	2.40	37.39	2.49	37.47	3.13	37.77	7.13
4	952453	385305	396966	40.73	3.46	40.76	3.59	40.94	4.52	41.65	10.10

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.



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Environment Agency

No defences exist modelled fluvial extent and height

Location (easting/northing)
384432/396578

Scale
1:2,500

Created
17 May 2022

Model name
Manchester Ship Canal 2018

Selected location

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 4.0
- 4.0 - 7.125
- 7.125 - 10.25
- 10.25 - 13.375
- 13.375 - 16.5
- 16.5 - 19.625
- 19.625 - 22.75
- 22.75 - 25.875
- 25.875 - 29.0

This map shows the 0.1% AEP height data

0 25 50 75 100
metres

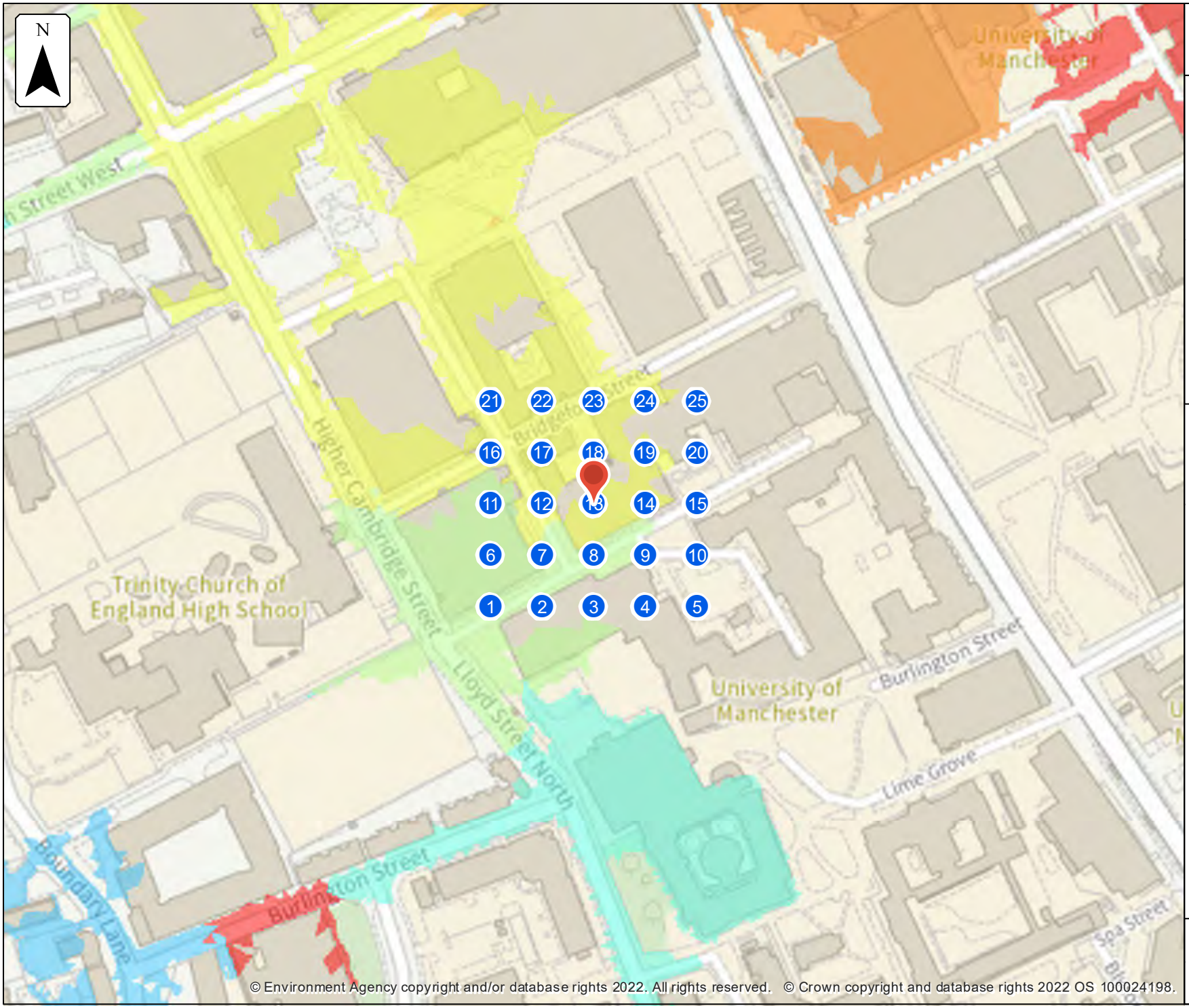
Sample point data

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	384382	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	384407	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	384432	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	384457	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	384482	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	384382	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	384407	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	384432	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	384457	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	384482	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	384382	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	384407	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	384432	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	384457	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	384482	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	384382	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

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	384407	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	384432	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	384457	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	384482	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	384382	396628			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	384407	396628			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	384432	396628			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	384457	396628			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	384482	396628			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Inland Modelling 2015-16: Manchester Ship Canal 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.



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Environment Agency

No defences exist modelled fluvial extent and height

Location (easting/northing)
384432/396578

Scale
1:2,500

Created
17 May 2022

Model name
Corn Brook 2017

Selected location

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 34.0
- 34.0 - 34.625
- 34.625 - 35.25
- 35.25 - 35.875
- 35.875 - 36.5
- 36.5 - 37.125
- 37.125 - 37.75
- 37.75 - 38.375
- 38.375 - 39.0

This map shows the 0.1% AEP height data

0 25 50 75 100
metres

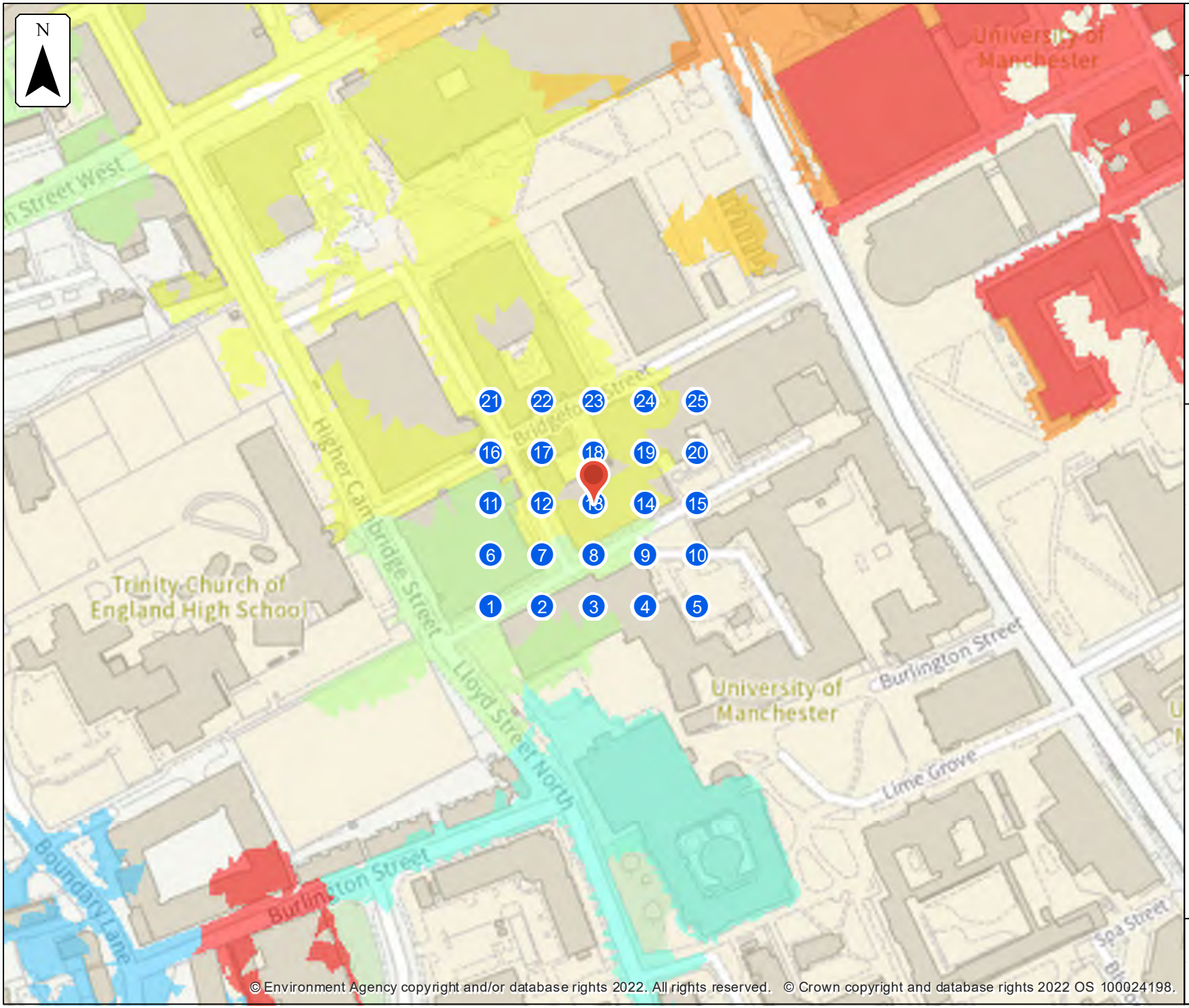
Sample point data

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	384382	396528			NoData	NoData	0.54	36.20	0.57	36.23	0.60	36.26	0.63	36.30
2	384407	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	384432	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	384457	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	384482	396528			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	384382	396553			NoData	NoData	2.41	36.28	2.45	36.32	2.48	36.35	2.53	36.40
7	384407	396553			NoData	NoData	0.14	36.29	0.18	36.33	NoData	NoData	0.26	36.41
8	384432	396553			NoData	NoData	NoData	NoData	0.15	36.38	0.19	36.40	0.15	36.43
9	384457	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	384482	396553			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	384382	396578			NoData	NoData	0.38	36.28	0.42	36.32	0.46	36.36	0.50	36.40
12	384407	396578			NoData	NoData	0.17	36.46	0.20	36.49	0.23	36.51	0.26	36.55
13	384432	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.17	36.62
14	384457	396578			NoData	NoData	NoData	NoData	NoData	NoData	0.14	36.55	0.21	36.62
15	384482	396578			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	384382	396603			NoData	NoData	0.18	36.54	0.21	36.57	0.23	36.60	0.28	36.64

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	384407	396603			NoData	NoData	0.20	36.61	0.23	36.65	0.27	36.68	0.31	36.73
18	384432	396603			NoData	NoData	NoData	NoData	NoData	NoData	0.12	36.70	0.17	36.75
19	384457	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.15	36.65
20	384482	396603			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	384382	396628			0.17	36.66	0.26	36.74	0.29	36.78	0.33	36.81	0.37	36.86
22	384407	396628			NoData	NoData	0.16	36.70	0.22	36.75	0.27	36.80	0.32	36.87
23	384432	396628			NoData	NoData	0.28	36.64	0.32	36.68	0.36	36.71	0.41	36.77
24	384457	396628			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.12	36.66
25	384482	396628			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.



Environment Agency

No defences exist climate change modelled fluvial extent and height

Location (easting/northing)
384432/396578

Scale
1:2,500

Created
17 May 2022

Model name
Corn Brook 2017

Selected location

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 34.0
- 34.0 - 34.625
- 34.625 - 35.25
- 35.25 - 35.875
- 35.875 - 36.5
- 36.5 - 37.125
- 37.125 - 37.75
- 37.75 - 38.375
- 38.375 - 39.0

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

0 25 50 75 100
metres

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	384382	396528	0.59	36.25	0.59	36.26	0.61	36.27	0.59	36.30
2	384407	396528	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	384432	396528	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	384457	396528	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	384482	396528	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	384382	396553	2.47	36.35	2.47	36.35	2.09	36.37	2.54	36.42
7	384407	396553	NoData	NoData	NoData	NoData	0.11	36.42	0.15	36.46
8	384432	396553	0.18	36.40	0.19	36.40	0.20	36.41	0.20	36.45
9	384457	396553	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	384482	396553	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	384382	396578	0.45	36.35	0.45	36.35	0.47	36.37	0.52	36.42
12	384407	396578	0.22	36.51	0.22	36.51	0.24	36.52	0.28	36.56
13	384432	396578	NoData	NoData	NoData	NoData	0.11	36.57	0.19	36.64
14	384457	396578	0.13	36.54	0.14	36.54	0.16	36.57	0.24	36.64
15	384482	396578	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	384382	396603	0.23	36.59	0.23	36.60	0.24	36.61	0.29	36.65

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	384407	396603	0.26	36.67	0.26	36.68	0.28	36.70	0.32	36.75
18	384432	396603	0.11	36.70	0.12	36.70	0.13	36.72	0.19	36.77
19	384457	396603	NoData	NoData	NoData	NoData	NoData	NoData	0.17	36.66
20	384482	396603	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	384382	396628	0.32	36.80	0.32	36.81	0.34	36.83	0.39	36.88
22	384407	396628	0.26	36.79	0.26	36.79	0.29	36.82	0.36	36.89
23	384432	396628	0.35	36.71	0.35	36.71	0.37	36.73	0.43	36.79
24	384457	396628	NoData	NoData	NoData	NoData	NoData	NoData	0.13	36.68
25	384482	396628	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