

Cambridge Halls

Drainage Planning Condition Discharge Report

Curtins Ref: CAM-CUR-XX-XX-RP-C-925002

Revision: P02

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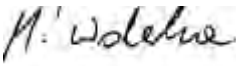
Client Name: Graham Construction

Control Sheet

Rev	Description	Checked	Issued	Date
P01	First Issue	MW	ATL	25/02/26
P02	SuDS Response Updated	MW	ATL	3003/26

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1.0 Planning Condition Discharge

1.1 Introduction

Curtins has been appointed by Graham Construction to provide a report to facilitate the discharge of Planning Conditions for the proposed development located at Cambridge Halls, Manchester, M15 6TT. Planning Approval Ref **142888/FO/2025**.

The Planning Conditions to be discharged is Condition 30 & 62, which relate to the proposed surface water drainage design for the scheme.

1.2 Condition 30

The wording of Condition 30 is as follows:

Notwithstanding the details shown within the approved drawings and documents, prior to the commencement of development within Phase 1, not including demolition, details of surface water drainage works in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015), or any subsequent replacement national standards, shall be submitted to and approved in writing by the City Council as local planning authority. The details shall include the following information:

- a) Progression through the drainage hierarchy must be evidence based and supported by site investigation including assessments of ground conditions and infiltration testing in accordance with BRE365. Proposals of attenuation should achieve half drain time within 24 hours;*
- b) Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice;*
- c) Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable;*
- d) Details of surface water attenuation to align with the Manchester, Trafford and Salford Strategic Flood Risk Assessment. For brownfield sites a minimum of 50% betterment is required for reduction in runoff rate compared to the existing rates with the aim of reducing to the Greenfield runoff rates;*
- e) A finalised drainage layout showing all components, outfalls, levels and connectivity;*
- f) An existing and proposed impermeable areas drawing to accompany all discharge rate calculations;*
- g) Hydraulic calculations of the proposed drainage system, including all design parameters. Calculations must Include Critical Storm Events for the 1 in 2, 1 in 30 and 1 in 100 + 45% Climate Change. Results must demonstrate no surcharge for the 1 in 2, no flooding in the 1 in 30 and no flooding of buildings for the 1 in 100 + 45% Climate Change;*

- h) Where a sewer diversion is proposed, agreement in principle from United Utilities is required. An email of acceptance will suffice;*
- i) Where a sewer build-over is proposed, agreement in principle from United Utilities is required. An email of acceptance will suffice;*
- j) A plan indicating surface water overland flow routes for extreme events to ensure flows are diverted away from existing and proposed buildings (including basements);*
- k) Construction details of flow control and SuDS elements; and*
- l) A plan indicating easements. SuDS features (including attenuation tanks) should be appropriately positioned, including a 2.5m easement from the existing highway and a 5m easement from any dwellings, guaranteeing accessibility for future maintenance and contingency for asset failure. This practice is in accordance with SuDS Manual (C753).*

The approved details shall be implemented in full before first occupation of the Phase 1 development.

Reason - *To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution, pursuant to national policies within the NPPF and local policies EN08 and EN14 of the Core Strategy.*

1.3 Condition 62

The wording of Condition 62 is as follows:

Notwithstanding the details shown within the approved drawings and documents, prior to the commencement of development within Phase 2, not including demolition, details of surface water drainage works in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015), or any subsequent replacement national standards, shall be submitted to and approved in writing by the City Council as local planning authority. The details shall include the following information:

- a) Progression through the drainage hierarchy must be evidence based and supported by site investigation including assessments of ground conditions and infiltration testing in accordance with BRE365. Proposals of attenuation should achieve half drain time within 24 hours;*
- b) Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice;*
- c) Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable;*
- d) Details of surface water attenuation to align with the Manchester, Trafford and Salford Strategic Flood Risk Assessment. For brownfield sites a minimum of 50% betterment is required for reduction in runoff rate compared to the existing rates with the aim of reducing to the Greenfield runoff rates;*
- e) A finalised drainage layout showing all components, outfalls, levels and connectivity;*

- f) An existing and proposed impermeable areas drawing to accompany all discharge rate calculations;*
- g) Hydraulic calculations of the proposed drainage system, including all design parameters. Calculations must include Critical Storm Events for the 1 in 2, 1 in 30 and 1 in 100 + 45% Climate Change. Results must demonstrate no surcharge for the 1 in 2, no flooding in the 1 in 30 and no flooding of buildings for the 1 in 100 + 45% Climate Change;*
- h) Where a sewer diversion is proposed, agreement in principle from United Utilities is required. An email of acceptance will suffice;*
- i) Where a sewer build-over is proposed, agreement in principle from United Utilities is required. An email of acceptance will suffice;*
- j) A plan indicating surface water overland flow routes for extreme events to ensure flows are diverted away from existing and proposed buildings (including basements);*
- k) Construction details of flow control and SuDS elements; and*
- l) A plan indicating easements. SuDS features (including attenuation tanks) should be appropriately positioned, including a 2.5m easement from the existing highway and a 5m easement from any dwellings, guaranteeing accessibility for future maintenance and contingency for asset failure. This practice is in accordance with SuDS Manual (C753).*

The approved details shall be implemented in full before first occupation of the Phase 2 development.

Reason - *To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution, pursuant to national policies within the NPPF and local policies EN08 and EN14 of the Core Strategy.*

2.0 Responses to Conditions 30 & 62

This individual requirements within the Planning Condition are separated below, and responses to the points provided. It should be noted that the requirements noted a-l are the same for both Condition 30 and 62. Therefore the responses below are provided for both Conditions. The response for section m pertains to Condition 62 only.

a) Progression through the drainage hierarchy must be evidence based and supported by site investigation including assessments of ground conditions and infiltration testing in accordance with BRE365. Proposals of attenuation should achieve half drain time within 24 hours;

As part of the updated Flood Risk Assessment and Drainage Strategy (Ref CAM-CUR-XX-XX-RP-C-92000, dated Dec 2025), an assessment of the Drainage Hierarchy was carried out.

The assessment concluded that the only feasible connection is to the existing 1950mm dia combined sewer within the site.

A copy of the FRA & Risk Assessment is enclosed in Appendix A.

b) Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice;

United Utilities have been consulted, and an acceptance of a flow of 14 l/s to the existing 1950mm dia combined sewer within the site has been received

A copy of the UU correspondence is enclosed in Appendix B.

c) Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable;

Rain Gardens and permeable paving have been utilised within the site where practicable. This is shown on drawings CAM-CUR-1Z-00-DR-C-925001 & CAM-CUR-2Z-XX-DR-C-925002, which are enclosed in Appendix C.

d) Details of surface water attenuation to align with the Manchester, Trafford and Salford Strategic Flood Risk Assessment. For brownfield sites a minimum of 50% betterment is required for reduction in runoff rate compared to the existing rates with the aim of reducing to the Greenfield runoff rates;

The original Drainage Strategy provided by Arup calculated the existing flow rate for the site to be 198 l/s for the 100-year storm event, based on the Modified Rational Method. The proposals of a 50% reduction to this figure was agreed in principle with the LLFA in October 2024. This provided a proposed discharge rate of 98.7 l/s. The original intent was to discharge to the combined sewer in Higher Chatham St, re-using the existing connection.

As part of the works undertaken by Curtins, a Pre-development enquiry was sent to United Utilities. The response confirmed that the maximum discharge rate to the public sewer does not exceed 14 l/s.

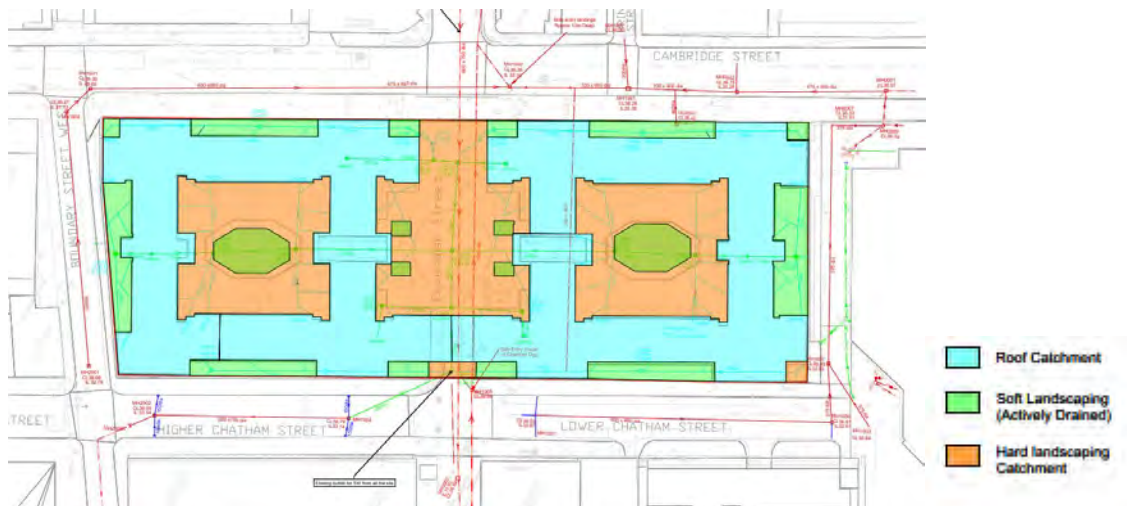
A copy of the FRA is enclosed in Appendix A, and the UU correspondence is enclosed in Appendix B.

e) A finalised drainage layout showing all components, outfalls, levels and connectivity;

Refer to drawings CAM-CUR-1Z-00-DR-C-925001 & CAM-CUR-2Z-XX-DR-C-925002, which are enclosed in Appendix C

f) An existing and proposed impermeable areas drawing to accompany all discharge rate calculations;

The screenshot below is taken from the FRA provided by Arup, which shows the existing impermeable areas



As shown, the full site area is 0.85 Ha considered as impermeable as the soft landscaping is actively drained.

The proposed site also includes the full site as impermeable, as within the proposals all soft landscaping areas are actively drained.

g) Hydraulic calculations of the proposed drainage system, including all design parameters. Calculations must Include Critical Storm Events for the 1 in 2, 1 in 30 and 1 in 100 + 45% Climate Change. Results must demonstrate no surcharge for the 1 in 2, no flooding in the 1 in 30 and no flooding of buildings for the 1 in 100 + 45% Climate Change;

A copy of the Hydraulic Calculations are enclosed in *Appendix D*.

It should be noted that there is some surcharging of the oversized pipework in the 2-year storm event. This is unavoidable due to the layout of the site, which means that the main attenuation is set at a relatively long distance from the flow control.

h) Where a sewer diversion is proposed, agreement in principle from United Utilities is required. An email of acceptance will suffice;

Drawing CAM-CUR-2Z-00-DR-C-925003, enclosed in *Appendix C*, highlights a section of 300 x 400mm sewer running through the site. This sewer is currently located under the occupied building, and no access is available to confirm whether it can be abandoned or requires a diversion.

Once the contractor is on site, works will be carried out to gain access to the sewer for survey works. At this point, either a diversion will be designed, or an application to abandon the sewer submitted to UU for agreement.

The UU sewer records indicate that this sections of sewer is the head of the system, and it is not anticipated that there will be any connections to this sewer form outside of the site, and therefore it will be abandoned.

i) Where a sewer build-over is proposed, agreement in principle from United Utilities is required. An email of acceptance will suffice;

There is no requirement for a sewer build-over for the site. The sewer easement is shown on drawing CAM-CUR-2Z-XX-DR-C-925003, which is enclosed in Appendix C.

j) A plan indicating surface water overland flow routes for extreme events to ensure flows are diverted away from existing and proposed buildings (including basements);

A copy of drawing CUR-XX-XX-DR-C-925004, showing the overland flow routes, is enclosed in Appendix E.

k) Construction details of flow control and SuDS elements;

Details of the flow control and SuDs elements are shown on drawings CAM-CUR-XX-XX-DR-C-925022 & CAM-CUR-XX-XX-DR-C-925023, which are enclosed in Appendix F.

l) A plan indicating easements. SuDS features (including attenuation tanks) should be appropriately positioned, including a 2.5m easement from the existing highway and a 5m easement from any dwellings, guaranteeing accessibility for future maintenance and contingency for asset failure. This practice is in accordance with SuDS Manual

Raingardens are located within 2.5 m of the site boundary; however, they do not provide attenuation storage, and act as a conveyance/ treatment phase only. The rain gardens will be lined with impermeable membranes, and water collected by perforated pipes. This should prevent any issues arising with infiltration under the public highway.

If MCC highway are required to carry out any works adjacent to the rain gardens, the impermeable liner and raingardens would need to be reinstated. However, this would not affect the attenuation volume within the site and would not increase the flood risk to the site.

The location of the Attenuation Tank is shown on drawing CAM-CUR-1Z-00-DR-C-925001, which is enclosed in Appendix C. Given the layout of the site, it is not possible to provide a 5m easement between the attenuation tank to the structure.

As the attenuation tank if not an infiltration device, there is not an issue with water from the tank undermining the structure. The foundations of the building are piled, so this should not cause an issue with the building loading the tanks, or the tank undermining the building foundations.

Further consultation has been carried out with Manchester CC Planning, and the following requirement was received: *'Where minimum easements cannot be met, evidence is required from the structural engineer that the building foundations are appropriately designed to protect the building and tank. Details of the provision of suitable access for future maintenance are also required'*

Discussions with a CCTV Survey company have confirmed that their equipment has sufficient reach to provide maintenance, survey and cleaning operations to the tank, without vehicular access to the courtyard area. A copy of the e-mail from the CCTV company.

Where the attenuation tank is in close proximity to the structure along gridline AX concrete mass fill is used along the slab edge to lower the founding level of the ground floor slab to below the zone of influence off the attenuation tank. Consequently, any future replacement of the tank will have no influence on the building structure.

A drawing showing sections through the structure and attenuation tank is enclosed in *Appendix F m) A feasibility assessment and engineering details of the Green / Blue Roof.*

A copy of the Blue Roof calculations and plans are enclosed in *Appendix G*

Appendix

Appendix A

Flood Risk Assessment

CAMBRIDGE HALLS, MANCHESTER

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

Curtins Ref: CAM-CUR-XX-XX-RP-C-92000

Revision: P03

Issue Date: 30 March 2026

Client Name: Graham Construction

Client Address: Graham, Unit 4, Digital Park, Pacific Way, Salford Quays, M50 1DR

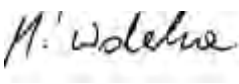
Site Address: Cambridge Halls, 41 Cavendish Street, Manchester, M15 6TT

Rev	Description	Issued by	Checked	Date
P01	First issue	JC	ATL	19 November 2025
P02	Summary Table Added to Drainage Strategy	ATL	MW	1 December 2025
P03	Phase 1 Rainwater Drainage Added	JC	ATL	30 March 2026

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Consulting Limited with respect to the information contained in the report will not extend to any third party.

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Reviewed	Signature	Date
Andy Losty MEng (Hons) Project Engineer		30 March 2026

Authorised	Signature	Date
Marta Wolska MEng (Hons) Senior Civil Engineer		30 March 2026

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Appendix B – United Utilities Sewer Maps

Appendix C – Topographical Survey, Existing Site Drainage and
CCTV survey

Appendix D – Flood Map for Planning

Appendix E – Environment Agency Flood Risk Data

Appendix F – United Utilities Correspondence and Lead Local
Flood Authority Correspondence

Appendix G – Proposed Blue Roof Plan & Proposed Drainage
Strategy

Appendix H – Existing Run-Off rate calculations

Appendix I – Proposed Blue Roof Calculations and Proposed
Drainage Calculations

1. INTRODUCTION

1.1. Project Background

Curtins has been appointed by Graham Construction to provide a Flood Risk Assessment (FRA) and Drainage Strategy for the proposed development located at 41 Cavendish Street, Manchester, M15 6TT (X: 384124, Y: 396987).

A previous Flood Risk Assessment and Drainage was produced for planning by Arup, reference CAM-ARP-ZZ-ZZ-RP-C-000001, to support the Planning Application Reference 142888/FO/2025.

This Drainage Strategy has been developed following the results of Drainage Surveys and response from UU regarding predevelopment enquiry and coordination with design team members, and the implications of this with regards to agreed discharge rates from the site.

The report provides information on the nature of flood risk at the site and follows Government guidance regarding development and flood risk.

The report is based on currently available information and preliminary discussions.

Proposals contained or forming part of this report represent the proposed drainage strategy. Some amendments may be required during the detailed design phase. However, it is anticipated that these will be minor, and the overall drainage strategy will be retained. In the event of adjustments require a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2. Scope of Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).

The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding,
- Consider design proposals to mitigate any potential risk of flooding determined to be present; and
- Consider foul and surface water drainage proposals for the proposed development.

The total site area is approximately 0.82 hectares and following scrutiny of the Environment Agency flood maps it has been identified that the majority of the site lies within Flood Zone 1, with a small area of the site located to the south within Zone 2. The immediate areas surrounding the south half of the site lie within zone 2. As an area of the site is located within zone 2, a Flood Risk Assessment is required to support a planning application. The site is located within Critical Drainage Area

In Dec 2024, the Government made changes to the National Planning Policy Framework, which made Sustainable Urban Drainage Systems (SuDS) a material consideration in the determination of planning applications for all developments.

This Flood Risk Assessment and Drainage Strategy reviews the following information:

- Environment Agency flood maps for rivers and sea flooding.
- UK Government Flood maps for planning.
- Manchester City Council level 1 Strategic Flood Risk Assessment (SFRA), dated March 2010.
- Manchester City Council level 2 Strategic Flood Risk Assessment (SFRA), dated March 2011.
- United Utilities Sewer Records, dated August 2025.
- Topographical Survey completed by CADPLAN, dated July 2024.

1.3. Proposed Development

The proposed development currently comprises the construction of a 2300- bed student accommodation with associated landscaping.

The Proposed Site Layout is enclosed in *Appendix A*.

2. EXISTING SITE DETAILS

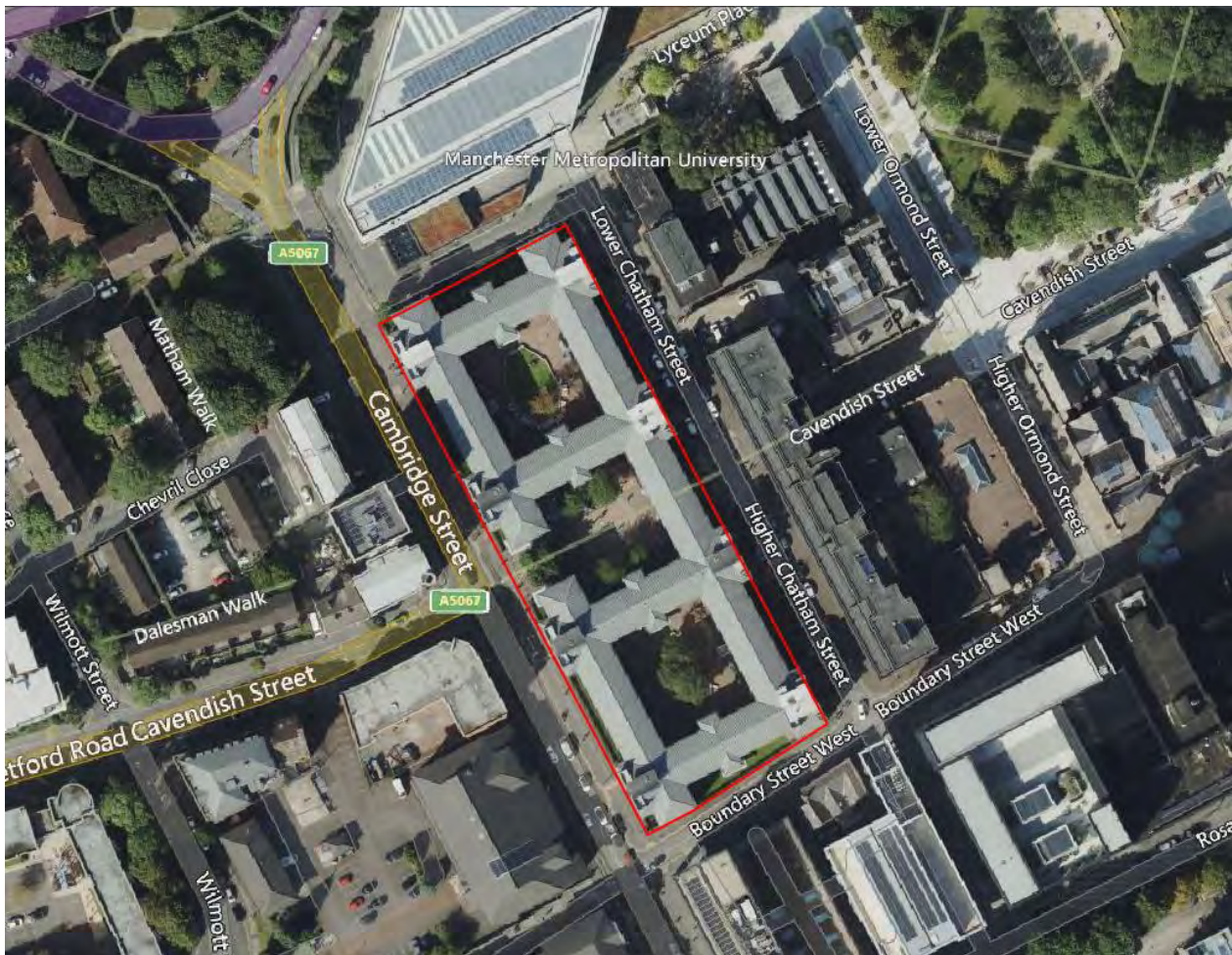
2.1. History and Current Use

The site is located in Manchester City Centre and is bound by a private access road to the north, Lower Chatham Street to the east, Boundary Street West to the south and Higher Cambridge Street to the west. Refer to Figure 1 for location.

The site is 0.82 ha and currently comprises an existing student accommodation, landscaping and small carpark.

The site is currently access via Cavendish Street to the west.

Figure 1 – Site Location Plan



2.2. Existing Watercourses and Other Waterbodies

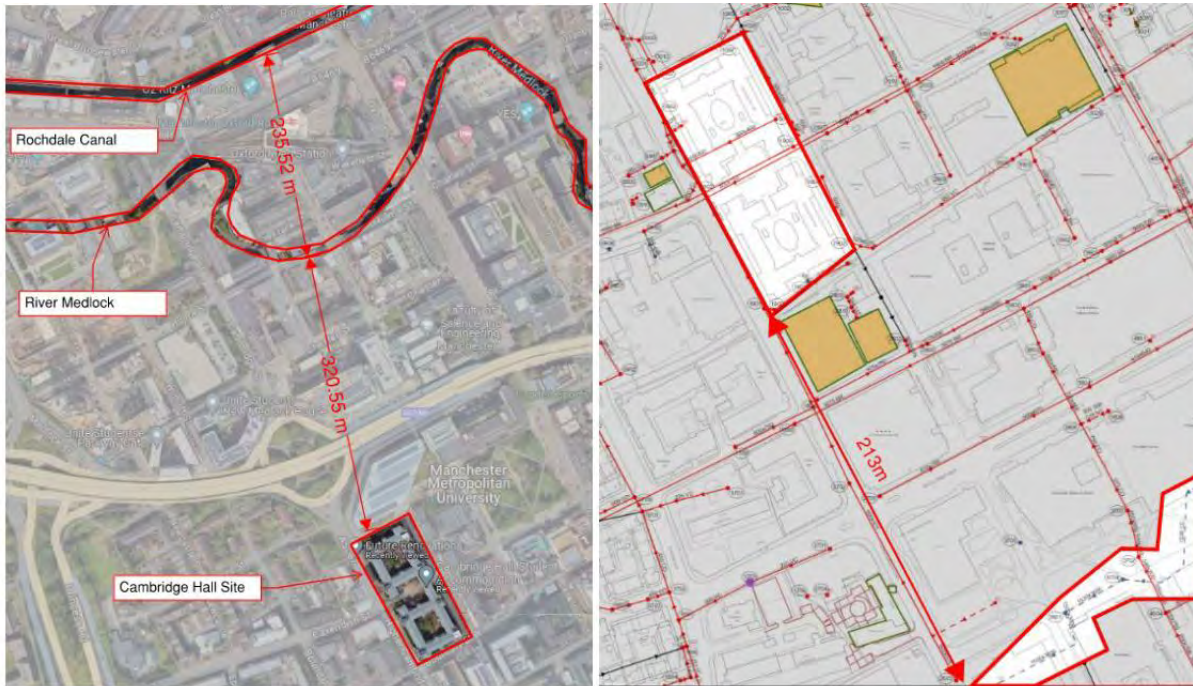
There are no main rivers or watercourses identified within the proposed site.

The following watercourses have been identified as located close to the proposed site. The locations of the watercourses relative to the site are shown in Figure 2.

River Medlock: This river is located approximately 320m north of the site. At this point, the river is culverted under Hulme St. The river forms is a significant feature in the local drainage and flood management system.

Cornbrook: The canal is located approx. 560m to the North of the site. The canal connects to the River Medlock and the Bridgewater canal.

Figure 2: Watercourses within the Locality of the Site; to the North (Left Picture) and to the South (Right Picture).



2.3. Existing Drainage

The United Utilities public sewer records have been obtained for the site and surrounding area and are enclosed in *Appendix B*.

The records indicate that the following public sewers are located within the site:

- There is a 300x400mm public combined sewer that runs from Lower Chatham Street to Cambridge Street below the existing building. This sewer discharges to a public combined sewer within Cambridge Street. The depth of the sewer is not known.
- There is a 1950mm public combined sewer, which is approx. 12m deep, crosses the site running southwest along Cavendish Street.
- There is a 600x750mm public combined sewer, which is approx. 5m deep, crosses the site running northeast along Cavendish Street.
- There is a 450 sewer adjacent to the western boundary of the site, which appears to connect to the public combined sewer within Cambridge Street

The following public sewers are located within the surrounding of the site:

- The 1950mm sewer mentioned above continues southwest along Cavendish Street away from the site.
- There is a 600x750mm public combined sewer that runs south along Higher Chatham Street then northeast along Boundary Street West.
- There is a 675 x 825mm public combined sewer that runs north along Cambridge Street. This sewer connects into the 1950mm combined sewer noted above via a 300mm sewer..
- There is a 440 x 750mm public combined located in Cambridge Street, the sewer records shows that the sewer runs both North, and also south, where it changes to a 500 x 800mm and then a 675 x 750-mm sewer, before connecting to the 1950mm sewer via the same connection as the 625 x 825mm sewer noted above.
- There is a 300mm public combined sewer that runs southwest along Boundary Street West which discharges to the 675x825mm sewer within Cambridge Street.

- There is a 600x680mm public combined sewer that runs north along Lower Chatham Street which discharges to a 375mm public combined sewer that runs southwest along the private access road to the north of the site. This sewer then discharges to the 700mm public combined sewer within Cambridge Street.

Both CCTV and point cloud surveys have been conducted by Murphy and have provided further information regarding the 1950mm sewer and the 600 x 750mm running through the central zone of the site.

- The survey indicates that the 600 x 750mm combined sewer, flowing Northeast from UU manhole 0900, appears to connect to the 675 x 825mm sewer within Cambridge St. This is based on the level information provided as part of the 3D laser survey, and has not been confirmed by the CCTV survey.
- There is evidence of the 600 x 750mm within the central zone of the site, flowing Northeast to UU manhole 2907. The survey showed a high level of silt build within the sewer at this manhole, therefore the survey of upstream part could not be feasible. The survey has not identified a manhole at what would be the head of this sewer, within the site. It is proposed to construct a manhole on this sewer as part of the works to enable investigate further and greater access in the future.
- The route of the 1950mm combined sewer has been confirmed through the site. The CCTV survey did not identify any defects within the section of the sewer running through the site.
- The 300mm combined sewer that runs under the building was not able to be surveyed. Further survey works are required in order to confirm that this section of sewer can be abandoned.
- The surveys identified a manhole within the site, (reference UU S01 on Survey Plan), which appears to connect, via a 450mm sewer, to the 675 x 825mm combined sewer in Cambridge St. The survey indicates that the between this manhole and the main sewer in Cambridge St is blocked and is redundant. The survey works indicate that the drain that connects into this manhole is from manhole inside the existing building. It is intended that this sewer will be put forward for abandonment.

Private drainage

The current buildings on the site are served by a network of foul and combined drains. The drainage network currently discharges foul and surface water, to the 600x750mm public combined sewer within Higher Chatham Street. This sewer flows in a Southeasterly direction, before turning Northeast into Higher Ormod St.

It is proposed to abandon all private drainage within the site as part of the proposed works.

A copy of the existing private drains is enclosed in *Appendix C*.

2.4. Topography

A Topographical Survey of the site was completed by CadPlan Surveys in August 2025 and is enclosed in Appendix C.

The topographical survey confirms that the site is generally level, with a slight fall from South to North, with some raised areas within the site.

The highest point is recorded at 37.02m AOD and is located within the northern courtyard.

The lowest point on the site is 36.19m AOD and is located in the Northwest corner of the site.

2.5. Geology

A Ground Investigation Report, Ref CCG-C-24-15079, was undertaken by CCG Geotechnical Limited, dated June 2025. Further to this, a Phase Site Investigation was Curtins, Ref CAM-CUR-ZZ-ZZ-RP-G-000002, dated November 2025.

The ground conditions encountered are summarised in Table 1 below:

Table 1 – Summary of Ground Conditions Encountered

Strata	Depth to Top of Strata m bgl (m AOD)	Thickness		Description
		Min m	Max m	
Made Ground	Ground Level (36.68 - 36.55)	0.90	5.20	Surface covering of blue/red brick paving underlain by hardcore. And Brown very gravelly fine to coarse SAND with moderate cobble content. And/or Brown to black soft very sandy very gravelly CLAY with localised moderate cobble content. And/or Slightly silty sandy GRAVEL
Glaciofluvial Sheet Deposits (Granular)	1.54 – 2.31 (35.76 – 34.37)	1.05	2.30	Light brown to grey very gravelly fine to coarse SAND. And/or Medium dense SAND And/or Slightly silty very sandy GRAVEL.
Glacial Till	0.90 – 5.20 (35.72 – 31.35)	1.80	7.45	Stiff brown slightly sandy slightly gravelly silty CLAY. And/or Very stiff brown very sandy, gravelly CLAY with localised moderate cobble content. And/or Reddish brown gravelly silty fine to medium sand.
Chester Formation Sandstone	6.20 – 10.50 (30.39 – 26.08)	5.75 ¹	11.81 ¹	Reddish brown fine to coarse SAND (highly weathered sandstone). And Weak to very weak reddish brown fine to coarse grained SANDSTONE.

¹ Thickness not proven.

A total of eight groundwater strikes were recorded across all exploratory hole locations during the ground investigation works. Groundwater was encountered within boreholes installed within the Chester Sandstone Formation between 10.12m to 10.49m bgl (26.46m to 26.06m AOD) and is more than likely representative of a continuous groundwater table.

Groundwater levels were monitored in the borehole locations, with a total of three measurements taken over the course of two weeks. The water levels encountered ranged from a minimum of 26.1m AOD to a maximum water level of 32.2m AOD (in WS/ RC02)

3. DEVELOPMENT AND FLOOD RISK

3.1. National Planning Policy Framework (NPPF) and Planning Practice Guidance

In March 2012, the Department of Communities and Local Government published the National Planning Policy Framework document (NPPF) and the Planning Practice Guidance was published in March 2014 and updated in December 2024, which provides guidance on how flood risk should be assessed during the planning and development

Table 2: (Extract from Planning Practice Guidance) Flood Zone Classifications

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 3: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's home social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Table 4: (Extract from Planning Practice Guidance) Flood Risk Vulnerability and Flood Zone Compatibility

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

Key:

✓ Exception test is not required

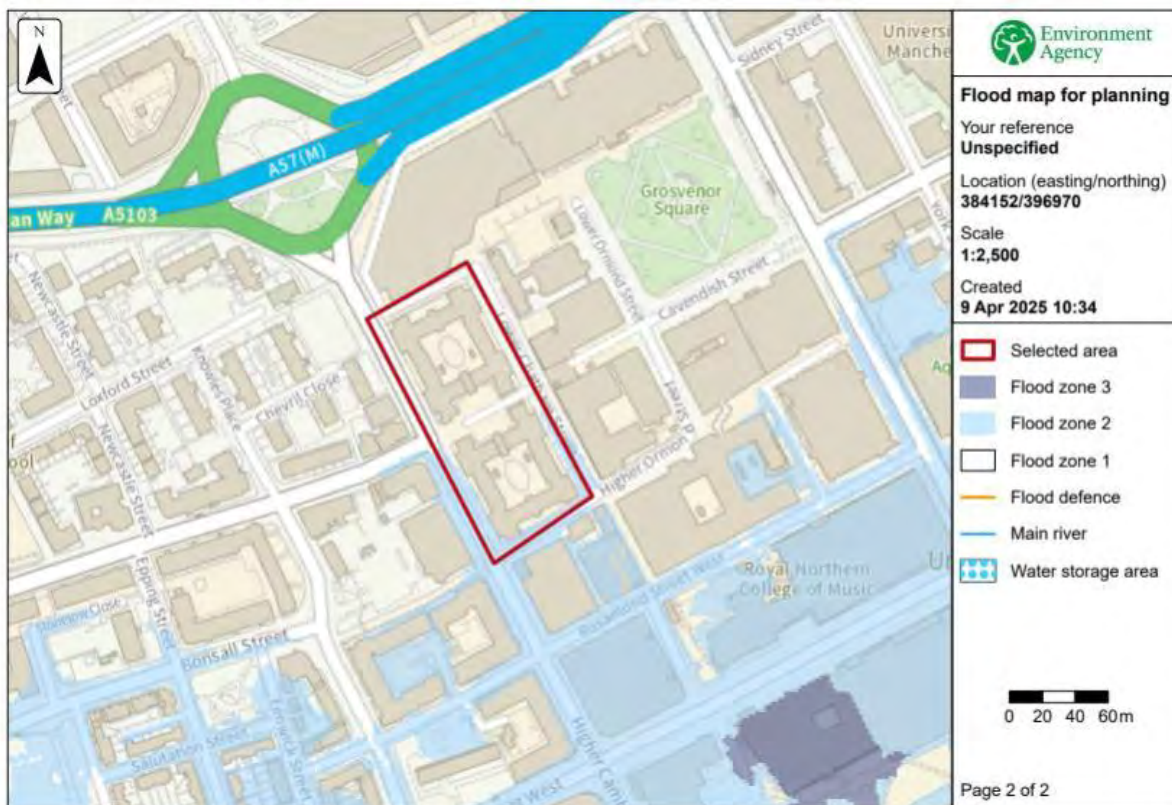
X Development should not be permitted

3.2. Site Specific NPPF Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the first step was to inspect the UK Government web based 'Flood Map for Planning' which is used to inform planning of a site's Flood Zones and the probability of flooding from rivers or sea (not taking into account the presence of flood defences or climate change). However, the web based 'Long Term Flood Risk Assessment for Locations in England' should also be used to identify the long-term flood risks from rivers and seas, surface water and reservoirs.

The Flood Map for Planning report is shown in Figure 3 D, and shows the site is classified as within Flood Zone 1, with a small area of the site located to the south within Zone 2 upon closer investigation, it appears to be due to the levels within the highway being at a lower level than the existing development – this is explored in more detail in Section 4.2.

Figure 3 - Flood map for Planning (© Crown Copyright)



The immediate areas surrounding the south half of the site lie within Flood Zone 2.

Further site-specific review of the flood risk to the site is provided in section 4.

The Flood Map from 4 Project Data is available in Appendix D.

3.3. Site Specific Flood Zone Compatibility

The proposals for the development site are likely to fall within the following category:

- **Buildings used for dwellings.**

Dwellings are classed as a 'More Vulnerable' development in the Flood Risk Vulnerability Classification (Table 3)

The site is located within Flood Zone 1 for which a 'More Vulnerable' development is deemed to be appropriate. Therefore, the development does not trigger the requirement for the sequential test/exception test (refer to the Flood Zone compatibility table in the NPPF technical guidance).

4. HYDROLOGICAL ASSESSMENT

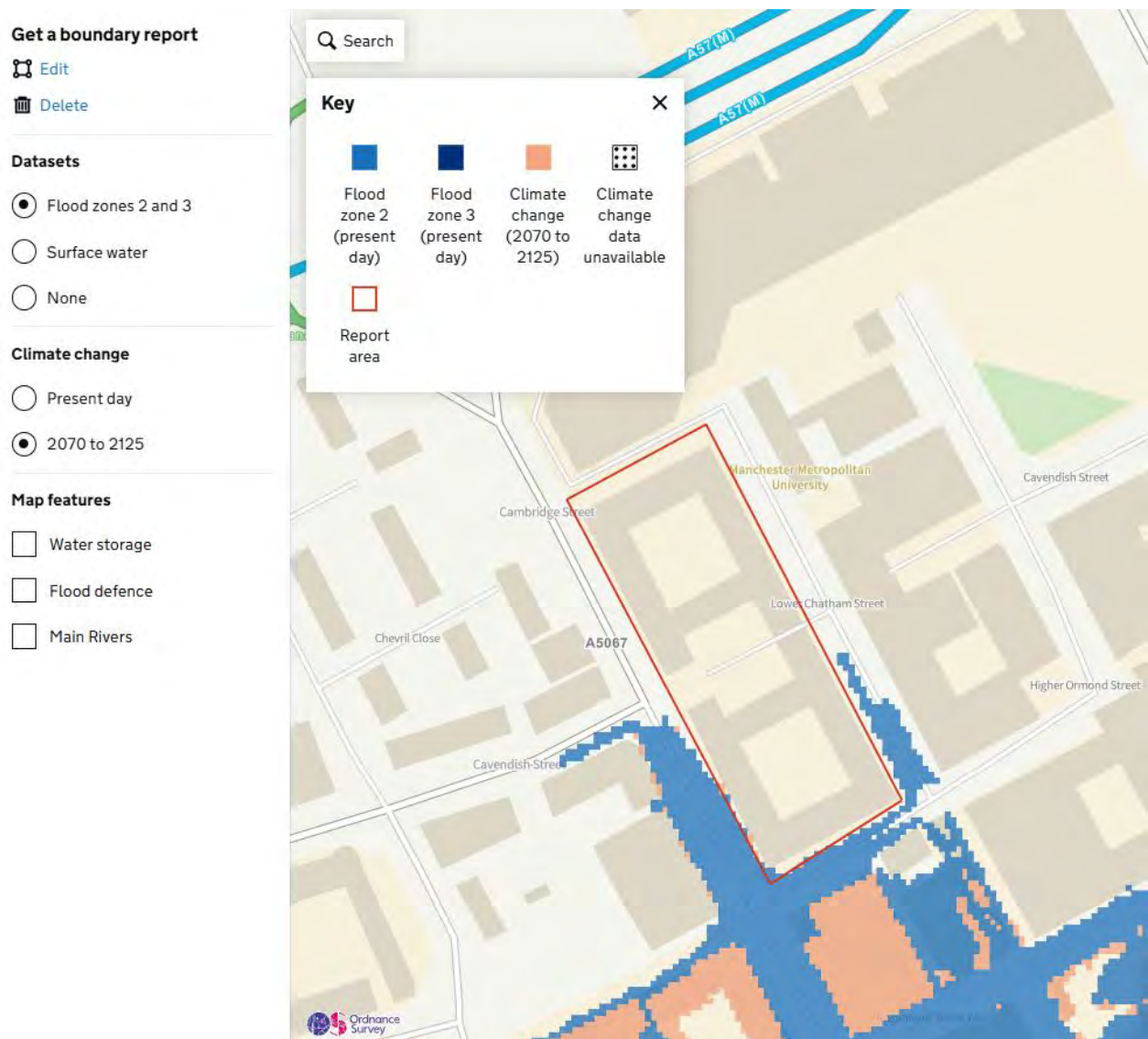
4.1. Sources of Flood Risk

This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

4.2. Fluvial Flooding (Rivers and Streams)

Flooding to the site from rivers and sea is indicated below in Figure 4, taken from the UK Government's Long-Term Flood Risk Information.

Figure 4 - Long Term Flood Risk Assessment Map – Flood Risk from Rivers or Sea (© Crown Copyright)



It can be seen that there are mostly no areas within the site considered to be at risk of fluvial flooding. There is a small area of risk within the south of the site. This small area within the site is part of a large area of flood risk within Cambridge Street and Boundary Street West.

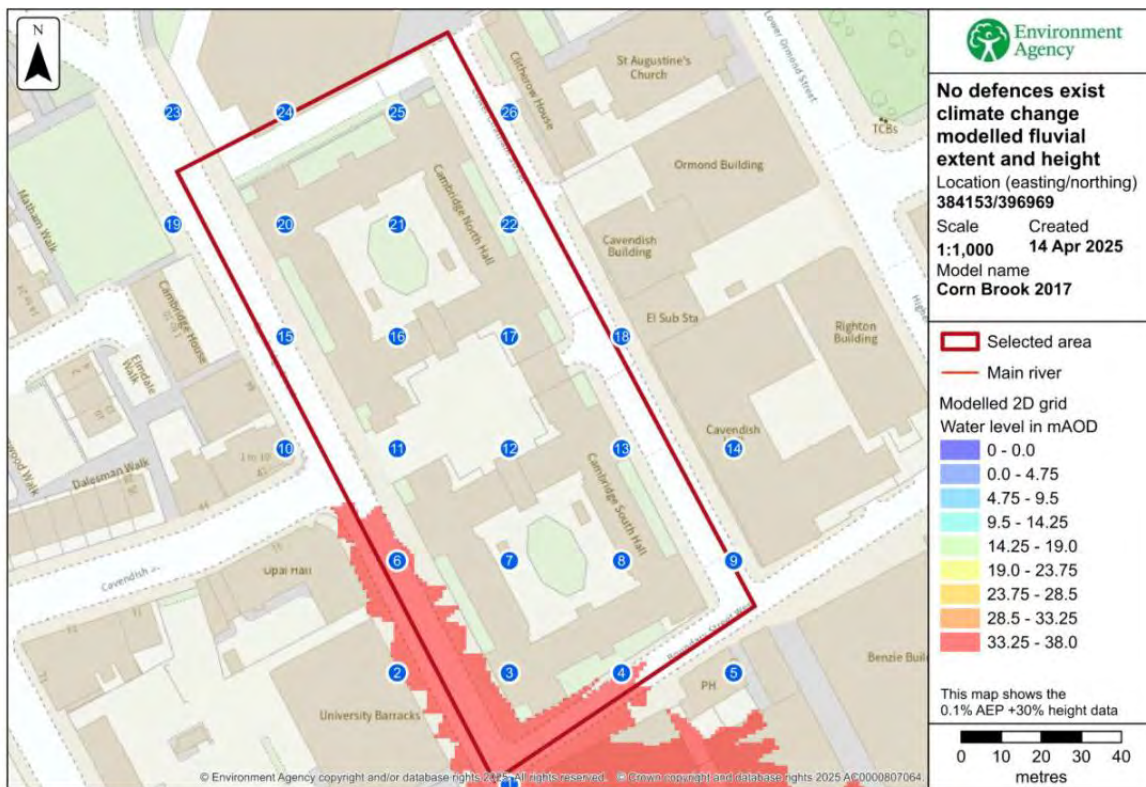
Figure 5 highlights the predicted increase in the extents of areas at risk from flooding due to climate change.

Figure 5 – 1 in 1000 year Flood Risk from Rivers and Sea (Flood Zone 2) – Present day vs Climate Change



More detailed flood depth information has been obtained from the EA (Product 4), and is shown in Figure 6. This provides flood depths at two locations in the vicinity of the site, with these positions illustrated in Figure 7.

Figure 6 - EA Product 4 flood levels.



Data Point 1 in Figure 4, located at the junction of Boundary St West and Higher Cambridge Street, has a flood depth of 0.21m during a 0.1% AEP (annual exceedance probability) + climate change storm event.

Data Point 6, located on Higher Cambridge Street, has a flood depth of 0.10m during a 0.1% AEP + climate change storm event.

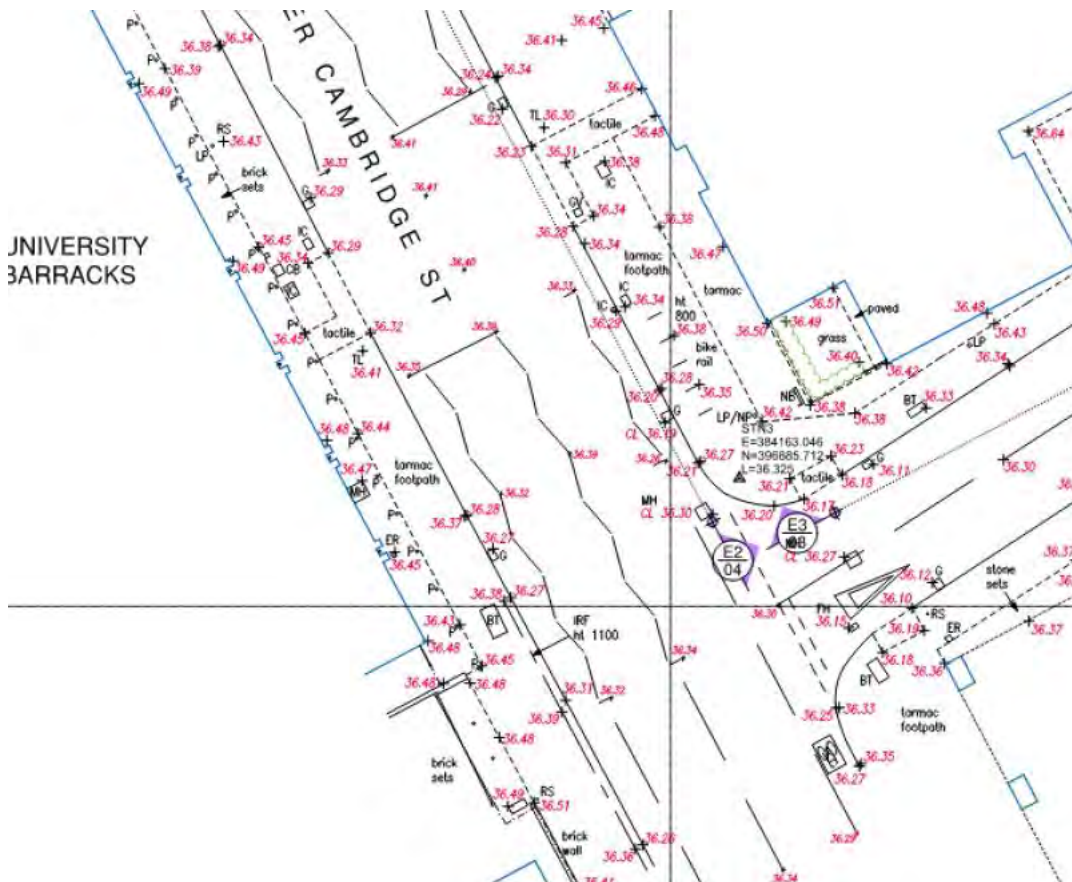
The other data points, including 2, 3 & 4 are shown on the fringe of the flood extent. However, on interrogation of the flood depth and level data supplied, they do not have flooding during this storm event.

Figure 7 - Data Point approximate locations



An assessment has been made by comparing the flood depths against the existing site levels captured during the Topographical Survey. An extract of the Topographical Survey is shown in Figure 8;

Figure 8 – Extract From Topographical Survey



The existing ground level at the location of data point 1 can be interpolated to be 36.3m, and data point 6 as 36.4m (indicated on Figure 8). This indicates an approximate flood water level of 36.5m AOD near the site.

The survey levels indicate that levels of the footway of Boundary St West and Higher Cambridge Street are below this flood level, hence their inclusion in the flood extents in Figure 6; the southwestern corner of the site has existing ground levels of 36.38-36.51m AOD. Therefore, the flood extents will reach to just within the site boundary, (approximately <0.1m deep). However, they do not extend beyond either the existing or the proposed building footprint.

The risk of flooding from rivers and seas is therefore considered to be **low** and fluvial flooding mitigation is not required.

4.3. Tidal Flooding (Coastal or Estuarine)

There is currently no flood risk identified on the UK Government flood maps for the site, and it is therefore regarded to be at **low** risk from tidal flooding and mitigation is not required.

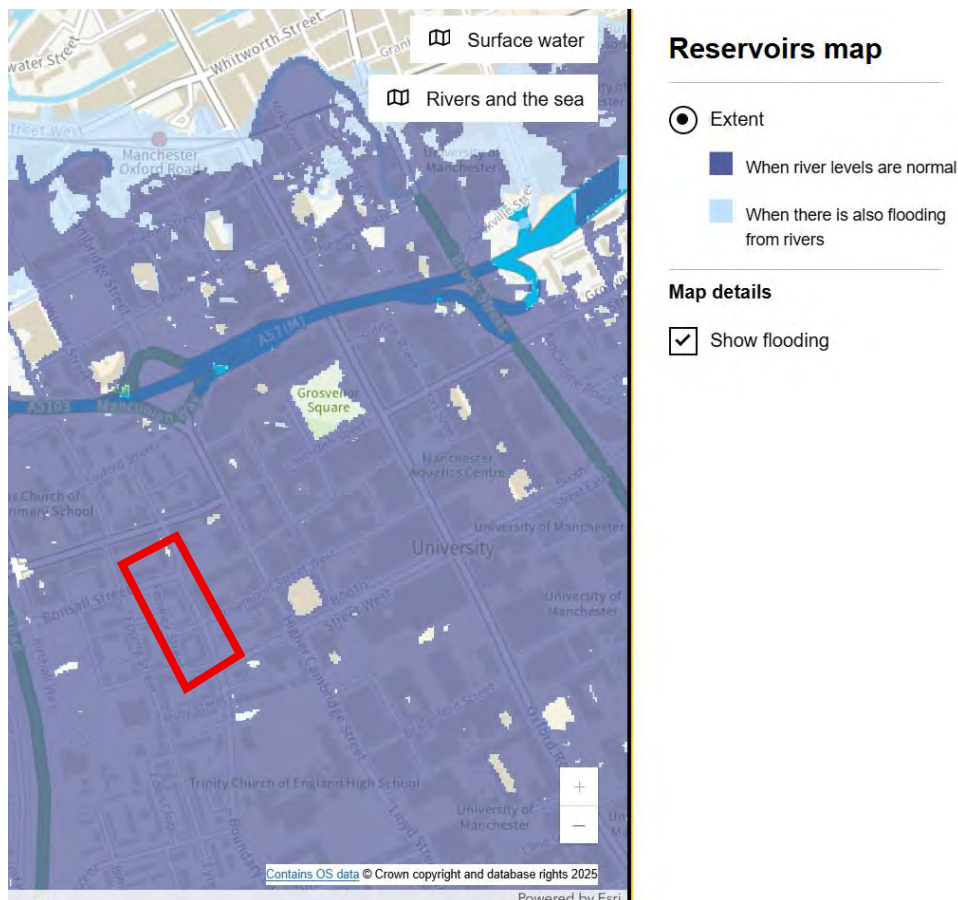
4.4. Reservoir Flooding

Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

The Long-Term Flood Risk Assessment (Flood Risk from Reservoirs) map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds (see Figure 9).

Reservoirs that could affected this area are noted as Audenshaw No. 1, No.2 and No.3, which are situated in Tameside and owned by United Utilities. The reservoirs are located over 6km away

Figure 9 - Long Term Flood Risk Assessment Map – Flood Risk from Reservoirs (© Crown Copyright)



The whole of the site is shown to be located within the extent of a reservoir flood risk.

Given that the extent of flooding would also require a catastrophic failure, and providing maintenance is carried out by United Utilities, the risk from reservoir flooding, the site can generally be considered at **low** risk of reservoir flooding, and no mitigation would be required.

4.5. Canal Flooding

As stated in section 2.3, the nearest canal is the Rochdale Canal, located approx. 560m north of the site.

Within the Manchester City Council (MCC) SFRA, there is only one mention of flooding caused by the Bridgewater Canal nearby the site. The flood, which occurred in 2001 in Castlefield, was caused by overtopping of the canal banks. The area that flooded is located more than 1km from the site.

There is no other mention of flooding caused by canals, within or surrounding the site, which would suggest there are no flooding issues caused by canals in the area.

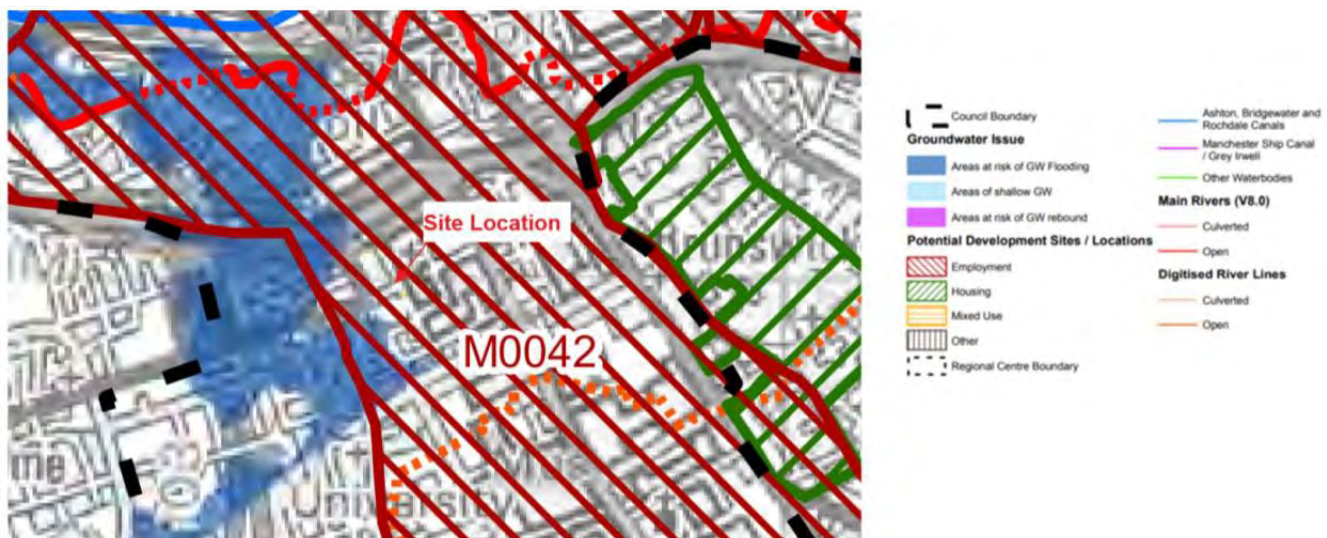
Given the above information, it is considered that there is a **low risk** of canal flooding to the site, and no mitigation is not required.

4.6. Groundwater Flooding

Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.

According to the MCC SFRA groundwater flood risk maps, Flooding from Groundwater map, the site boundary along the south-western corner is next to an area at risk of groundwater flooding. An extract of the map is shown in Figure 10.

Figure 10 – Extract from Groundwater Flood Risk Map (Manchester CC, 2024)



As noted in Section 2.5, monitoring stations were set up in four of the boreholes undertaken as part of the Site Investigation works. The maximum groundwater level encountered was approx. 32.2m AOD, which is approximately 4.3m below the existing site levels.

Based on ground investigations from the local vicinity, the ground water is generally understood to be 9 to 12m bgl with the higher levels associated with perched ground water in the made ground and glacial till layers.

The proposed building contains areas of basements, which are set with a finished floor level of 31.325m AOD. Subsequently, ground water control measures are anticipated to be required for the basement excavations. Given the

above, it is considered that the risk from groundwater flooding would therefore be considered **low** post development and no mitigation is not required, other than noted above.

4.7. Public Sewers or Highway Drainage Flooding (Infrastructure Failure)

United Utilities sewer maps show that there are sewers surrounding the site. A full description of the sewers is provided in section 2.3 above. Sewer defects encountered during any sewer surveys will be reported to United Utilities.

There are gullies within the highways surrounding the site. These gullies are likely to be highway assets maintained by MCC Highways.

Gullies can flood due to high intensity rainfall periods as well as blockages entering the gullies. In the event that road gullies flood, water would flow along the kerb line to other gullies further down the road.

The gullies on Cambridge St would flow in two directions:

- Northwest along Cambridge St and away from the site to the North
- Southeast toward the Southwest corner of the site, at the junction with Boundary St West. There are low points along the kerbline in this area; however, levels indicate that flow would flow away to the South before as water levels build up.

The gullies on Lower Chatham St would flow in two directions:

- Northwest towards Lyceum Place. There appears to be a low point close to the Northern corner of the site. Levels indicate that further overflow from this area would be toward the Northwest corner of the site and away as noted above.
- Southeast toward the junction with Boundary St West. At this point, flow would run southwest along the road toward the Southwest corner of the site, as noted above.

The SFRA does not identify any recorded flooding incidents in the vicinity of the development.

Following the CCTV survey United utilities have been informed regarding blockages in their assets in the vicinity of the site. The existing site discharges to the public combined sewer in Higher Chatham Street, has some capacity issues. The flow from the development will be discharged to the 1950mm combined sewer at 14l/s. Therefore the flow from the site will be removed from the public sewer in Higher Chatham Street. This will improve current situation.

Providing United Utilities and MCC Highways maintain their drainage assets within the vicinity of the site, the risk of flooding to the proposed development site from public sewers or highway drainage is considered as **low**, and no mitigation is required.

4.8. Surface Water Flooding to the site

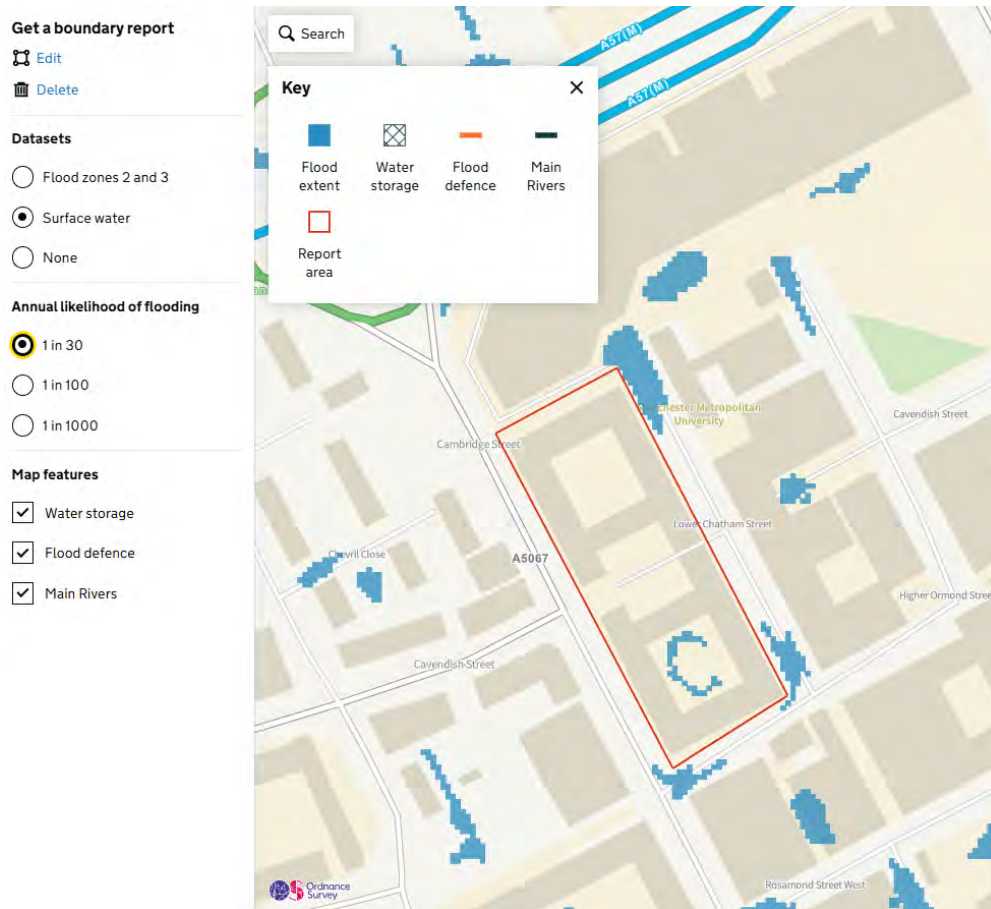
Surface water flooding can be caused when rainwater during extreme rainfall events does not drain away through the normal drainage system or soak into the ground can result in overland flows which if originating at a higher elevation than the development site can potentially pose a flood risk.

From the UK Government's Flood Risk from Surface Water (extent of flooding) map;

- Where a site is located in a dark blue shaded zone, this indicates that the site is at high risk of flooding, where flooding occurs as a result of rainfall with a greater than 1 in 30 (3.3%) chance in any given year.
- Where a site is located in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding, where flooding occurs as a result of rainfall of between 1 in 100 (1%) and 1 in 30 (3.3%) chance in any given year.
- Where a site is located in a light blue shaded zone, this indicates that the site is at low risk of flooding, where flooding occurs as a result of rainfall of between 1 in 1000 (0.1%) and 1 in 100 (1%) chance in any given year.
- Where a site is located in a clear (unshaded) area; this indicates that the site is at very low risk of flooding, where flooding occurs as a result of rainfall with less than 1 in 1000 (0.1%) chance in any given year.

The extent of flooding to the site from surface water is indicated in Figure 11.

Figure 11 - Risk of Flooding from Surface Water - Extent of Flooding



Get a boundary report

[Edit](#)

[Delete](#)

Datasets

☐ Flood zones 2 and 3

☒ Surface water

☐ None

Annual likelihood of flooding

☐ 1 in 30

☒ 1 in 100

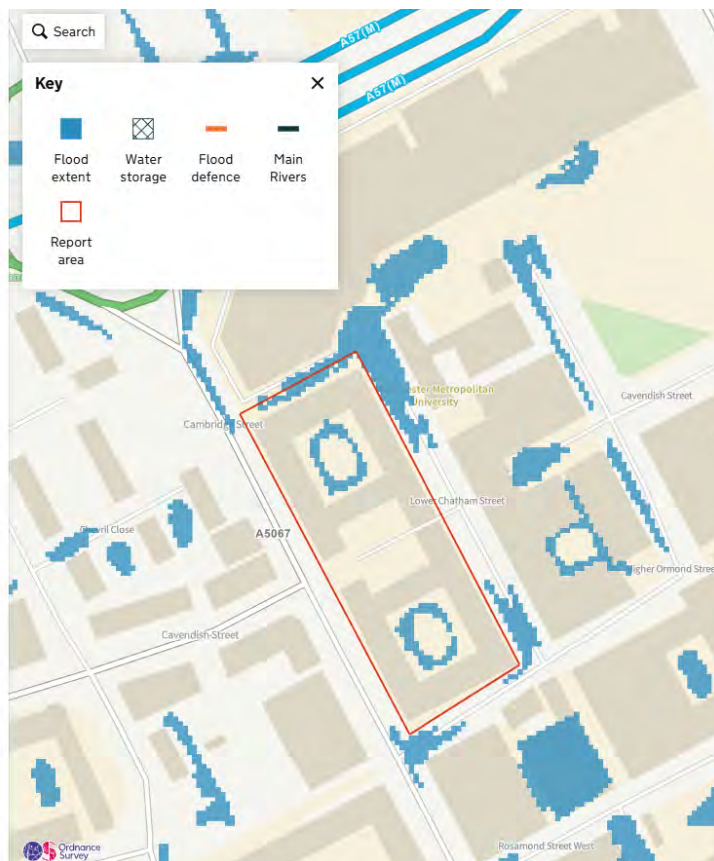
☐ 1 in 1000

Map features

☒ Water storage

☒ Flood defence

☒ Main Rivers



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[Delete](#)

Datasets

☐ Flood zones 2 and 3

☒ Surface water

☐ None

Annual likelihood of flooding

☐ 1 in 30

☐ 1 in 100

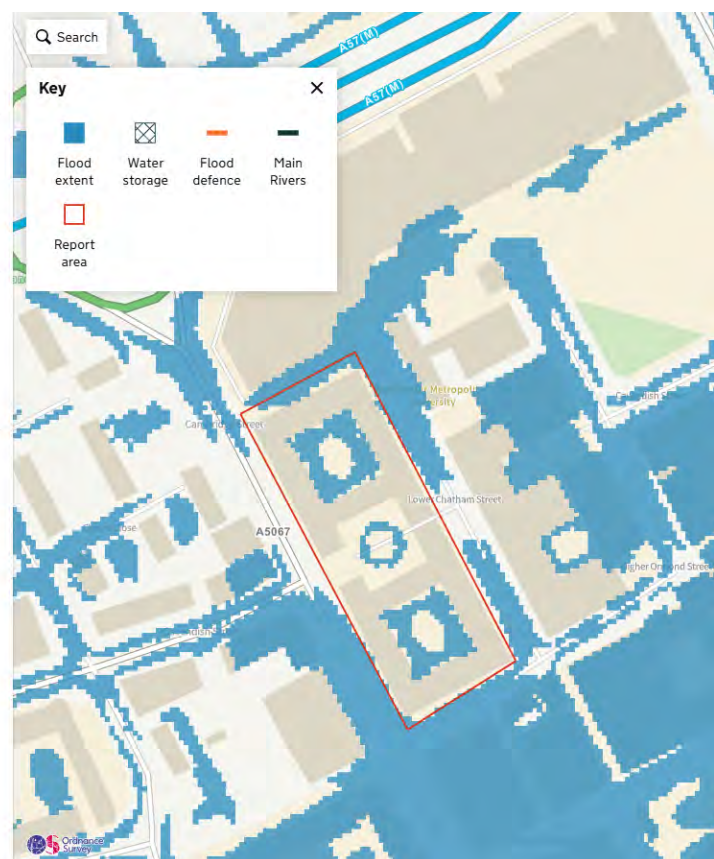
☒ 1 in 1000

Map features

☒ Water storage

☒ Flood defence

☒ Main Rivers



It can be seen that, for a 1 in 30-year rainfall event, the majority of the site has no areas of risk, however there is a small area in the centre of the site considered to be at risk of surface water flooding. During a 1 in 1000-year rainfall

event, this area of flooding within the site increases in size. The roads surrounding the site are also flooded in this event.

Considering the above information, the risk of surface water flooding to the site is generally considered low, with localised areas considered to be at high-risk. With mitigation measures put in place, the areas of high-risk surface water flooding could be lowered to low risk. These mitigation measures are described in section 5.

4.9. Surface Water Flooding from the site

Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. Where new development is proposed, the new surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.

Development has the potential to increase flood risk where additional run-off from proposed roads, paved areas and building roofs are discharged freely into the downstream drainage network. It is therefore encouraged to propose landscaping areas and incorporate sustainable drainage features utilising infiltration or attenuation where possible.

As part of the development, a positive drainage network is proposed to be installed to mitigate the risk from surface water flooding to the building and the surrounding site, incorporating the use of sustainable drainage where possible.

4.10. Historical Flooding

Within the Manchester City Council SFRA, there are no recorded events of flooding extending within the development site boundary.

4.11. Summary of Flood Risk

From the evidence collated and subsequent negotiations the site is considered to be at potential risk of:

- Surface water flooding to the site
- Ground water to basement???-check levels

Considering the above points and all the data presented in Sections 4.1-4.10, Cambridge Halls is considered to have **Low Probability** of Flooding.

5. MITIGATION

5.1. Surface Water Flooding to the Site

To avoid surface water flooding issues, levels must fall away from the proposed properties. The properties should be set at a higher elevation to existing ground levels where possible. We recommend setting floor levels above the anticipated flood depths shown on the UK government flood maps.

The proposed FFL of 36.50m AOD is higher than the surface water flood levels between 2040 and 2060 shown on the UK government surface water flood risk maps.

All external levels will be designed to drain away from building thresholds.

The site is surrounded by Manchester CC adopted highway. All footway levels will be designed to fall away from the site and building levels.

On the basis the above measures are implemented, the risk Surface Water flooding to the site would be considered **low** risk.

6. DRAINAGE STRATEGY

6.1. Existing Drainage

UU has confirmed under predevelopment enquiry that a total 6 m easement is required for both 600mm and 1950mm combined public sewer crossing the site. As the easements overlap the total extent is shown on CAM-CUR-XX-XX-D-C-925003 P03 Public sewer and easements

Pile foundations have been proposed outside the easement; there will not be any surcharge on the public sewer.

A further survey of the 300x400 public sewer is required to confirm if any existing connections are present. To complete the survey, a trial pit is necessary due to the lack of upstream and downstream access. At present, it is not feasible to undertake a trial pit investigation due to the presence of existing utilities within the public footway and the existing building occupying the site. Furthermore, the precise location of the 300x400 sewer within the building or building's courtyard area remains undetermined. Therefore, trial pit be carried out during the building demolition phase, once safe and unobstructed access to the area becomes available. It is proposed that any live connections will be diverted to adjacent sewers and the 300x400 sewer will be abandoned. This proposal will be refined once the additional survey has been carried out. The abandonment will require a S116 agreement to be agreed with United Utilities.

There is a 450 sewer adjacent to the western boundary of the site, which appears to connect to the public combined sewer within Cambridge Street. The survey works indicate that this connection is blocked and is redundant. It is also intended to abandon this connection through a S116 agreement with United Utilities.

6.2. Proposed Foul Water Drainage

A Pre-Development Enquiry has been submitted to United Utilities, and they have confirmed that there is sufficient capacity in their network for foul water to be discharged at an unrestricted rate to either the 600x750mm or 1950mm public combined sewers that run through the central section of the site.

A copy of correspondence with United Utilities is enclosed with Appendix F.

The survey identified a high level of siltation within the sewer in the vicinity of UU manhole 2907, which is located downstream of any potential connection point. Therefore, it is proposed to discharge the foul drainage to the 1950mm combined sewer.

Any new connection to the public sewer network will be subject to a Section 106 Agreement with United Utilities.

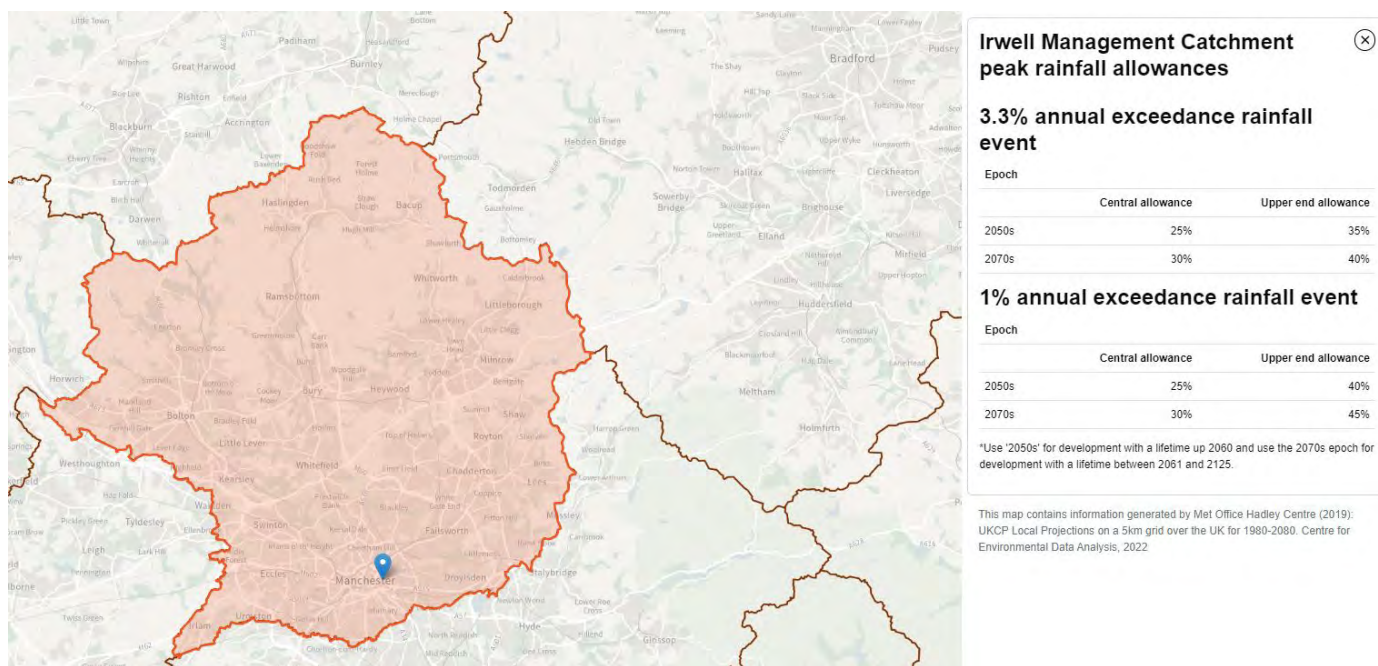
The proposed foul water network is shown on the Drainage Strategy which is enclosed in Appendix G.

6.3. Proposed Surface Water Drainage

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services.

In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nationwide allowances, each area has its own peak rainfall allowances. In the case of the proposed site area, this is the Upper Mersey Management Catchment. Figure 12 demonstrates the climate change allowances with central and upper end allowances being considered for the 1% event.

Figure 12: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments



Based on the nature of the development, a lifespan in excess of 100 years is anticipated. Therefore, the potential climate change allowance for the 2070's ranges between 30% for the central allowance and 45% for the upper end allowance. As such, an allowance of 45% for climate change on peak rainfall intensity will be included in calculations.

Surface Water hierarchy

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Infiltration

Systems such as infiltration trenches and soakaways were considered as part of the surface water management strategy.

The results of the Curtins Site Investigation indicates that there is a clay layer which underlays the site, which ranges from 1.80 – 7.59m thick.

As part of the original CCG Site Investigation Report, Soakaway tests were undertaken. The results of the tests are summarised in Table 5.

Table 5: Soakaway Test Results

Soakaway Test Reference	Depth of Test Pit (m)	Measured Infiltration Rate (m/s)
SA01	2.1	2.95×10^{-6}
SA02	2.0	5.95×10^{-6}
SA03	2.0	1.01×10^{-6}

The Infiltration rates measured in the soakaway tests indicate that the ground is unsuitable for infiltration.

Given the information provided above, it is considered that discharge via infiltration is not viable.

Watercourse

There are no suitable watercourses within the vicinity of the site.

Surface Water Sewer

There are no surface water sewers within the vicinity of the site.

Combined Water Sewer

The CCTV survey confirmed that there are a 600 x 750mm and 1950mm combined sewers running across the central section of the site.

The survey identified a high level of siltation within the sewer in the vicinity of UU manhole 2907, which is located downstream of any potential connection point. Therefore, it is proposed to discharge the surface water drainage to the 1950mm combined sewer.

Table 6 summarises the options for surface water disposal.

Table 6: Surface Water Disposal

Surface Water Disposal	Potential	Description
Infiltration	X	Infiltration is not suitable due to poor infiltration rates.
Watercourse	X	There are no suitable nearby watercourses.
Surface Water Public Sewer	X	There are no suitable nearby surface water sewers
Combined Public Sewer	✓	It is proposed to discharge to the public combined sewer on site.

The original Drainage Strategy provided by Arup calculated the existing flow rate for the site to be 198 l/s for the 100-year storm event, based on the Modified Rational Method. The proposals of a 50% reduction to this figure was agreed in principle with the LLFA in October 2024. This provided a proposed discharge rate of 98.7 l/s. The original intent was to discharge to the combined sewer in Higher Chatham St, re-using the existing connection.

As part of the works undertaken by Curtins, a Pre-development enquiry was sent to United Utilities. The response confirmed that the maximum discharge rate to the public sewer does not exceed 14 l/s. the connection was allowable to either the 600x750mm or the 1950mm diameter combined sewer running through the centre of the site.

It is therefore proposed that the surface water drainage will discharge to the 1950mm combined sewer within the site boundary.

Existing run-off rates have been calculated using the Modified Rational Method for the 1, 30 and 100-year storms, to confirm the proposed reduction in run-off rate for each storm event. The results are summarised in Table 7.

Table 7: Surface Water Existing and Proposed Discharge Rates

Storm Event	Existing Run-off Rate	Proposed Run-off Rate	Reduction in flow
1-Year	30.4 l/s	14 l/s	54%
30-Year	73.9 l/s	14 l/s	82 %
100-Year	112.6 l/s	14 l/s	88 %

The existing run-off rate calculations are enclosed in *Appendix H*.

A detailed model of the proposed drainage strategy has been created and conforms to the design parameters noted above. The limitation of 14 l/s placed on the surface water outfall rates results in a requirement to provide additional attenuation compared to Arup's design.

As the restricted discharge is more onerous than in the Arup's report, an increased volume of storage is required for the site. The forms of attenuation are summarised below:

Cellular Storage

The volume of attenuation is estimated to be approximately 331m³ which would be provided within an attenuation tank located within the Phase 1 courtyard. Comments have been received from LLFA that indicate that the cellular attenuation tank should be a minimum of 5m from any building foundations. However, the constraints present, with respect to the proposed tower crane bases, requires the footprint of the attenuation tank to encroach within this 5m zone.

Blue Roof:

A portion of the Phase 2 building includes a blue roof, which includes a restriction to the flow entering the drainage network from this area. A plan of the blue roof area is enclosed in Appendix G, and a copy of the Phase 2 roof catchment flows, which include the restricted flows, is enclosed in *Appendix I*. Based on the information available, the blue roof provides an estimated 58m³ of Attenuation.

Oversized Pipework:

Further attenuation of approximately 56m³ is also provided within oversized pipework located within the Phase 2 works.

Permeable Paving:

There are a number of permeable paving areas located throughout the site, which are included as both an attenuation feature and also a treatment stage.

Paved areas have been graded to direct runoff towards adjacent soft landscaping; a portion of the collected water will also be utilised for the planters. Permeable paving has been proposed in the courtyard and some other external areas to further aid in surface water management.

Surface infiltration rates should be significantly greater than the design rainfall intensity to avoid surface water ponding. A minimum value of 2500mm/h is considered reasonable for a new pavement surface. The rate of infiltration reduces over time, due to accumulation of silt and debris in the pore spaces. However, it is very rare that clogging causes complete sealing of the whole surface, and normally it will continue to provide sufficient drainage capacity.

An impermeable barrier is provided on the bottom of planters, permeable pavement and around the attenuation tank. The perforated pipe has been proposed on the bottom of planters and permeable pavement subbase to collect surface water and discharge to the public sewer.

In areas where the external levels tie into the public footway or where low spots occur, channel drains have been included to capture runoff.

Permeable pavement has been designed in accordance with BS-7533-13, based on pedestrian loading.

Rain Gardens:

There are a number of rain gardens proposed within the site. The Arup's design included cellular storage at the base of these areas, and also allowances for attenuation within the fill media, and also in standing water above ground in these areas.

The current proposals have removed the crates from the bases of the rain gardens, in order to increase buildability, and also to prevent clashes with the Gas Supply easement to the western boundary of the site. No allowance has been included for the fill media and standing water volume included in the Arup's design.

The approximate provided attenuation volumes are summarised in Table 8.

Table 8: Approximate Attenuation Volumes Provision

Attenuation Type	Phase 1 Volume	Phase 2 Volume	Total Volume
Cellular Storage	331m ³	0 m ³	331 m ³
Blue Roof	0 m ³	58 m ³	58 m ³
Oversized Pipework	0 m ³	56 m ³	56 m ³
Permeable Paving	41m ³	5 m ³	46 m ³
Total Attenuation	372 m ³	119 m ³	491 m ³

The drainage network is designed as a single drainage network with a single flow control, which serves both Phases 1 and 2.

It is proposed that all sewers within the site boundary will remain private and therefore where sewers remain private, connection to the public sewer network will be subject to a Section 106 Agreement with United Utilities.

As the surface water connects to the combined public sewer, water traps have been proposed on surface water pipes in strategic locations in order to prevent smells

Refer to *Appendix G* for the Drainage Strategy, and *Appendix I* for proposed Drainage Calculations.

The final design of the drainage networks shall be in accordance with the legislation set by the Manchester City Council and United Utilities.

Sustainable Drainage Systems and Green Infrastructure

Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Access roads and pedestrian footways are considered as a low hazard in terms of contamination. Figure 13 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

Figure 13: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Figure 14 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015)

Figure 14: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

TABLE 26.3	Indicative SuDS mitigation indices for discharges to surface waters			
		Mitigation indices ¹		
	Type of SuDS component	TSS	Metals	Hydrocarbons
	Filter strip	0.4	0.4	0.5
	Filter drain	0.4 ²	0.4	0.4
	Swale	0.5	0.6	0.6
	Bioretention system	0.8	0.8	0.8
	Permeable pavement	0.7	0.6	0.7
	Detention basin	0.5	0.5	0.6
	Pond ⁴	0.7 ³	0.7	0.5
	Wetland	0.8 ³	0.8	0.8
	Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See [Chapter 14](#) for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

The selection of treatment should ensure that the SuDS mitigation component index (Figure 14) exceeds the pollution hazard index (Figure 13).

The proposed SuDs features are described in Section 6.3.

7. DESIGN COMPARISON

The proposed design differs from the original design described in the Arup FRA and Drainage Strategy, ref CAM-ARP-ZZ-ZZ-RP-C-000001.

The design changes are summarised in Table 9 below.

Table 9: Summary of Comparison of Curtins/ Arups Designs

Design Element	Curtins (Current) Design	Arup Design
Outfall Location	Connection to the 1950mm Public Combined Sewer within the site, as agreed with United Utilities.	Connection to existing 450mm Public Combined Sewer in Higher Chatham St
Discharge Rate	14 l/s – as agreed with United Utilities	98.7 l/s
Blue Roof	Portion of Phase 2 roof designed as blue roof. Included within drainage calculations, in line with current Blue Roof design.	Portion of Phase 2 roof designed as blue roof. Included within drainage calculations
Cellular Attenuation	Singular cellular storage tank located under Phase 1 courtyard. Layout required co-ordination with proposed tower crane base locations. Single tank used to improve buildability and coordination with other services.	Cellular Attenuation provided under rain garden areas throughout the site.
Rain Gardens	Rain gardens updated to suit revised Landscape Architect's layout. Cellular tanks removed from underneath rain gardens to improve buildability and avoid Gas Main Easement. Above ground drainage and storage within soil layers not included in calculations to prevent standing water within garden areas. The stone drainage layer has been included within the drainage model.	The storage allowance within the rain gardens includes for the stone drainage layer, the soil planting zone, and also an element of standing water at the surface for extreme storm events.

Permeable Paving	Permeable paving has been included within the design, in line with the Landscape Architect's plans. This includes areas within the Phase 1 Courtyard, and the zone between Phases 1 & 2. The permeable sub-base layer has been included as storage within the drainage model.	Permeable paving is provided in the zone between Phases 1 & 2. Design not coordinated with extent of permeable pavement on Landscape Architect's plans at Planning Stage. The permeable sub-base layer has been included as storage within the drainage model.
Oversized Pipework	Oversized pipes (1200mm) have been provided within the zone between Phases 1 & 2.	Oversized pipes (600mm) have been provided within the zone between Phases 1 & 2.
Overall Storage Provided (Approximate)	491m ³	395m ³
Other Design Changes	Drainage has been rationalised and developed to Stage 4, in order to minimise the number of internal manholes. Coordination with updated information: • Architect's Plans • M&E pop-up Locations • Landscape Architect's Plans • Foundation Plans • Tower Crane Bases • Proposed and Existing Services Plans • Additional CCTV/ 3D Sewer Survey Information.	

8. CONCLUSION

The Flood Risk Assessment Report, has considered all potential flooding mechanisms and the site is considered to have **Low Probability** of Flooding.

The report shows that the site can effectively manage flood risk through a combination of sustainable drainage systems and flood mitigation measures. By analysing historical data, current site conditions, and future climate change projections, the report identifies potential flood hazards and outlines strategies to mitigate these risks.

United Utilities records have identified a 300 x 400mm combined sewer located under the existing building. Further survey works are required for this sewer. It is intended to abandon this sewer via a S116 agreement with United Utilities. A further abandonment is proposed for a section of 450mm combined sewer on the Western boundary of the site.

The Drainage Strategy has been designed in accordance with current best practice to provide adequate capacity not to flood for the critical plus climate change storm event.

The Drainage Strategy provides attenuation allowances within a cellular storage tank, oversized pipework, blue roofs and permeable paving.

The drainage strategy proposes a combined discharge point to the 1950mm combined sewer within the site. A discharge rate of 14 l/s has been agreed with United Utilities. (This is a reduction from the original 98.7 l/s discharge proposed in the Arup's Report)

The sewer connection will require a S106 agreement to be agreed with United Utilities.

In conclusion, with the adoption of the recommended drainage strategy and flood mitigation measures, the development site will be resilient to flood risk, promoting safety, sustainability, and long-term viability. Regular monitoring and maintenance will further enhance the effectiveness of these measures, ensuring the site's preparedness for future climatic changes.

9. MAINTENANCE

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event. Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.

A management company may be required for maintenance of attenuation facilities.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

9.1. Components

The following components have been included within the drainage design for the proposed development:

- Inspection, Manhole and Catchpit Chambers
- Pipes
- Drainage Channels and Gullies
- Rain Gardens
- Attenuation Tank
- Flow Control Unit
- Blue Roof Area
- Permeable Paving

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

It is assumed that the maintenance of the drainage network will be the responsibility of an on-site facilities management team, however Manchester City Council may adopt the sustainable drainage features proposed.

A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.

The surface water network has been designed to accommodate the 1 in 100 year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 45-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDs features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted below.

It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.

Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.

Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.

During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

The locations of all drainage components are indicated on Curtins drainage drawings enclosed in Appendix G

9.2. Inspection, Manhole and Catchpit Chambers

Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.

The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

9.3. Pipes

Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with the Curtins drainage specification.

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers and manholes.

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	Rod through poorly performing runs as initial remediation.	Required.
	If continued poor performance jet and CCTV survey poorly performing runs.	Required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

9.4.

9.5. Drainage Channels and Gullies

Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	Required.

9.6. Rain Gardens

The rain gardens are intended for surface water conveyance, and a first stage water quality treatment.

Access for maintenance has been provided through access chambers and rodding points.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including incoming channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required
	Remove sediment from pre-treatment structures.	Monthly or as required
Remedial Action	Replace geotextiles and clean and replace filter media, if clogging occurs. Terram 1000 typical design life is 25 years.	Required.
	Excavate trench walls to expose clean soils if infiltration performance reduces to unacceptable levels.	Required.

9.7. Attenuation Tanks

The attenuation tanks are currently specified as geocellular units and are intended for storage of surface water run-off from the site up to and including the 1 in 100 year plus 45% climate change event to reduce the rate of run-off into the downstream network and to minimise flood risk.

The geocellular units are proprietary products and therefore manufacturer's recommendations should also be taken in to consideration.

Access for maintenance has been provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.

Geocellular units are proprietary products and therefore manufacturer's recommendations should also be taken in to consideration. Additionally different manufacturers may have different connection types and arrangements which will need to be taken in to consideration.

Regular inspection and maintenance is important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets, outlets and overflows.	Required.

9.8. Flow Control Units

The flow control units are intended for flood control and flow restriction.

The flow controls are specified as Hydro-brake or similar approved and are proprietary products; therefore manufacturer's recommendations should also be taken in to consideration.

Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	Required.

9.9. Blue Roof

The blue roof is intended as a first stage treatment for water quality, and also as attenuation for surface runoff.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets and outlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and filter chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets/outlets.	Required.

9.10. Permeable pavements

The pavement should be inspected regularly for clogging, litter, weeds and water ponding, preferably during and after heavy rainfall to check effective operation. Permeable pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. The SuDS Manual indicates that sweeping once per year is sufficient for most sites, however the sweeping frequency should be adjusted to suit site specific conditions and should also be informed by annual inspection reports.

The below table outlines the proposed operation and maintenance regime for permeable pavements. This is adapted from The SuDS Manual (C753).

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall or reduced frequency as required, based on site- specific observations of clogging - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediments
Occasional maintenance	Stabilise and mow contributing and advancement areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required –once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required

APPENDICES

Appendix A – Proposed Site Layout



key

To be read in conjunction with CAM-RFM-XX-XX-SP-L-000001 NBS Landscape Specification

Site boundary

Paving Type 1 Q25.110A
Buff, brown & red, Natural Stone
P1 Size: 125 w x 250 l x 90 d mm
P1v: vehicle overrun area
Refer to: drg. CAM-RFM-XX-00-DR-L-008010 & 008011

Paving Type 2 Q25.110B
Buff, brown & red, Natural Stone
P2 Size: 250 w x 500 l x 90 d mm
P2v: vehicle overrun area
Refer to: drg. CAM-RFM-XX-00-DR-L-008010 & 008011

Paving Type 3 Q25.110D
Grey, Permeable Clay Bricks
P3 Size: 65 w x 200 l x 80 d mm
Refer to: drg. CAM-RFM-XX-00-DR-L-008010 & 008011

Paving Type 4 Q25.110E
Winter Bronze, Porous Resin Bound Gravel
P4 Size: 6-10 d mm

In ground cycle path signage Q10.415
Natural Stone
Refer to drawing CAM-RFM-XX-00-DR-L-008030

Existing Tactile paving

Proposed Tactile paving Q25.210
Dark grey, Natural stone
Size: 400 w x 400 l x 50 d mm

Proposed Kerbs
Refer to: drg. CAM-RFM-XX-00-DR-L-000013 & 000014

Line marking Q10.395
thermoplastic
RAL TBC

Glass Balustrade Q40.210
Glass with Stainless steel posts and top rail
including gates as indicated

Seating Platforms Q50.225
Refer to: drg. CAM-RFM-XX-00-DR-L-008003

Seating cubes Q50.230
Size: 450 w x 150 l x 450 h mm
Refer to: drg. CAM-RFM-XX-00-DR-L-008003

Seating Q50.227
Free standing with backrest and armrests
Size: 500-1000 w x varies l x 450-900 h mm
Refer to: drg. CAM-RFM-XX-00-DR-L-008003

Sculptural Seating Q50.240
With backrest and armrests
Size: 500-1000 w x varies l x 450-900 h mm
Refer to: drg. CAM-RFM-XX-00-DR-L-008012 & 008013

Shelter type 01 Q50.310A
With Green Roof
Size: 3500 mm H dimensions as shown on detailed
Refer to: drg. CAM-RFM-XX-00-DR-L-008005

Shelter type 02 Q50.310B
Size: 3500 mm H dimensions as shown on
Refer to: drg. CAM-RFM-XX-00-DR-L-008005

Sheffield Cycle stand Q50.320
Size: 850mm above ground, 900mm long, 51mm width

Steel Pergolas Q50.330
Size: 2900 mm x varying lengths long (steel gauge and width tbd)
Refer to: drg. CAM-RFM-XX-00-DR-L-008003

Litter bins Q50.340

Telescopic Drop Bollards Q50.190

Tree pots Q50.350
Size: 1200/1600mm d x 900mm h

Note: For lighting details see M&E details for further information. Lighting spec. listed below in line with wider All Saints masterplan specification

Existing Column lighting

Proposed Column lighting

Feature stack lighting
Supplier: Selux
Product: Olivo Sistema with multi head luminaire as required to meet required lux levels
Size: 8000mm high

Posts & Festoon Lighting Q50.360

Tree uplight
Spike lights to trees in soft landscape.
For trees in hard landscape:
Supplier: We-e
Product: ETC120

Feature uplighting
For trees in hard landscape:
Supplier: We-e
Product: ETC120

Feature Underseat Lighting
Supplier: Studiotech
Product: PowderLED Lineo Line

Low Level Bollard Lighting
Supplier: Elo
Product: Lightstack

Maintenance taps
See M&E details for further information.

Pop up power
See M&E details for further information.

Existing trees to be removed

Notes

- All dimensions in mm, unless otherwise stated.
- Scaling from drawing if printed incorrectly may lead to errors.
- All information outside red line boundary shown for contextual purpose only.
- All hatch patterns are indicative only unless stated otherwise.
- This drawing is to be read in conjunction with all re-form landscape architecture documentation; and all relevant documentation from the design team
- Levels information on this drawing illustrates the design intent. The contractor is to check and verify all levels and dimensions against site survey information.
- Any discrepancies in the design information are to be brought to the attention of re-form landscape architecture, in writing, prior to commencement of construction works.
- All proprietary products shall be installed in strict accordance with manufacturers written instructions.
- Refer to other consultants' drawings and specifications for the following design information:
 - Foundation details
 - Base course and/or sub bases design & specification
 - Waterproofing of any element
 - Levels & Drainage design and infrastructure
 - Lighting and ducting
 - Existing & proposed utilities

For planting and planting medium refer to CAM-RFM-XX-XX-SP-L-000001 NBS Landscape Specification sections Q28 and Q31

Proposed tree in hard landscape
Refer to: drg. CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed tree in soft landscape
Refer to: drg. CAM-RFM-XX-00-DR-L-008015 to 8018

Indicative location of structural cells for tree planting.

Tensile Wiring System for Vertical Planting QXXX.XXXX

Proposed hedge
Refer to: drg. CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed Rain gardens
Refer to: drg. CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed shrub planting
Refer to: drg. CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed gradients

Proposed levels

Existing levels

Crest lines and contours

Proposed slot drain to drainage engineers specification

Warning of significant hazards or information which may be unusual or difficult to manage

- Building over easement
- Rain garden construction
- Building above podium waterproofing layer

Scale

0m 1m 2m 3m 4m 5m 6m 7m 8m

03.10.25 Sub structure and civils layouts coordinated. Spec referenced updated

Date	Description of revision	Drawn	Checked	Approved

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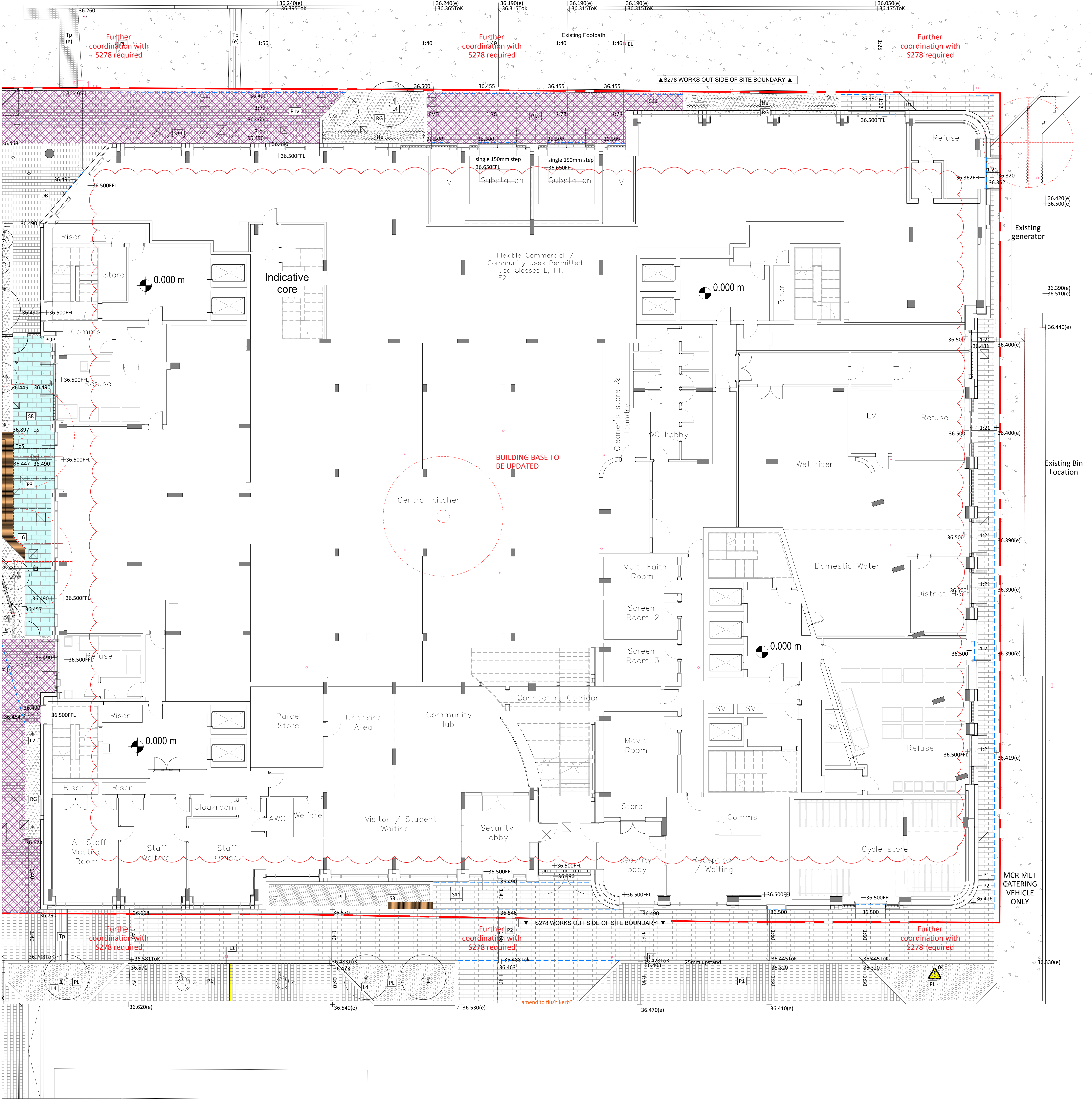
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For **Drainage Layout** information, refer to Civil engineers drawing:
• CAM-CUR-12-00-DR-C-925001 Phase 1 Drainage Layout
• CAM-CUR-22-00-DR-C-925002 Phase 2 Drainage Layout

For **material buildup** information, refer to Civil engineers drawing:
• CAM-CUR-XX-XX-D-C-94710 External Details

For **MEP layout** information refer to drawing:
• CAM-WVL-ZZ-ZZ-DR-N-512003 MEP EXTERNAL UTILITIES LAYOUT PHASE 01 & 02

For **Architectural layout** information refer to drawings:
• CAM-CPA-12-00-DR-A-002001 Proposed - Phase 01 - Ground Floor Plan
• CAM-CPA-22-00-DR-A-002051 Proposed - Phase 02 - Ground Floor Plan



key

To be read in conjunction with CAM-RFM-XX-XX-SP-L-000001NBS Landscape Specification

Site boundary

Paving Type 1 Q25.110A Buff, brown & red. Natural Stone P1 Size: 125 w x 250 l x 90 d mm P1v: vehicle overrun area Refer to drg: CAM-RFM-XX-00-DR-L-008010 & 008011

Paving Type 2 Q25.110B Buff, brown & red. Natural Stone P2 Size: 250 w x 500 l x 90 d mm P2v: vehicle overrun area Refer to drg: CAM-RFM-XX-00-DR-L-008010 & 008011

Paving Type 3 Q25.110D Grey, Permeable Clay Bricks P3 Size: 65 w x 200 l x 80 d mm Refer to drg: CAM-RFM-XX-00-DR-L-008010 & 008011

Paving Type 4 Q25.110E Winter Bronze, Porous Resin Bound Gravel P4 Size: 6-10 d mm

In ground cycle path signage Q10.415 Natural Stone Refer to drawing CAM-RFM-XX-00-DR-L-008030

Existing Tactile paving

Proposed Tactile paving Q25.210 Dark grey, Natural stone Size: 400 w x 400 l x 50 d mm

Proposed Kerbs Refer to drg: CAM-RFM-XX-00-DR-L-000013 & 000014

Line marking Q10.395 thermoplastic RAL TBC

Glass Balustrade Q40.210 Glass with Stainless steel posts and top rail including gates as indicated

Seating Platforms Q50.225 Size: As indicated on plan Refer to drg: CAM-RFM-XX-00-DR-L-008003

Seating cubes Q50.230 Size: 450 w x 150 l x 450 h mm Refer to drg: CAM-RFM-XX-00-DR-L-008003

Seating Q50.227 Free standing with backrest and armrests Size: 500-1000 w x varies l x 450-900 h mm Refer to drg: CAM-RFM-XX-00-DR-L-008003

Sculptural Seating Q50.240 With backrest and armrests Size: 500-1000 w x varies l x 450-900 h mm Refer to drg: CAM-RFM-XX-00-DR-L-008012 & 008013

Shelter type 01 Q50.310A With Green Roof Size: 3500 mm H dimensions as shown on detailed Refer to drg: CAM-RFM-XX-00-DR-L-008005

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Sheffield Cycle stand Q50.320 Size: 850mm above ground, 900mm long, 51mm width

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Litter bins Q50.340

Telescopic Drop Bollards Q50.190

Tree pots Q50.350 Size: 1200/1600mm d x 900mm h

Notes: For lighting details see M&E details for further information. Lighting spec. listed below in line with wider All Saints masterplan specification

Existing Column lighting

Proposed Column lighting

Feature stack lighting Supplier: Selux Product: Olivio Sistema with multi head luminaire as required to meet required lux levels Size: 8000mm high

Posts & Festoon Lighting Q50.360

Tree uplight Spike lights to trees in soft landscape. For trees in hard landscape: Supplier: We-ed Product: ETC120

Feature uplighting For trees in hard landscape: Supplier: We-ed Product: ETC120

Feature Underseat Lighting Supplier: Studiotech Product: PowderLED Lineo Line

Low Level Bollard Lighting Supplier: Elo Product: Lightstack

Maintenance taps See M&E details for further information.

Pop up power See M&E details for further information.

Existing trees to be removed

For planting and planting medium refer to CAM-RFM-XX-XX-SP-L-000001 NBS Landscape Specif sections Q28 and Q31

Proposed tree in hard landscape Refer to drg: CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed tree in soft landscape Refer to drg: CAM-RFM-XX-00-DR-L-008015 to 8018

Indicative location of structural cells for tree planting.

Tensile Wiring System for Vertical Planting CXX.XXX

Proposed hedge Refer to drg: CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed Rain gardens Refer to drg: CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed shrub planting Refer to drg: CAM-RFM-XX-00-DR-L-008015 to 8018

Proposed gradients

Proposed levels

Existing levels

Crest lines and contours

Proposed slot drain to drainage engineers specification

Warning of significant hazards or information which may be unusual or difficult to manage

1. Building over easement

2. Rain garden construction

3. Building above podium waterproofing layer

For Drainage Layout information, refer to Civil engineers drawings:

- CAM-CUR-12-00-DR-C-925001 Phase 1 Drainage Layout
- CAM-CUR-22-00-DR-C-925002 Phase 2 Drainage Layout

For material build up information, refer to Civil engineers drawing:

- CAM-CUR-XX-XX-D-C-94710 External Details

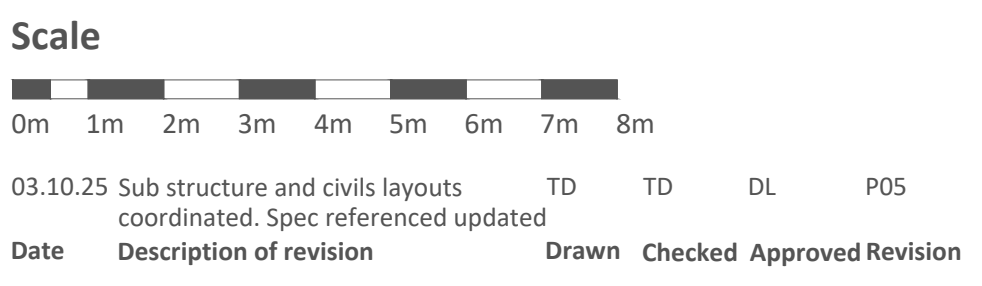
For MEP layout information refer to drawing:

- CAM-WVL-22-22-DR-N-S12003 MEP EXTERNAL UTILITIES LAYOUT PHASE 01 & 02

For Architectural layout information refer to drawings:

- CAM-CPA-12-00-DR-A-002001 Proposed - Phase 01 - Ground Floor Plan
- CAM-CPA-22-00-DR-A-002051 Proposed - Phase 02 - Ground Floor Plan

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 - This drawing is to be read in conjunction with all re-form landscape architecture documentation: and all relevant documentation from the design team
 - Levels information on this drawing illustrates the design intent. The contractor is to check and verify all levels and dimensions against site survey information.
 - Any discrepancies in the design information are to be brought to the attention of re-form landscape architecture, in writing, prior to commencement of construction works.
 - All proprietary products shall be installed in strict accordance with manufacturers written instructions. Refer to other consultants' drawings and specifications for the following design information:
 - Foundation details
 - Base course and/or sub bases design & specification
 - Waterproofing of any element
 - Levels & Drainage design and infrastructure
 - Lighting and ducting
 - Existing & proposed utilities



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Project
CAMBRIDGE HALLS
RF24-1132

Client
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METROPOLITAN UNIVERSITY

Document title
L00 DETAILED GENERAL ARRANGEMENT - PH2

Paper size
A0

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1:100

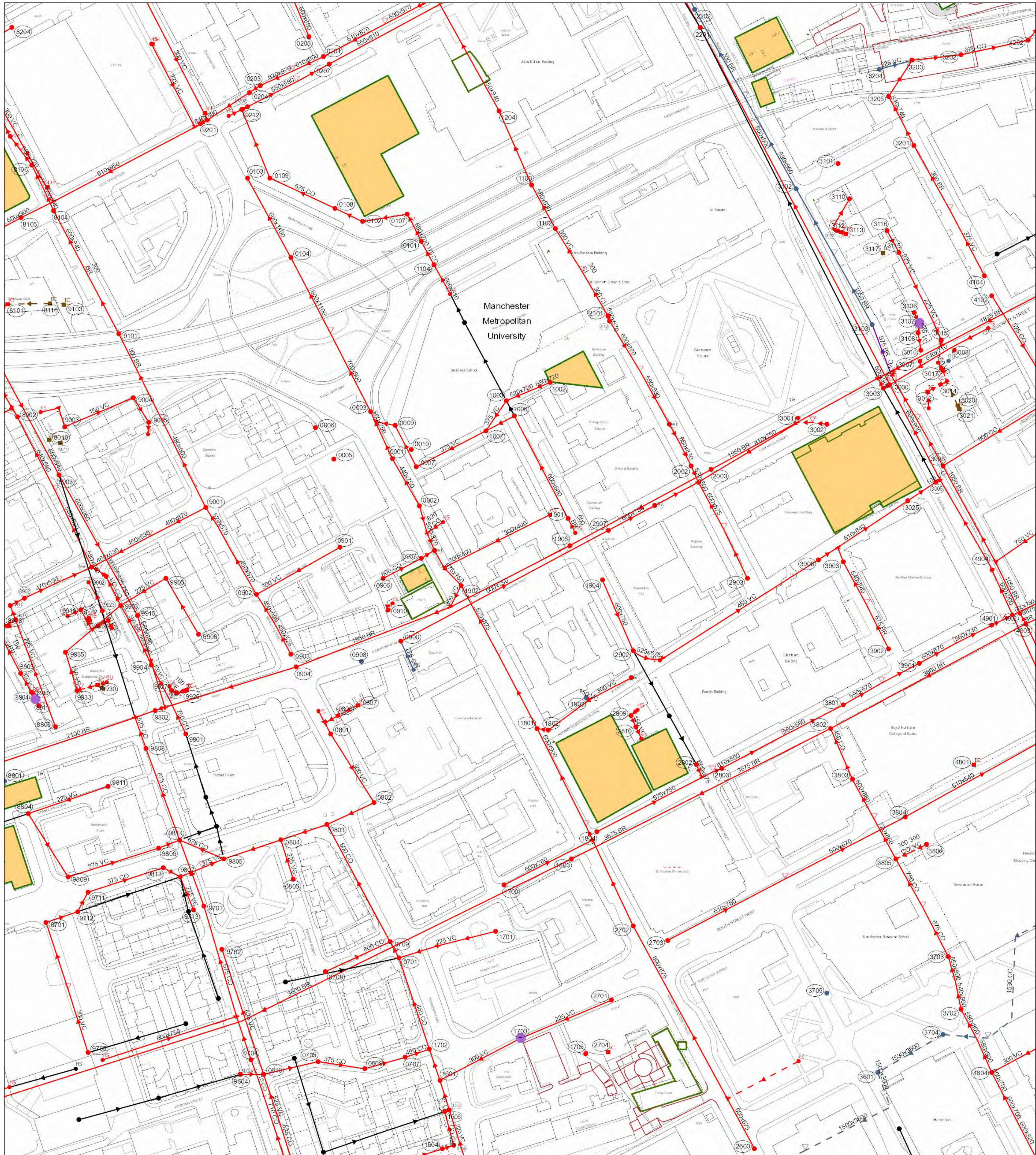
Status
FOR STAGE APPROVAL

Drawing number
CAM-RFM-XX-00-DR-L-000011

Revision
P05

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Appendix B – United Utilities Sewer Maps



Refo	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
1702	CO	0	31.44	450			BR	11.88034	1 in 171
1803	CO	0	3600				BR	379.131	
0009	CO	0	375				VC	11.18008	
9711	CO	0	375				CO	43.70504	
3103	BR	0	1050				BR	34.41669	
1103	CO	0	550				BR	44.77723	
4901	27.77	CO	20.45	550			BR	6.708054	
0609	34.9	CO	31.83	450			CO	23.23455	
9923	CO	0	600				VC	18.05026	
1007	CO	0	375				VC	43.1763	
0201	34.75	CO	24.93	610			BR	18.78829	
4604	CO	0	580				BR	18.69772	
3806	37.02	CO	34.33	300			VC	9.944272	1 in 0.28376497
2007	CO	0	600				CO	27.37044	
1802	36.19	CO	31.1	300			VC	6.082763	1 in 43
4202	38.88	CO	31.52	375			CO	14.21267	1 in 203
0104	32.41	CO	28.37	600			BR	50.11986	
0902	35.49	CO	30.02	550			BR	5	1 in 100
0003	35.9	CO	30.39	700			BR	48.30214	1 in 45
1204	CO	0	500				BR	82.36504	
3801	37.35	CO	30.69	600			BR	22.82542	1 in 208
9808	35.27	CO	24.9	525			BR	18.02776	
2803	CO	0	600				BR	140.0463	
0802	35.8	CO	32.06	300			VC	28.63564	1 in 37
0707	CO	0	31.83	450			CO	14.01056	
0601	35.63	CO	33.06	300			VC	52.83038	
8804	CO	0	375				VC	41.34005	1 in 181
0809	34.79	CO	31.94	375			VC	52.46762	
2101	37.14	CO	28.5	300			CI	27.78489	1 in 1
4904	37.88	CO	30.22	600			VC	54.98501	
0205	CO	0	600				VC	80.23092	1 in 103
2901	36.54	CO	31.97	300			VC	24.54294	1 in 327
6807	35.23	CO	30.81	375			CO	13.07304	
1207	CO	0	600				CO	26.05125	
3801	38.43	SW	1500				CO	31.02195	
3115	CO	0	150				VC	43.24533	
9917	CO	0	150				PSC	16.16164	
3903	37.46	CO	34.04	610			BR	54.89618	
9913	CO	0	375				CO	10.58698	
9701	34.98	CO	27.82	675			CO	38.81314	1 in 776
2002	37.05	CO	27.91	630			BR	9.84858	
3802	37.3	CO	20.78	3875			BR	186.1031	
4903	37.81	CO	0	1050			VC	6.642511	
3108	CO	0	225				VC	9.76584	
9933	CO	0	150				VC	22.10219	
3704	36.45	SW	34.02	1530			CO	41.67133	1 in 298
1804	CO	0	675				BR	72.00751	
0108	35.47	CO	30.72	675			VC	39.8404	1 in 34
3015	CO	0	225				VC	3.139419	
3003	37.73	CO	0	600			BR	6.188076	
3008	37.79	CO	33.52	640			BR	38.8495	
9935	CO	0	225				VC	39.9147	1 in 175
9705	34.81	CO	32.54	300			VC	36.68787	
1801	36.21	CO	30.96	600			BR	45.17743	
3803	CO	0	600				BR	15.23155	1 in 762
1002	36.72	CO	28.11	600			VC	13	
8002	34.96	CO	28.81	640			BR	13.89244	
3025	CO	0	610				BR	18.54775	
4903	37.81	CO	22.03	3600			BR	122.2249	1 in 96
3702	CO	0	540				BR	15.20706	1 in 105
2702	36.29	CO	31.97	600			BR	52.48031	
0207	34.85	CO	0	550			BR	109.0841	
1001	36.52	CO	33.01	600			VC	63.85637	
3005	37.9	CO	0	100			BR	2.815737	
3801	37	CO	30.78	500			BR	24.18977	1 in 806
3203	37.13	CO	32.68	375			CO	27.18615	1 in 136
0906	35.25	CO	33.04	225			VC	35.8469	1 in 149
0109	35.14	CO	29.56	675			CO	40.85452	
9901	35.46	CO	29.86	580			BR	45.51881	1 in 35
3000	CO	0	33.52	640			BR	4.11281	1 in 89
3001	35.41	CO	32.23	480			BR	53.85563	
2001	36.98	CO	27.88	600			BR	12.05993	
0708	CO	0	600				CO	38.21952	
3805	CO	0	720				BR	25.05993	
0610	34.8	CO	31.95	375			CO	30.90709	1 in 238
3703	36.43	CO	29.63	675			CO	40.41381	1 in 2
2810	CO	0	150				VC	7.175132	
0701	35.73	CO	31.11	600			VC	10.16685	1 in 51
9212	34.35	CO	28.45	550			BR	3.613208	1 in 72
3204	37.09	SW	34.62	225			VC	18.68154	1 in 104
3006	37.88	CO	28.4	1050			BR	28.6531	1 in 239
2803	36.54	CO	31.29	610			BR	38.47077	
0203	34.37	CO	28.68	600			BR	77.71337	
0801	35.54	CO	32.81	300			VC	44.94441	1 in 85
9914	36.1	CO	27.87	675			VC	53.8653	1 in 158
4104	37.94	CO	35.14	375			VC	49.70626	1 in 107
2809	CO	0	150				BR	6.800198	
3007	37.67	CO	24.65	1950			BR	23.85041	
9003	CO	0	31.94	150			VC	41.16122	1 in 140
1703	35.78	CO	31.94	300			VC	50.42175	
9604	CO	0	300				VC	12.98904	
9918	CO	0	150				PSC	6.137641	
9712	CO	0	375				VC	12.2322	
0805	34.68	CO	33.2	225			BR	22.83022	1 in 83
3102	37.09	SW	26.95	630			BR	57.30619	1 in 249
2202	36.37	SW	26.49	300			BR	33.10589	
9805	35.06	CO	30.53	675			CO	28.63363	1 in 156
0804	35	CO	30.79	600			CO	33.20076	1 in 332
0007	CO	0	375				VC	25.79993	
0001	35.41	CO	32.37	480			BR	34.88553	1 in 46
2201	36.47	CO	31.44	450			VC	8.18104	1 in 59
0202	34.27	CO	28.31	550			VC	95.04575	
1003	CO	0	31.44	450			VC	30.14034	
2101	37.14	CO	28.28	560			BR	3.162278	
3205	CO	0	375				CO	23.85372	
3001	37.38	CO	32.16	610			BR	64.14047	
3000	CO	0	600				VC	223.27	
9801	35.4	CO	30.28	750			CO	21.0238	1 in 2102
3116	CO	0	225				VC	13.85537	
1102	CO	0	580				BR	27.25949	
9902	35.21	CO	31.61	470			BR	21.0238	1 in 78
1700	CO	0	600				CO	54.83751	
1005	36.64	CO	24.38	1950			BR	185.424	1 in 551
9902	CO	0	450				BR	17.54563	
3002	37.57	CO	32.44	510			BR	8.052258	1 in 0.29564568
1605	CO	0	375				BR	19.27436	
1904	36.63	CO	33.85	600			BR	42.54409	1 in 118
9905	35.29	CO	32.79	225			VC	23.15476	1 in 104
1602	35.23	CO	31.54	450			CO	17.23419	1 in 431
9713	CO	0	225				VC	19.70064	
6204	33.53	CO	29.85	600			BR	47.01004	1 in 45
9802	35.26	CO	23.7	2100			BR	179.3054	1 in 448
2802	36.8	CO	32.77	600			VC	6.15173	
2701	36.22	CO	34.43	225			VC	54.23099	1 in 111
9916	CO	0	150				PSC	8.018335	
6201	33.89	CO	30.07	600			BR	7.68004	
0000	CO	0	600				CO	129.8857	
9803	37.16	CO	25.41	1950			BR	68.54994	1 in 45
1604	CO	0	375				CO	6.51502	
9004	CO	0	150				VC	16.07307	
4102	37.97	CO	31.45	525			CO	66.03786	
2103	37.04	CO	0	600			BR	32.75989	
9915	CO	0	500				CO	52.87496	
0810	34.8	CO	26.24	525			VC	72.6876	1 in 186
9906	CO	0	100				PE	3.303437	
9201	34.12	CO	24.48	620			BR	1.414214	
1605	CO	0	375				VC	7.753436	
9701	34.56	CO	32.1	375			CO	18.35546	
3201	37.53	CO	34.37	300			BR	15.65248	
8003	35.11	CO	31.82	375			CO	88.92625	1 in 1
0705	34.8	CO	31.82	375			CO	28.06673	1 in 137
9914	CO	0	225				VC	8.576575	
0709	CO	0	31.11	600			CO	73.53867	1 in 368
2803	37.11	CO	28.87	630			BR	29.96965	
3804	36.84	CO	32.92	610			BR	102.9563	
0202	36.06	CO	30.12	440			BR	30.01666	
3107	CO	0	225				VC	5.466803	
0001	35.96	CO	33.96	440			BR	14.31762	1 in 8
1006	CO	0	375				VC	17.76769	
3202	37.24	CO	32.47	375			VC	17.76769	1 in 223
8106	34.07	CO	30.23	680			VC	10	1 in 125
3106	CO	0	225				VC	6.266931	
3902	37.33	CO	34.43	675			BR	28.83282	1 in 141
0903	35.46	CO	32.82	450			BR	19.23538	1 in 1
9903	35.37	CO	30.12	750			CO	8.944272	1 in 179
8901	35.11	CO	31.67	490			BR	8.944272	1 in 224
0203	34.37	CO	0	620			BR	6.956056	
9811	CO	0	225				VC	46.48696	1 in 23
0102	35.54	CO	31.21	675			CO		

Appendix C – Topographical Survey

Existing Drainage Plan

CCTV Survey Plan

[illegible]

Notes			
Ceiling Height		Arch	
Level	+20.00	Radiator	
Floor Level	+20.00 FL	Station	
Ceiling Level	+20.00 CL	Hedge	
Soffit Level	+20.00 SL	Sleep slope	
False Ceiling Level	+20.00 FCL		
Floor to cill height	c-1234	Fence	
Cill to head height	h-1234	Foul pipe	
Door height	dh-2000	Storm pipe	

Survey Coordinates and Grid

Please note that the grid shown on this drawing is as follows:

- ☐ Arbitrary
- ☐ Arbitrary but related to building line
- ☐ Arbitrary but approx. related to North
- ☐ Best fit to an Ordnance Survey Digital Sheet
- ☒ Related to the Ordnance Survey National Grid

Levels

Please note that the levels shown on this drawing are as follows:

- ☐ Arbitrary and related to a temporary bench mark
- ☐ Related to an Ordnance Survey Bench Mark
- ☒ Related to the Ordnance Survey National GPS Network

Level positions are indicated by a cross or the decimal point

Type	GPS Survey
Position	
Value	

Trees

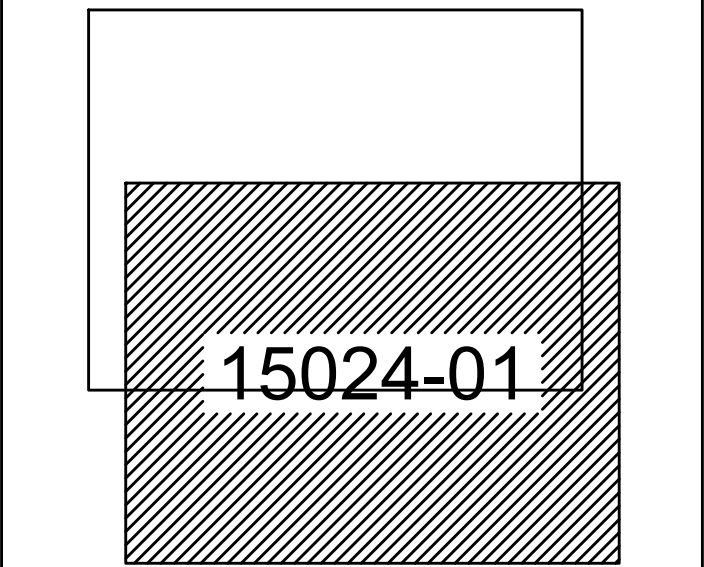
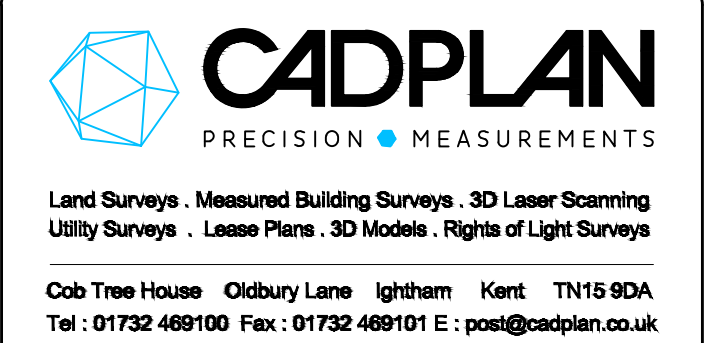
All trees sizes are approximate and should be checked on site before using information. Where guaranteed tree species become important the services of a tree expert should be employed

Notation : diameter of trunk / Height / Spread

Drainage

Where drainage covers have been lifted data has been recorded for each individual manhole from the surface and connections to other manholes, pipes or gullies are assumed. Where information is required by accessing the manhole or tracing to other manholes then a services trace will be needed.

Notes

[illegible]

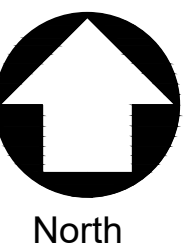
Client
Unite Group Plc

Project
Cambridge Halls
Manchester Metropolitan University
Manchester

Drawing Title

SitePlan 1 of 2

Sheet/Scale	Date	Drawn	Checked
A0@1:200	05/07/24	M.R.H	C.S.D.
Project No.	Drawing No.	Preliminary	Revision
15024	01		A



Abbreviations	
AB	Air Brick
AV	Air Valve
BS	Basin
BGP	Break Glass Point
BR	Brick
BS	Blue Sign
C	Chain Link
CB	Cable Box
CO	Column
CONC	Concrete
CPL	Cable Pole
CPS	Concrete Paving Slab
CTV	Cable Television Cover
DA	Drop Area
DH	Door Height
EP	Electric Pole
ER	Earthing Rod
FB	Flashed
FC	Fake Ceiling
FE	Fire Escape
FM	Fire Main
FR	Fire Hose Reel
FL	Flag Pole
GP	Gate Post
GU	Gully
GV	Gas Valve
H	Chill to Head Height
HT	Height
I	Insulation Cover
IR	Iron Railings
JOB	Joint Box
LB	Litter Bin
LP	Light Pole
LW	Light Well
MH	Manhole
MK	Meter
MY	Mercury
OH	Overhead
PM	Parking Meter
PS	Post Box
PR	Post & Rail
RE	Roofing Eave
RET	Retaining
RSS	Roller Steel Station
RSJ	Roller Steel Joint
RWP	Rain Water Pipe
SC	Stop Cock
SVP	Soil Vent Pipe
TBR	Telephone Call Box
TBM	Tamp. Bench Mark
TP	Township Pole
TL	Traffic Light
TK	Tank
UTL	Unable To Lift
V	Vent
VP	Vent Pipe
WM	Water Meter
WP	Water Pipe
WSC	Water Stop Cook
WV	Water Valve

Notes	
Setting Height	Arch
Level	Radiator
Floor Level	Station
Ceiling Level	Hedge
Soil Level	Slope
False Ceiling Level	Shed
Floor to sill height	Fence
Cill to head height	Foul pipe
Door height	Storm pipe

Survey Coordinates and Grid	
☐ Arbitrary	
☐ Arbitrary but related to building line	
☐ Arbitrary but approx. related to North	
☐ Best fit to an Ordnance Survey Digital Sheet	
☐ Related to the Ordnance Survey National Grid	

Levels	
☐ Arbitrary and related to a temporary bench mark	
☐ Related to an Ordnance Survey Bench Mark	
☐ Related to the Ordnance Survey National GPS Network	
Level positions are indicated by a cross or the decimal point	
Bench Mark	
Type	GPS Survey
Position	
Value	

Trees	
All trees sizes are approximate and should be checked on site before using information. Where guaranteed tree species become important the services of a tree expert should be employed.	
Notation: diameter of trunk / Height / Spread	

Drainage	
Where drainage covers have been lifted data has been recorded for each individual manhole from the surface and connections to other manholes, pipes or gullies are assumed. Where information is required by accessing the manhole or tracing to other manholes then a services trace will be needed.	

Notes	
15024-02	

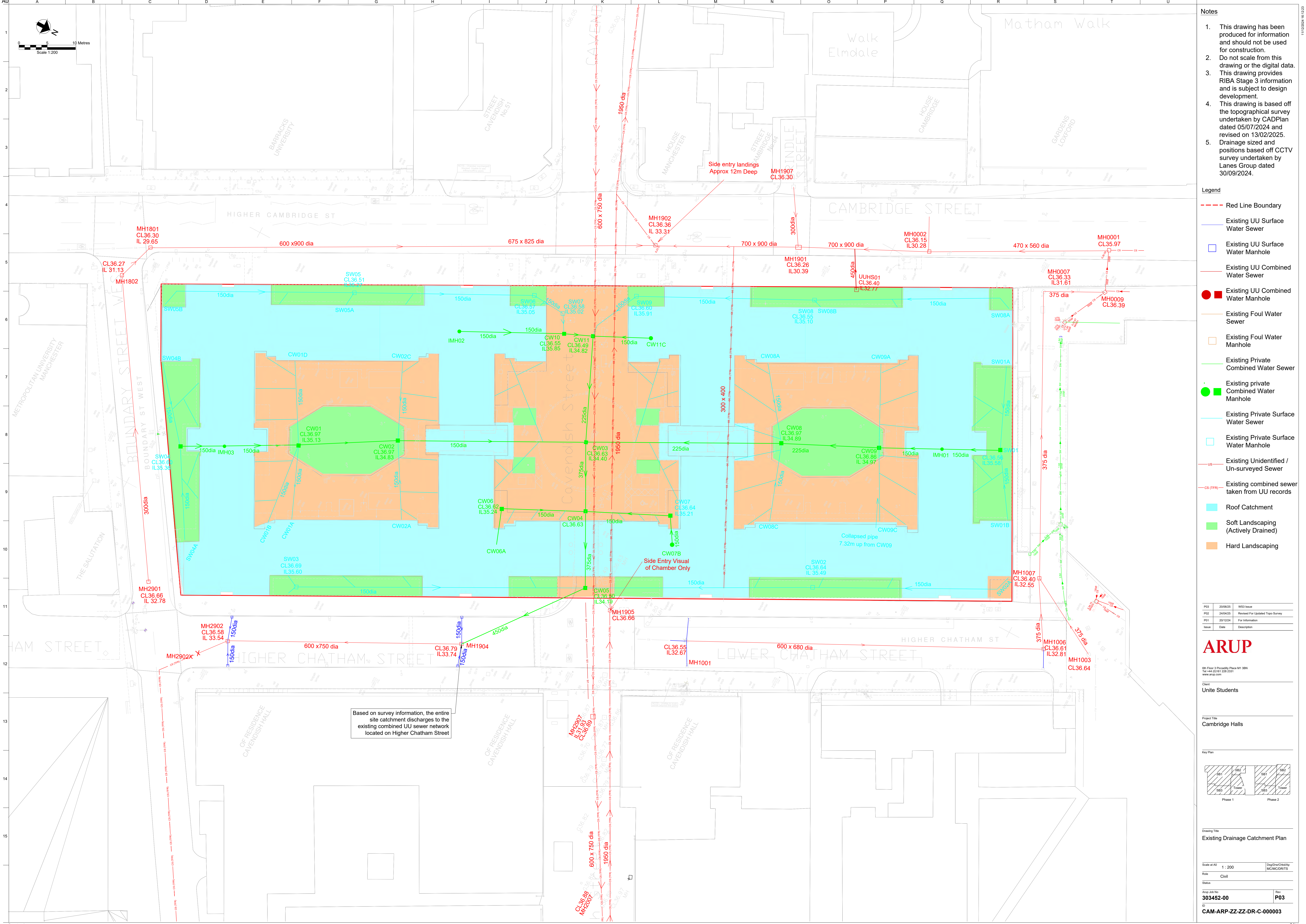
Revision	
Revision	Date By

Land Surveys, Measured Building Surveys, 3D Laser Scanning, Utility Surveys, Lease Plans, 3D Models, Rights of Light Surveys	
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Client	
Unite Group Plc	
Project	
Cambridge Halls Manchester Metropolitan University Manchester	
Drawing Title	
Site Plan 2 of 2	

Sheet/Scale	Date	Drawn	Checked
A0@1:200	05/07/24	M.R.H	C.S.D.
Project No.	Drawing No.	Preliminary	Revision
15024	02		





- Notes
1. This drawing has been produced for information and should not be used for construction.
 2. Do not scale from this drawing or the digital data.
 3. This drawing provides RIBA Stage 3 information and is subject to design development.
 4. This drawing is based off the topographical survey undertaken by CADPlan dated 05/07/2024 and revised on 13/02/2025.
 5. Drainage sized and positions based off CCTV survey undertaken by Lanes Group dated 30/09/2024.

- Legend
- Red Line Boundary
 - Existing UU Surface Water Sewer
 - Existing UU Surface Water Manhole
 - Existing UU Combined Water Sewer
 - Existing UU Combined Water Manhole
 - Existing Foul Water Sewer
 - Existing Foul Water Manhole
 - Existing Private Combined Water Sewer
 - Existing private Combined Water Manhole
 - Existing Private Surface Water Sewer
 - Existing Private Surface Water Manhole
 - Existing Unidentified / Un-surveyed Sewer
 - Existing combined sewer taken from UU records
 - Roof Catchment
 - Soft Landscaping (Actively Drained)
 - Hard Landscaping

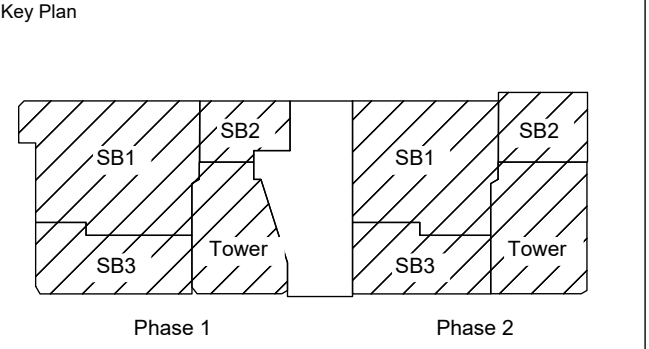
P03	20/08/25	W03 Issue
P02	24/04/25	Revised For Updated Topo Survey
P01	20/12/24	For Information
Issue	Date	Description

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Client
Unite Students

Project Title
Cambridge Halls



Drawing Title
Existing Drainage Catchment Plan

Scale at A0	1 : 200	DispDwnChd/Up
Rule	Civil	MC/MC/DR/TS
Status		
Arup Job No	303452-00	Rev
ID	CAM-ARP-ZZ-ZZ-DR-C-000003	P03