

14551 51 – 53 Richmond St, Manchester

Drainage Strategy & Maintenance Report

Booth King Partnership Limited

Revision P01 – December 2022

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1. Introduction

1.1. Scope

Booth King Partnership Ltd have been appointed by Eminence Development Ltd to develop Civil and Structural Engineering design proposals for the conversion of an existing Grade II listed mill building in central Manchester. Proposals comprise refurbishment of the existing building into 4No. new residential demises and the construction of a 5-storey town house in the narrow parcel of land adjacent the site.

This report identifies the drainage strategy to be employed on site, and how this is to be managed and maintained over time to ensure that the system continues to work satisfactorily.

1.2. Summary

- The site is entirely occupied by the existing building footprint and the proposed new build over the current impermeable surface car park. There is also expected to be a thickness of made ground (potentially contaminated) on site due to historic development. It is therefore considered that disposal of surface water runoff via infiltration is not feasible.
- It is not considered feasible to expect flow control devices to perform satisfactorily at flow rates less than 5 l/s. For design and maintenance purposes, a discharge rate of 5.0l/s to UU combined sewer is proposed. The drainage is to be designed for a 1 in 100 year plus 30% climate change storm return period.
- Sustainable Drainage Systems (SuDS) are to be implemented and maintained for the lifetime of the building.

1.3. Site Location

The site is located in central Manchester at 51 to 53 Richmond Street, M1 3WB (E: 384318 , N:397809). The site is at approximately 41.0mAOD.

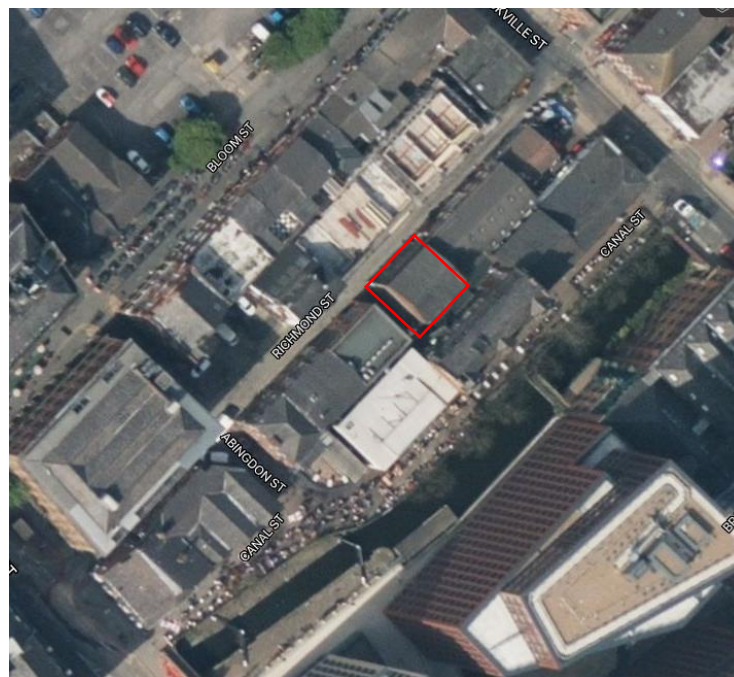


Figure 1: Site Location Plan

1.4. Existing Site Description

The site is currently occupied by a Grade II mill building originally constructed in c.1860. It is 4-storeys in height including a partial basement and is bound by Richmond Street to the front elevation and a narrow alley and low-medium rise buildings to the rear.

Either side of the building are more contemporary low-medium rise buildings. To the north the building shares a party wall with its neighbour whilst to the south a narrow parcel of brownfield land is occupied by a single parking space.

The existing building is currently occupied by a textile merchant “Albert Jones Textiles Ltd” and has, by all accounts, served a similar purpose throughout its history. The building is used generally for material storage with a small office space albeit the second floor and basement have been disused for some time.

1.5. Geo-Environmental Conditions

A Preliminary Desktop Study has been undertaken for the site. The study was carried out by NX Consulting in June 2022, report reference NX451. Please refer to NX Consulting’s report for full details.

Key findings of the report are as summarised in the following sub-sections.

1.5.1. Geotechnical

The report indicates that a thickness of made ground would be expected on site given its development history. Based on historical borehole logs, underlying the fill a superficial deposit of Till comprising stiff clay, sands and gravel is expected above a bedrock of Chester Pebble Beds largely comprising sandstone at depth.

1.5.2. Hydrological

Historical borehole logs (from the BGS website) reviewed show that no groundwater was encountered albeit the risk of flooding from groundwater is considered moderate. The site does not lie within a groundwater abstraction zone.

1.5.3. Contamination

Potential contamination sources affecting the site were identified as heavy metals, PAHs, sulphate, asbestos, petroleum hydrocarbons PCBs, solvents and gas (carbon dioxide, methane and depleted oxygen) arising from the historic industrial uses of the site and the surrounding area.

The proposed building footprint covers the entire site and as such migration pathways of potential contaminants to end users are restricted.

2. Flood Risk Assessment

- It has been considered that Flood Risk Assessment is not necessary for the following reasons:

- The site is smaller than 1ha in size
- The site is in Flood Zone 1
- The site is at low surface water flood risk
- The site is not in a reservoir inundation zone



Figure 2: EA Flood Risk Map Demonstrating Site to be in Flood Zone 1 (FZ1)

2.2. Standards and Regulations

All elements of the works will be designed in accordance with the latest relevant British Standards and the Building Regulations and will comply with any relevant statutory or Local Authority requirements. Specifically, the below ground foul and surface water drainage systems will comply with:

- BS 752 Part 1 to 7;
- Local Authority Requirements;
- The SuDS manual by CIRIA;
- Building Regulations Part H;
- 7th Edition Sewers for Adoption.

3. Below Ground Drainage Strategy

3.1. Performance Objectives

The below ground drainage network is designed to convey water from the building to a suitable outfall. The principle objective is for surface water (from rainfall) to be separated from foul water flows, and conveyed to separate outfalls. Where possible, in line with the National Planning Policy, Sustainable Drainage Systems (SuDS) should be used for restricting surface water flows off site.

The current building roof is drained via a series of eaves level gutters into RWP's which discharge directly onto the footpath. This is to be improved via installation of gullies at the RWP's to capture the roof run off in a buried piped network where the discharge rate is to be controlled prior to discharge from site directly to public combined network.

There are currently no surface water drainage goods present to the existing car park where the proposed new build is to be constructed. Again, this is to be improved via development whereby the new build roof runoff will be drained to a buried piped network where the discharge rate is to be controlled prior to discharge from site to public combined network.

3.2. Foul Drainage

Foul water drains have been sized using the discharge unit method contained in BS EN 12056 Part 2.

The system is designed to flow not more than three-quarters full and will be laid at gradients that allow self-cleansing velocities to be achieved.

For the proposed new building, the on-site foul water network connects to a combined manhole prior to connecting into the existing UU combined sewer 450mm pipe beneath Richmond Street.

New Building			
	Number	D.U.	Total D.U.
Wash Hand Basin	2	0.3	0.6
Toilet	2	1.4	2.8
Sink	1	1.3	1.3
Shower	2	0.4	0.8
Wash Machine	1	0.6	0.6
Dish Washer	1	0.2	0.2
			6.3

TOTAL D.U.	K	TOTAL l/s $(k \cdot \sum(D.U.)^{1/2})$
6.3	0.5	1.25

Figure 3: Design Foul Flow Rate for New Build

The proposed building, containing a single dwelling, will have a peak flow rate of 1.25 l/s.

The existing building contains an existing foul pop up and this is assumed to be connected directly into the public combined sewer beneath Richmond Street. The private drainage network is to be surveyed and repaired as necessary.

Refurbish Building			
	Number	D.U.	Total D.U.
Wash Hand Basin	8	0.3	2.4
Toilet	8	1.4	11.2
Sink	4	1.3	5.2
Shower	8	0.4	3.2
Wash Machine	4	0.6	2.4
Dish Washer	4	0.2	0.8
			25.2

TOTAL D.U.	K	TOTAL l/s $(k \cdot \sum(D.U.)^{1/2})$
25.2	0.5	2.51

Figure 4: Design Foul Flow Rate for Refurbished Building

The refurbished building, containing 4No. dwellings, will have a peak flow rate of 2.51 l/s.

3.3. Surface Water

3.3.1. Sustainable Drainage Systems (SuDS)

The National Planning Policy Framework states that Sustainable Drainage Systems (SuDS) should be used for restricting surface water flows off site.

The Flood and Water Management Act 2010 requires new developments and redevelopments in England and Wales to have drainage plans for surface runoff approved by the Sustainable Drainage Systems Approval Body (SAB) where the construction work would have drainage implications. The SAB is responsible for adopting and maintaining new SuDS that serve more than one property and have been constructed as approved and function as designed.

The current National Standards for Sustainable Drainage Systems require all new developments, where practicable (excluding single properties), to implement SuDS. The standards set out appropriate design criteria based on four main parameters:

1. Runoff Destination hierarchy (in order of preference);
 - a. To ground;
 - b. To surface water body;
 - c. To road drain or surface water sewer;
 - d. To combined sewer
2. Peak flow rate and volume (pre and post development)
3. Water Quality (based on potential hazards arising from development and sensitivity of the runoff destination)
4. Function (design; flood risk; operation and maintenance)

3.3.2. Ground Conditions

The NX Consulting Ltd desktop study report indicates the presence of made ground on site beneath the proposed development. The ground conditions, in combination with the proposed building footprint encompassing the entire site, renders disposal of runoff via infiltration not feasible.

The nearest watercourse is the Rochdale canal. There is a row of building between the site and the watercourse and therefore disposal of runoff via a water body is not feasible.

3.3.3. Outfall Location

The intention is to combine surface water runoff from the building roofs and foul drainage into a single combined chamber prior to discharge into the 450mm diameter combined public sewer beneath Richmond Street.

Please refer to appended United Utilities record map showing the presence of a 450mm diameter combined sewer below Richmond Street.

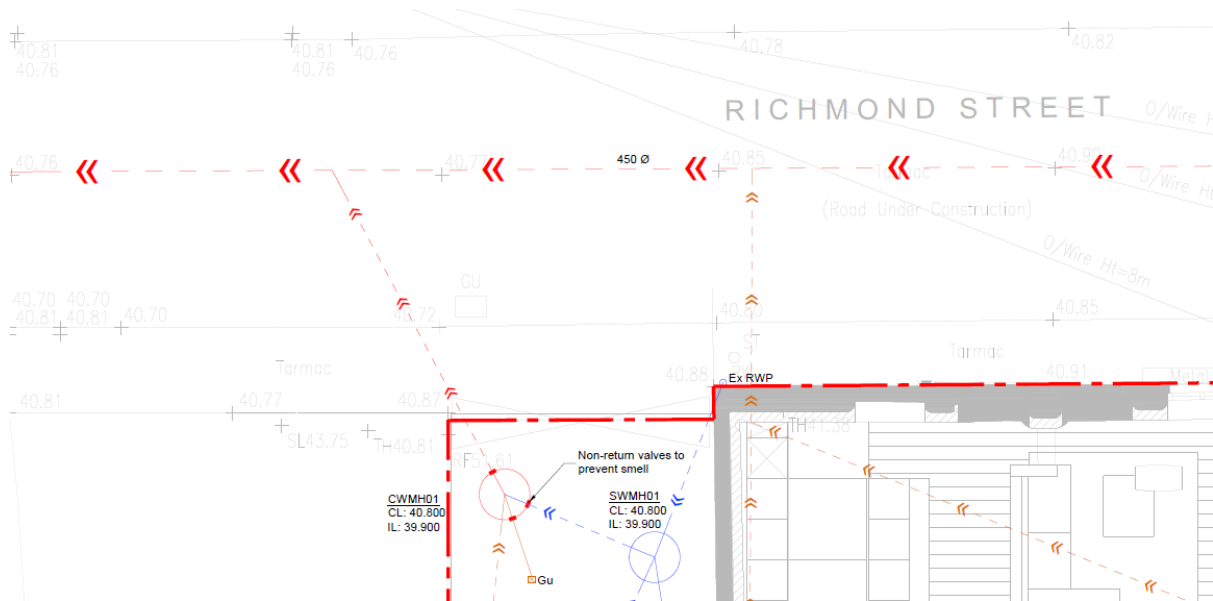


Figure 5: Combined Sewer Outfall

3.3.4. Assessment of surface water flows (existing and proposed)

The below ground surface water network collects water from the roofs and terraces of both buildings on site.

The surface water flows have been fully analysed for the existing hard standing and roofs within the site and the proposed arrangement.

The on-site network has been sized using the Causeway Flow with the following design criteria:

- No surcharging within the system for storm with a return period of 1:1 years;
- No surface water flooding for storms with a return period of 1:30 years;
- No surface water flooding for storms with a return period of 1:100-year;
- Controlled water flooding for storms with a return period of 1:100-year + 30% increase for climatic change.
- It is not considered feasible to expect flow control devices to perform satisfactorily at flow rates less than 5 l/s. For design and maintenance purposes, a discharge rate of 5.0l/s to UU combined sewer is proposed. The drainage is to be designed for a 1 in 100 year plus 30% climate change storm return period.
- Existing drainage simulation shows 6.3 l/s discharge and we are proposing 5 l/s, a 20% betterment.

3.3.5. Pre-Development Discharge Rates

1 in 1 year	1.5 l/s
1 in 30 years	3.8 l/s
1 in 100 years	4.9 l/s
1 in 100 years + 30%cc	6.3 l/s

3.3.6. Post-Development Discharge Rates

1 in 1 year	1.5 l/s
1 in 30 years	3.2 l/s
1 in 100 years	4.0 l/s
1 in 100 years + 30%cc	5.0 l/s

3.4. Supporting drawings and calculations

A full set of calculations are provided with this submission analysing the surface water network and verifying the above flow rates for the existing and proposed arrangements. The proposed drainage network is shown on drawing no. 14551-BKP-ZZ-ZZ-DR-C-0500 (Rev. P01).

2 Maintenance Requirements

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

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

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

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

3.1 Manholes

Manholes are typically sized in accordance with Sewers for Adoption, which relates to the incoming and outgoing pipe diameters. However, as the system is not Adopted, PPICs have been used where manufacturer's limitations permit.

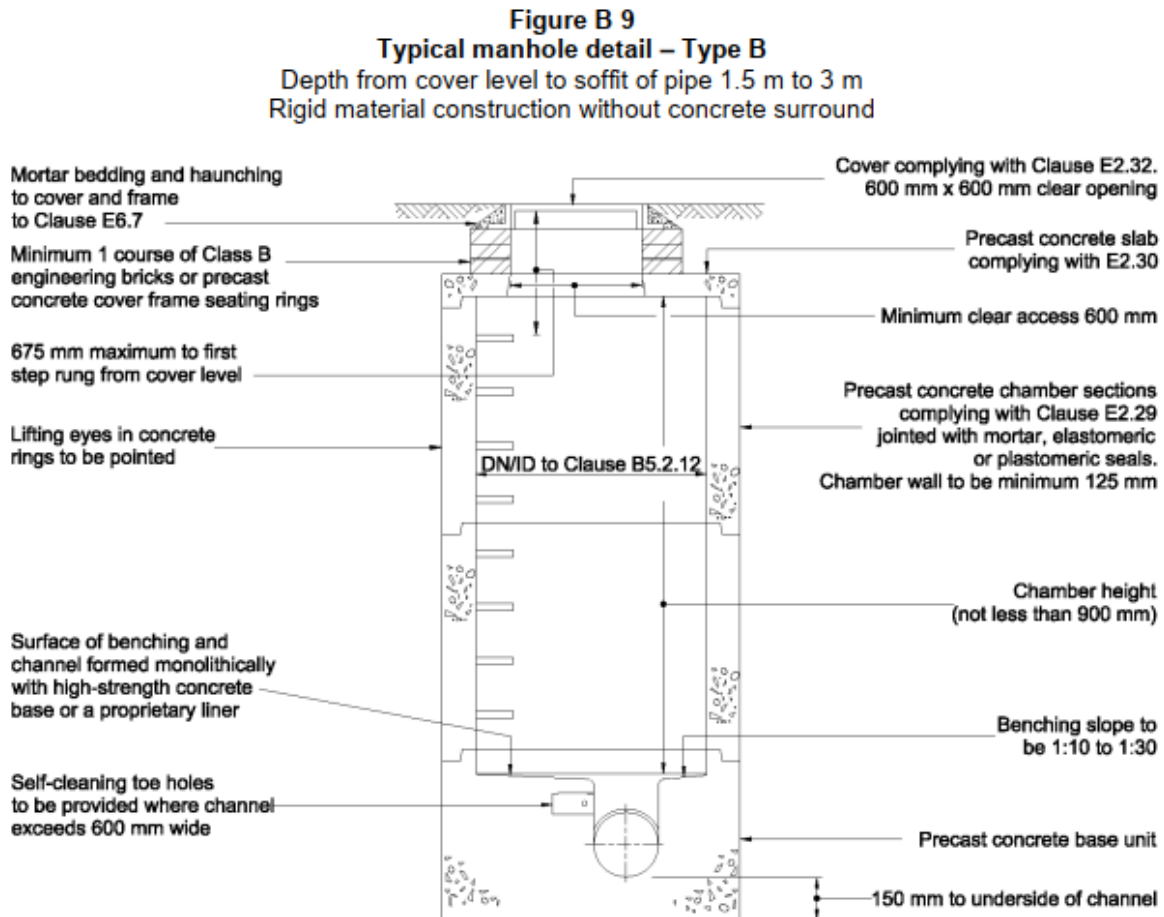
Manholes have been located outside the building in all cases which will allow much greater freedom with future maintenance access.

Maintenance Schedule	Required Action	Frequency
Occasional Maintenance and Monitoring	Covers should be lifted and inspected for litter and debris to ensure that the runs are free-flowing.	3 Monthly (or as required).

Appendix A – Typical Manhole Details

For maintenance requirements, please refer to product manual.

The manual provides information on the specifications, installation details, typical applications and Technical Support information. Please refer to this documentation in the first instance for any future maintenance.



Appendix B – Orifice Plate Flow Control Device

For maintenance requirements, please refer to product manual.

The manual provides information on the specifications, installation details, typical applications and Technical Support information. Please refer to this documentation in the first instance for any future maintenance.



Appendix C – Drainage Layout

Appendix D – Drainage Calculations

Appendix E – UU Record Map