BSM-REN-00-XX-RP-C-00003

Drainage Technical Note

Project:	Brunswick Street, Manchester
Project No:	2004-04

Revision	Description	Issued By	Date	Checked
P01	First Issue	H. Wilkinson	13.10.23	S. Higginson
P02	Revised to suit LLFA comments	J. Bullough	13.12.23	S. Higginson

1.0. ABSTRACT

This Technical Note has been produced to support the discharge of planning condition 10 associated with planning application ref 133478/JO/2022.

10) Before the commencement of the authorised development, a scheme shall be submitted to and approved in writing by the City Council as local planning authority to demonstrate accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements national standards.

The development shall be undertaken in accordance with any related and agreed construction works, which shall be fully implemented prior to the occupation of the authorised residential units and maintained in situ thereafter.

The document provides supplementary information to the drainage strategy for the proposed Brunswick Street, Manchester development, detailing drainage maintenance that will be utilised on-site. It is to be read in conjunction with the manufacturer's recommendations and the project's drainage drawings and reports.

2.0. THE SITE

2.1. Site Location

The proposed development site is located off Brunswick Street, Manchester.

The site location is described below:

- Post Code M13 9XE
- OS X (Easting) 385245
- OS Y (Northing) 397073
- Nat. Grid SJ852970

The site location is illustrated in Figure 2.1 below.

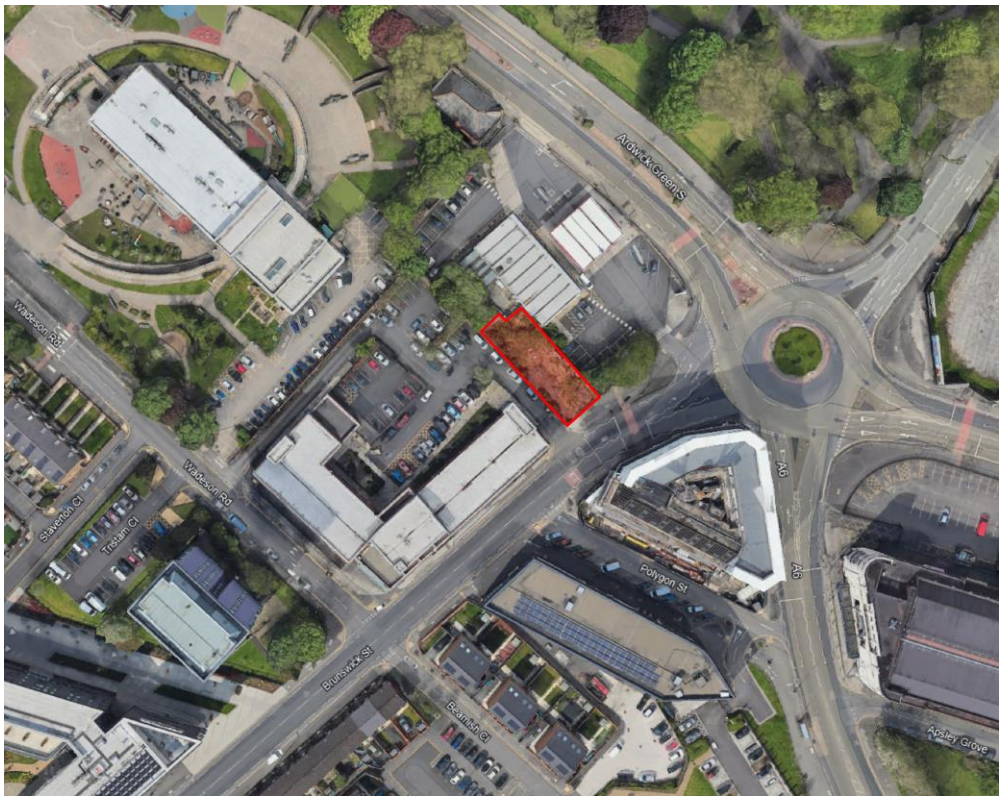

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Figure 2.1: Site Location

3.0. DRAINAGE STRATEGY

The proposed onsite networks for the development have been assessed previously as part of the original planning application for the site (131240/FO/2021) and the proposed discharge rates discussed and agreed with United Utilities and the LLFA for the development. The proposed drainage strategy submitted as part of the amended planning application that this document relates to follows the same principles of this previously approved scheme.

Details of the originally approved drainage network for the development can be found within ELLUC Projects Ltd Drainage Strategy date April 2021 (Document reference: ELLUC-CD-617-181016-FRA-F2). Refer to Appendix A.

3.1. Proposed Surface Water Drainage Network

The surface water discharge from the development is to be restricted to 5l/s, as previously agreed with United Utilities, before utilising an existing connection to the combined public sewer within Brunswick Street. The proposed connection will be subject to a S106 application with United Utilities. The required surface water attenuation will be provided by oversized manholes.

The surface water drainage network has been designed in accordance with Building Regulations Part H, BS EN 752 and the Sewerage Sector Guidance Appendix C Design and Construction

Guidance (DCG). In addition the following requirements will also be adopted in accordance with the Non-Statutory Technical Standards for Sustainable Drainage, National Planning Policy Framework and Planning Practice Guidance:

- Foul and surface water are to be drained via separate systems.
- The below ground drainage system will be designed to ensure flooding does not occur on site for the 1 in 30 year events and no internal flooding for the 1 in 100 year events.
- The surface water system is to be designed to accommodate the 1, 2, 30 and 100 year events with a 40% climate change allowance for the 100 year event.
- The system will be designed for a maximum storm duration of 6 hours.

Refer to Appendix B for the Proposed Below Ground Drainage Plan.

Refer to Appendix C for the Proposed Surface Water Drainage calculations.

3.2. Proposed Foul Water Drainage Network

As required by the Non-Statutory Technical Standards for Sustainable Drainage, a separate foul water drainage network has been proposed. This network will combine with the surface water network in the last manhole before utilising the existing connection to the public sewer.

Foul water will be allowed to discharge to the public sewer at an unrestricted rate as per standard agreements with United Utilities for the disposal of domestic wastewater. The anticipated peak foul flow rate from the 16 apartments is 5l/s.

The foul water drainage network has been designed in accordance with Building Regulations Part H, BS EN 752 and the Sewerage Sector Guidance Appendix C Design and Construction Guidance (DCG).

Refer to Appendix B for the Proposed Below Ground Drainage Plan.

3.3. Overland Flood Flow Routes

The on-site surface drainage system has been designed to ensure it remains operational and provides sufficient attenuation for upto the 1 in 100 year +40% climate change rainfall run-off events. A drawing of the overland flood flow routes in the event of a blockage or exceedance of the system capacity is included within Appendix D.

4.0. FUTURE MANAGEMENT & MAINTENANCE

The proposed drainage solution uses SUDS techniques in accordance with the CIRIA SUDS Manual C753. The following SUDS feature has been adopted in the Brunswick Street drainage strategy: -

- Oversized manhole providing storage to accommodate the reduced flows from the site.

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

- Inspection chambers, manholes and catchpits.
- Pipes.
- Drainage channels and gullies.
- Flow control Device

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.

The Main Contractor delivering the development is to update the general requirements to reflect the product specific requirements and incorporate these into the Operation & Maintenance manual for the building.

It should be noted that the Main Contractor should provide a Verification Report, including photographic evidence, to demonstrate that the drainage has been constructed as per the design drawings. As-built drawings should be supplied by the Main Contractor where the construction of the drainage varies from the construction drawings.

As such, the maintenance of the specified SUDS should be included within the developments Operation and Maintenance Manual and should be detailed in accordance with the CIRIA SUDS Manual C753, as per the operation and maintenance guidance outlined below.

4.1. General Maintenance & Inspection Requirements

No work shall be carried out on the drainage system without permission from a nominated person, who has access to information/a working knowledge of the system.

Maintenance/inspection work shall be carried out in a safe/planned manner.

All work is to be carried out by competent persons suitably trained and equipped in accordance with current statutory safe working policies.

Entry into confined spaces shall be kept to a minimum and be restricted to suitably qualified/equipped personnel working in accordance with current statutory safe working policies.

Drainage systems shall be inspected on a regular basis or when any problems arise. Any debris/defects discovered shall be recorded and a programme of cleaning/ repair initiated. Urgent repairs/cleaning shall be actioned as soon as practicable.

It is recommended that the drainage system is inspected a minimum of twice a year, with the system also being inspected after all major storm events.

Clearing of the drainage system can be achieved by a number of methods depending on the nature of the work;

- Rodding – Manual/Mechanical with flexible rods.
- Jetting – High pressure water jetting.
- Plunging.

4.2. Inspection Chambers, Manholes and Catchpits

The appropriate health and safety equipment must be used when accessing manholes/catchpits. 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. The following operations should be carried out annually:

- Covers of inspection chambers and manholes shall be removed and the sides, benching and channels cleared.
- Deposits of silt in inspection chambers, catchpits and manholes shall be removed. Any traps shall then be plunged and thoroughly flushed out with clean water. This should be completed in Autumn, after leaf fall has halted.
- Main and branch drains shall be cleared as required and afterwards be flushed with clean water. Any obstructions found shall be removed and not flushed down the system.
- Covers of inspection chambers, manholes and catchpits shall be replaced, bedded in suitable sealing material as required and bolted/locked down as appropriate. Missing bolts and broken items shall be replaced in accordance with the manufacturer's details.

4.3. Pipes

Regular inspection and maintenance are important to identify areas which may have become obstructed/clogged and may not be draining correctly, failure to do so would expose the development to flood risk.

Pipes are proprietary products and therefore the materials used can vary across the site. As such, the manufacturer's recommendations should be followed. Access for maintenance of the pipes is provided through inspection chambers and manholes. The below table sets out the maintenance schedule for the pipe components of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for evidence of poor operation via water levels. If required, take remedial action.	Monthly for 3 months, then six monthly intervals. Also, 48 hours after large storms.
	Check and remove large debris and/or vegetation growth near pipe runs.	Monthly or as required.
Remedial Actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue.	As required, if above actions do not improve performance.
Monitoring	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect/check all inlets, outlets and overflows to ensure they are in good condition and operating as designed.	Monthly for 3 months, then six monthly intervals. Also, 48 hours after large storms.

4.4. 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. The below table sets out the maintenance schedule for the drainage channel and gullys components of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Litter and debris removal.	Monthly or as required.
	Check and remove large debris and/or vegetation growth near pipe 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.	Monthly for 3 months, then six monthly intervals. Also, 48 hours after large storms.
Remedial Actions	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue.	As required, if above actions do not improve performance.
Monitoring	Initial inspection including channel outlet boxes and gully sumps.	Monthly for 3 months, then six monthly intervals. Also, 48 hours after large storms.

4.5. Flow Control Device

Regular inspection and maintenance are important, to identify if the vortex flow control device has become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a risk of flooding.

Vortex flow control devices are proprietary products and therefore can vary from manufacturer to manufacturer. As such, the manufacturer's recommendations should be followed.

Normally, little maintenance is required as a vortex flow control device has no moving parts.

If blockages occur they tend to do so at the intake of the vortex flow control device.

Vortex flow control devices are generally fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

The smaller type conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the vortex flow control device it is vitally important that any building materials etc. are removed from the unit and the chamber.

After the system is made fully functional, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. Units should also be inspected within 48 hours after large storms.

4.6. Surface Water Management During Construction

The management of surface water management during construction will be addressed by the Main Contractor as part of their 'Construction Management Plan'.

A brief overview of the key consideration relating to surface water management and flood risk that will need to be incorporated into the Main Contractors construction methodology include:

- The existing buildings on site are to be demolished. Stockpiling of material on site is to be minimised to ensure that the flood storage capacity for the 1 in 1000 year (0.1% AEP) event is not compromised.
- Due to the industrial history of the site it is anticipated that ground remediation may be required. A working platform will also be required during construction to allow for formation of piled foundations etc. The top of the working platform is to be located at or lower than existing site levels to ensure that the flood storage capacity for the 1 in 1000 year (0.1% AEP) event is not compromised.
- Subject to the level of contamination beneath the site, level of site remediation, and quality of working platform compaction to reduce infiltration, consideration should be given to the risk of residual contamination on site affecting groundwaters.
- The risk of spillage of diesel and other contamination risks during construction activities are to be assessed, and measures implemented to ensure they do not cause a risk to groundwaters.

APPENDIX A

Previously Approved Drainage Strategy

ELLUC Projects Ltd

- Consultancy
- Project Management
- Site Regeneration

DRAINAGE STRATEGY

Proposed Development at
Brunswick St.
Manchester

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Document History and Status

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F2	01.02.17	Final	Charles Townsend	F2	George Isles	George Isles
F3	21.04.21	Final	Matthew Price	F3	Stuart Fraser	Stuart Fraser

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ABBREVIATIONS

Term	Meaning / Definition
AEP	Annual Exceedence Probability
BGL	Below ground level
BGS	British Geological Society
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
CoP	Code of Practice
EA	Environment Agency
EFO	Extreme Flood Outline (Boundary of floodplain associated with a flood event with a probability of occurrence of 0.1%, 1 in 1000 years)
FDA	Flood Defence Agency (e.g. Environment Agency)
FERS	Flood Event Recording System
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FW	Foul Water
GPZ	Groundwater Protection Zone
LDD	Local Development Document
LDF	Local Development Framework
LHA	Local Highway Authority
LPA	Local Planning Authority
m AOD	Metres above Ordnance Datum
MAF	Mean Annual Flood
NGR	National Grid Reference
OS	Ordnance Survey
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
SFRA	Strategic Flood Risk Assessment
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SW	Surface Water
WFD	Water Framework Directive

1.0 INTRODUCTION

1.1. Brunswick Living Limited are proposing a new building. The building is approximately 220m^2. The total area of the site is approximately 0.0359ha and has been cleared, excavated & backfilled.

1.2. The Local Planning Authority has requested that a Drainage Statement is undertaken to assess the risk of drainage to the site.

1.3. ELLUC Projects Limited have been commissioned by Brunswick Living Limited to prepare a formal Drainage Strategy (statement) to accompany an Full Planning Application for the building.

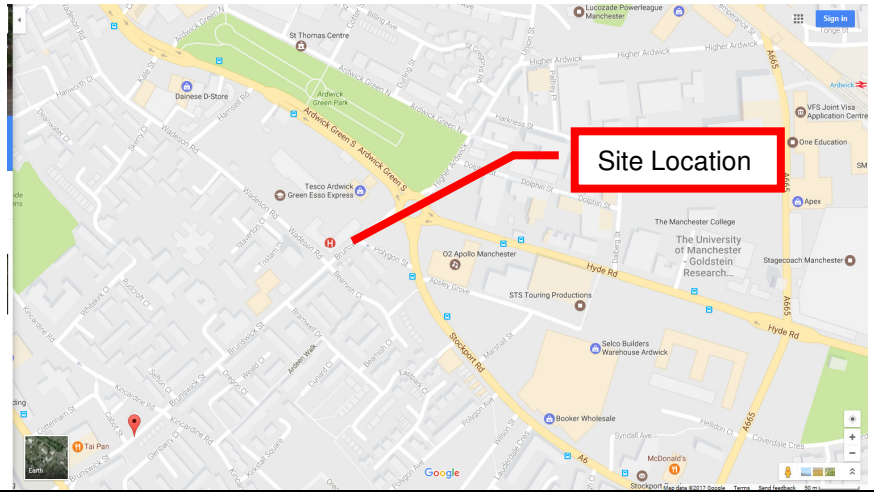
2.0 SITE CONTEXT

SITE LOCATION

2.1. The site is located at Brunswick Street, Manchester. The entire site is approximately 0.0359ha. The new building is for approximately 220m^2.

2.2. At grid reference E405711 N280046. Ref. Figures 5.1 and Figure 5.2:

Figure 5.1 Site Location Plan



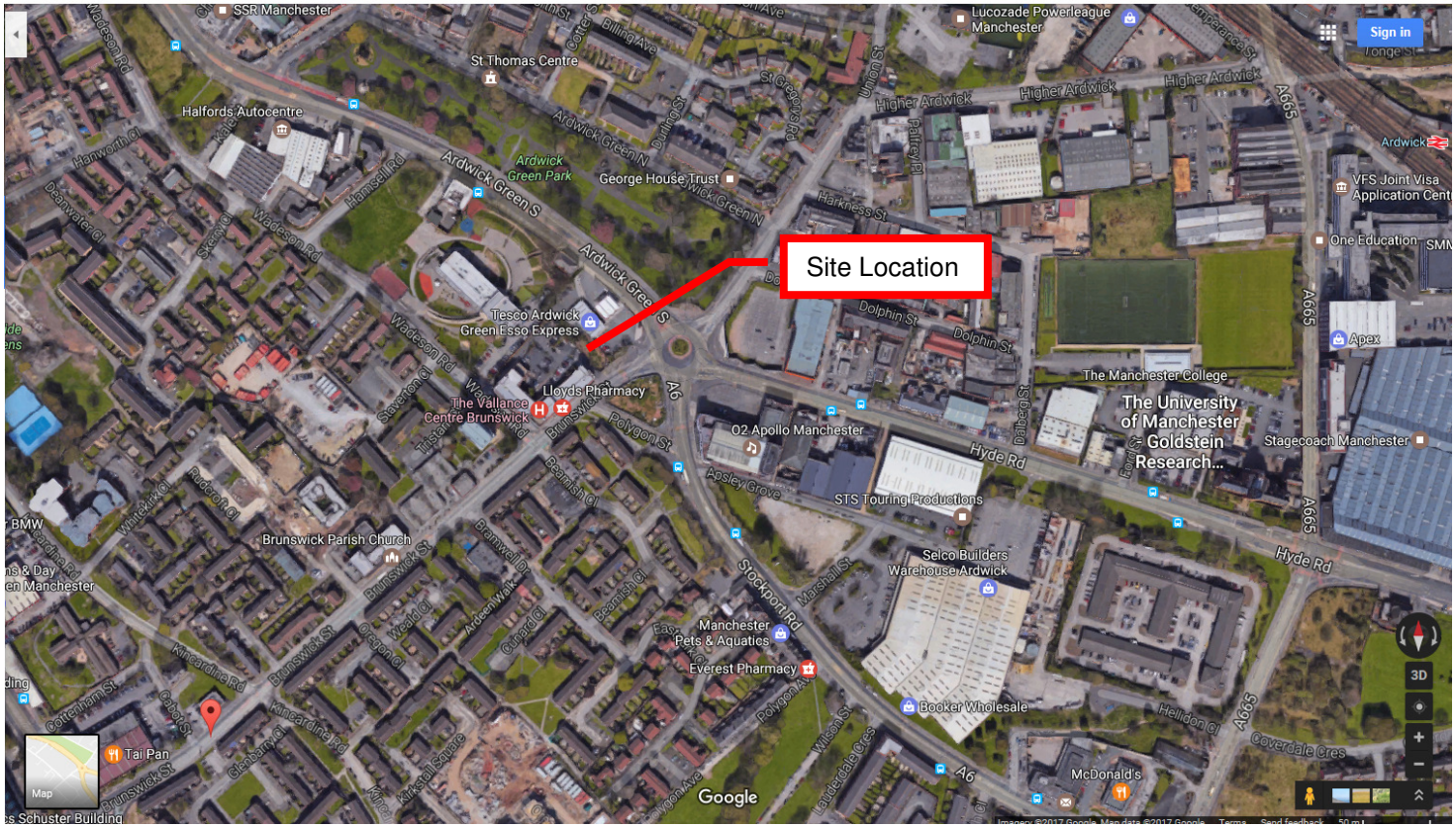


Figure 5.2: Aerial Image

EXISTING SITE CHARACTERISATION / LAND-USE

2.3. The site and surrounding boundary conditions are shown on the Aerial Image in Figure 5.2.

2.4. To the North the site is bounded by the Medlock Primary School .

2.5. To the East the site is bounded by the Tesco Ardwick Green Esso Express

2.6. To the South the site is bounded by Brunswick Street.

2.7. To the West the site is bounded by Vallance Centre.

2.8. The existing site has been cleared, excavated & backfilled.

EXISTING SITE TOPOGRAPHY

2.9. The site is at an approximate elevation of 41.54mAOD at the North Western border and slopes to the South Eastern border which is approximately 40.51mAOD.

EXISTING WATERCOURSES / WATER BODIES /DRAINAGE INFRASTRUCTURE

2.10. There is no watercourse within the vicinity of the site.

EXISTING GROUND CONDITIONS

2.11. According to the British Geological Society website 1:50,000 maps, the bedrock is of Chester Pebble Beds. The superficial deposits are Till Devensian in this area.

2.12. The site is not within a groundwater source total catchment zone.

3.0 PROPOSED DEVELOPMENT

PROPOSED LAYOUT

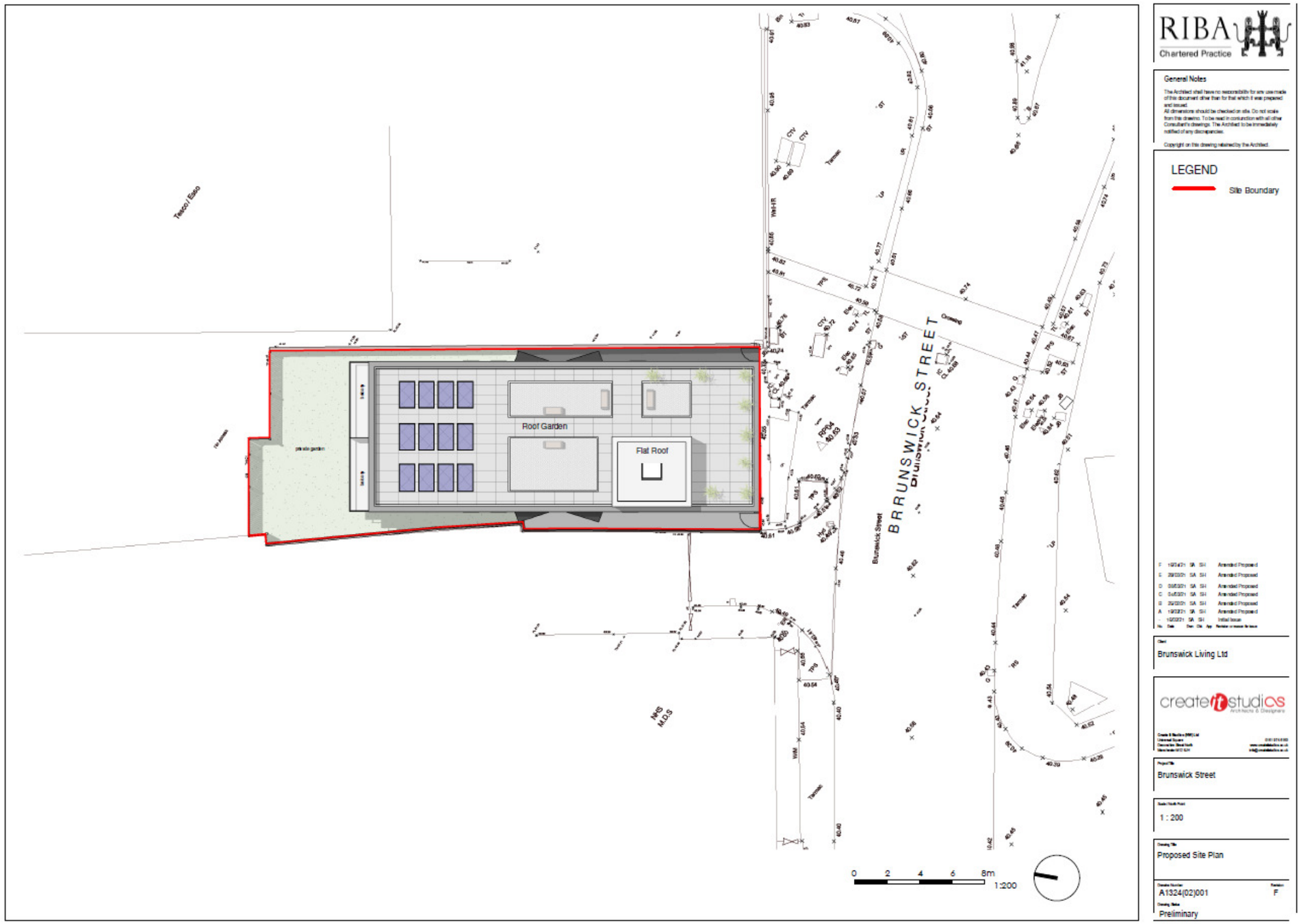
3.1. The proposed site layout is shown in Figure 6.1 and the full version is in Appendix C

3.2. The proposed development is a building of 220m^2.

PROPOSED LEVELS

3.3. The preliminary proposed levels surround the building will be kept as close as possible to the existing levels.

Figure 6.1 Proposed Layout



4.0 PROPOSED DRAINAGE

SURFACE WATER DRAINAGE OPTIONS

4.1. Redevelopment of the site will result in no increase in impermeable area as the new building will be placed on hard standing. The proposed building will be 220m^2 It has been agreed with United Utilities and Manchester City Council that it is acceptable to discharge at 5l/s into the sewer infrastructure, if ground conditions are not conducive for soakaway.

4.2. In order to ensure that post-development run-off volumes and peak flow rates discharging from the site do not exceed current levels, it may be necessary to employ SuDS (Sustainable Drainage Systems) methods and source control techniques, including flow control devices to restrict flows and to store attenuated water on site. The provision of such techniques will ensure that the maximum discharge from the site does not exceed the agreed rates with the statutory bodies. In addition, where practicable, opportunities for reducing flood risk through the management of surface water run-off from the site should be included.

4.3. Storage of attenuated flows within the site could be provided in a number of ways:

- under ground – over-sized pipes / tanks or proprietary storage systems such as 'Stormcell';
- above ground – storage / balancing pond, designated surface areas (low risk areas such as car parks, open space);
- combination of underground and above ground;

4.4. Proposed SW drainage systems are generally designed in accordance with 'Sewers for Adoption' [1], which requires that any surface water drainage system, which is proposed to be Adopted after construction, should not surcharge during the 1 in 5 year storm event, and should not produce any surface flooding during a 1 in 30 year storm event (i.e. all run-off contained wholly within the sewerage system during the 1 in 30 year event).

4.5. It is generally accepted that a degree of surface flooding can be permitted during extreme storm events, subject to specific surface areas being designated as flood-susceptible and subject to flooding of these areas posing little or no risk to human life and/or damage to property. Examples of surface areas which might be permitted to flood during extreme events are:

- Agricultural land;
- Recreational land (playing fields etc.);
- Landscaped areas;
- Car parks;
- Other non-inhabited, designated areas.

4.6. In all cases where surface flooding might be permitted or designed in to a scheme, due diligence needs to be given to NPPF and the need to make potential users of such areas aware of their functionality and purpose, and the requirement to maintain safe access and egress at all times.

[1] 'Sewers for Adoption' 6th Edition, published by WRc Plc., March 2006

4.7. The Building Regulations Approved Document H (2002) outlines a hierarchy of potential methods of disposing of surface water from a site:

- A soakaway; or where that is not practicable
- A watercourse or river; or where that is not practicable,
- A sewer.

4.8. The viability of this hierarchy has been assessed below:

SOAKAWAY

4.9. According to the BGS the super deposits are Devensian Till. Till is not permeable and therefore soakaways are unlikely to work in this area.

4.10. It is not recommended that this type of drainage is used on this site.

WATERCOURSES / WATER BODIES

4.11. There are no watercourses in the vicinity of the site.

SEWERS

4.12. There are existing public sewers flowing down Brunswick Street. With agreement from United Utilities and Manchester City Council the surface water and foul can be discharge to the public sewers in Brunswick Road.

4.13. Below is a chart based on table 1.1 typical SuDS components within CIRIA Guidance 697 SuDS manual. This discusses the viable SuDS components and whether they are useable for this site.

Component	Description	Is it viable
Filter Strips	These are wide, gently sloping areas of grass or other dense vegetation that treat runoff from adjacent impermeable areas.	Infiltration is likely to be unsuccessful therefore this type of SuDS system should not be viable.
Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store runoff, and can infiltrate the water into the ground (if ground conditions allow)	Infiltration is likely to be unsuccessful therefore this type of SuDS system should not be viable.
Infiltration Basins	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value	Infiltration is likely to be unsuccessful therefore this type of SuDS system should not be viable.
Wet Ponds	Wet ponds are basins that have a permanent pool of water for water quality treatment. They provide temporary storage for additional storm runoff above the permanent water level. Wet ponds may provide amenity and wildlife benefits	Wet ponds are suitable for this site. However the proposed development is a building and a pond would take too much space. Therefore this type of SuDS is unsuitable
Extended detention basins	Extended detention basins are normally dry, though they may have small permanent pools at the inlet and outlet. They are designed to detain a certain volume of runoff as well as providing water quality treatment.	Extended detention basins would not be possible due to the ground not being permeable. Therefore this type of SuDS is unsuitable
Constructed Wetland	Constructed wetlands are ponds with shallow areas and wetland vegetation to improve pollutant removal and enhance wildlife habitat	Constructed wetland would be possible Therefore this type of SuDS is suitable
Filter drains and perforated pipes	Filter drains are trenches that are filled with permeable material. Surface water from the edge of paved areas flows into the trenches, is filtered and conveyed to other parts of the site. A slotted or	Infiltration is likely to be unsuccessful therefore this type of SuDS system should not be viable.

	perforated pipe may be built into the base of the trench to collect and convey the water.	
Infiltration devices	Infiltration devices temporarily store runoff from a development and allow it to percolate into the ground.	Infiltration is likely to be unsuccessful therefore this type of SuDS system should not be viable.
Pervious surfaces	Pervious surface allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water	Infiltration is likely to be unsuccessful therefore this type of SuDS system should not be viable.
Green Roofs	Green roofs are system which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insulation.	The green roofs are not to be used in this development as there is no space on the roofs. Therefore this type of SuDS is unsuitable
Geo cellular storage	Geo cellular are tanks below ground that hold surface water	This type of SuDS will be feasible on the site. It will not take up land. Therefore this type of SuDS is suitable.

4.14. Following the above exercise a manhole will be used for attenuation

SURFACE WATER DRAINAGE STRATEGY

4.15. There is no increase in impermeable area. The discharge from the proposed building will be set at 5l/s and discharge into the existing public sewers.

4.16. The proposed surface water network has been designed using Micro drainage flow simulation software to ensure the following:

4.17. No surcharging of drainage network for Design Storm of 1 in 2 years.

4.18. No flooding for design flood frequency of 1 in 30 years.

4.19. 1:100 year + 30% model should be duly reviewed and flood routing plans prepared as part of the detailed site designs

4.20. The discharge from the site is 5 l/s to the existing drainage network. The attenuation up to and including the 1 in 100 year event is 3.5m^3. This will be kept within a manhole.

4.21. Maintenance of the drainage will be undertaken by Brunswick Living Limited.

5.0 CLIMATE CHANGE

5.1. Below are the recommended rainfall intensity increases from the Flood Risk Assessment climate change allowance report dated 19th February 2016.

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

5.2. For practical reasons it is difficult to define the lifetime of a development as each development has different characteristics. However, residential development is considered to have a minimum lifetime horizon of 100 years, unless there is specific justification for considering a shorter period (e.g. development controlled by a time-limited Planning Condition). This development lifetime is approximately 100 year design life

5.3. Therefore, over the next 100 years, the recommendations contained in table 2 Flood Risk assessments: climate change allowance document in terms of increased rainfall, would equate to an increase of between 20% and 40% in peak rainfall intensity.

5.4. A rainfall intensity of 30% has been used for designing this development. At detailed design the drainage will be investigated to ensure there is no flooding at 40% rainfall intensity.

5.5. The preliminary design of the proposed SW drainage system has taken account of this increase in peak rainfall intensity over the lifetime of the proposed development and has demonstrated that surface water run-off can be managed in a sustainable manner on the site, including the effects of climate change. It is therefore considered that the proposed development has taken account of climate change effects

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1. Brunswick Living Limited are proposing a new building. The proposed size of the new building is approximately 220m$^{2.}$ There is no increase in impermeable area.

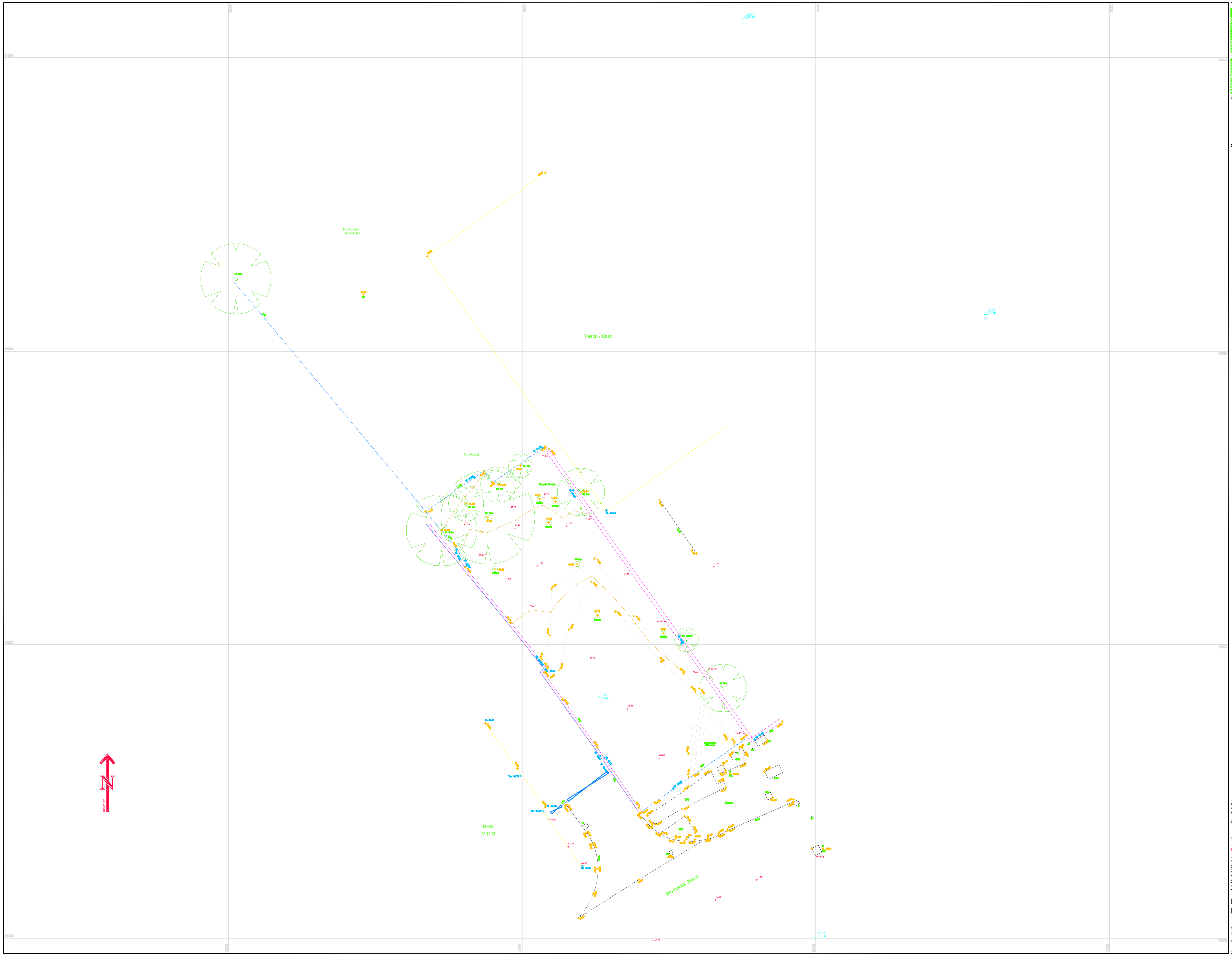
6.2. The Local Planning Authority has requested that the drainage is formally assessed through a Drainage Strategy.

6.3. Redevelopment of the site will not be expected to displace any flood waters.

6.4. It is proposed the building will discharge at 5l/s into the existing UU infrastructure in Brunswick Street. This has been agreed with UU. The storage required is 3.5m^3.

6.5. Based on the information provided to ELLUC Projects Ltd to accompany this Drainage Strategy, redevelopment of the site would be considered sustainable in terms of Drainage as per the existing site.

APPENDIX A:



Topographical Survey Legend

B	Bollard	h	Height	RWP	Rain Water Pipe		Level Prefix Descriptions
BS	Bus Stop	Hyd	Hydrant	SP	Soil Pipe	AL	Arch Level
BT	Telecommunications IC	IC	Inspection Cover	SPS	Stone Paving Slabs	BL	Bed Level
CPS	Concrete Paving Slabs	JB	Junction Box	ST	Stop Tap	CL	Cover Level
CTV	Cable Television Cover	KO	Kerb Outlet	Stay	Cable Stay	EL	Eaves Level
DP	Downpipe	LB	Letter Box	SV	Stop Valve	FL	Floor Level
DR	Drain	LP	Lamp Post	TCB	Telephone Call Box	IL	Invert Level
Elec	Electrical IC	Mkr	Utility Marker	TL	Traffic Light	OL	Overhead Cable Level
EP	Elec. Pole	MP	Mile Post	TP	Telegraph Pole	PL	Parapet Level
ER	Earth Rod	NP	Name Plate	TPS	Tactile Paving Slabs	RL	Roof/ridge Level
FP	Flagpole	P	Post	VP	Vent Pipe	SL	Soffit Level
FT	Floodlight	PM	Parking Meter	WM	Water Meter	Spr	Arch Springing Level
G	Gully	RE	Rodding Eye	WO	Water Outlet	TF	Top Of Fence Level
GP	Gate Post	RS	Road Sign	UTL	Unable To Lift	TW	Top Of Wall Level
GV	Gas Valve	RTW	Retaining Wall			Thr	Threshold Level
						WL	Water Level

Fence Annotation

B/W	Barbed Wire
C/B	Closed Boarded
C/I	Corrugated Iron
C/L	Chain Link
C/P	Concrete Panel
H/R	Hand Rail
I/R	Iron Railings
O/B	Open Boarded
P/C	Post & Chain
P/R	Post & Rail
P/W	Post & Wire
W/M	Wire Mesh

C/L Fence
Safety Barrier
Gate
Stile
Hedge
Limit of Foliage & Tree Canopy
50.00 Spot Level
SSL1 50.00 Survey Control Station (coordinated point)
Tree
MT Multi Trunk

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

Survey Station Coordinates

Stn	Easting	Northing	Level
0001	481.53	520.51	40.62
0002	500.00	500.00	40.56
0003	514.49	553.26	40.96
0004	493.99	578.47	40.86
OSBM	636.18	601.87	41.45

Head and Registered Office
Survey Systems Ltd
Willow Bank House
Old Road
Handforth • Wilmslow
Cheshire SK9 3AZ
Tel. 01625 533444
Fax 01625 526815
mail@survsys.co.uk
www.survsys.co.uk

Levels are related to **OSBM**
Value **41.45m**
Situated on No.2 Higher Ardwick.

Coordinates are related to **Local Grid**

Scale **1:100**

0 1 2 3 4 5 6 7 8 9
metres

The accuracy of this survey is commensurate with the drawing scale specified within the title block. Copyright in this drawing remains with Survey Systems Ltd. Do not scale from this drawing, work to figured dimensions. Check all dimensions on-site. In the event of any discrepancy, please refer query to Survey Systems Ltd.

Client Ollier Smurthwaite Architects

Title
Topographical Survey Brunswick Street Manchester

Surveyed AL AF	Drawn BP		
Date February 2015	Checked AG		
File name 16392	Revision No.	Sheet size A0	

Drawing No. **SSL:16392:100:1:1**

SURVEYsystems

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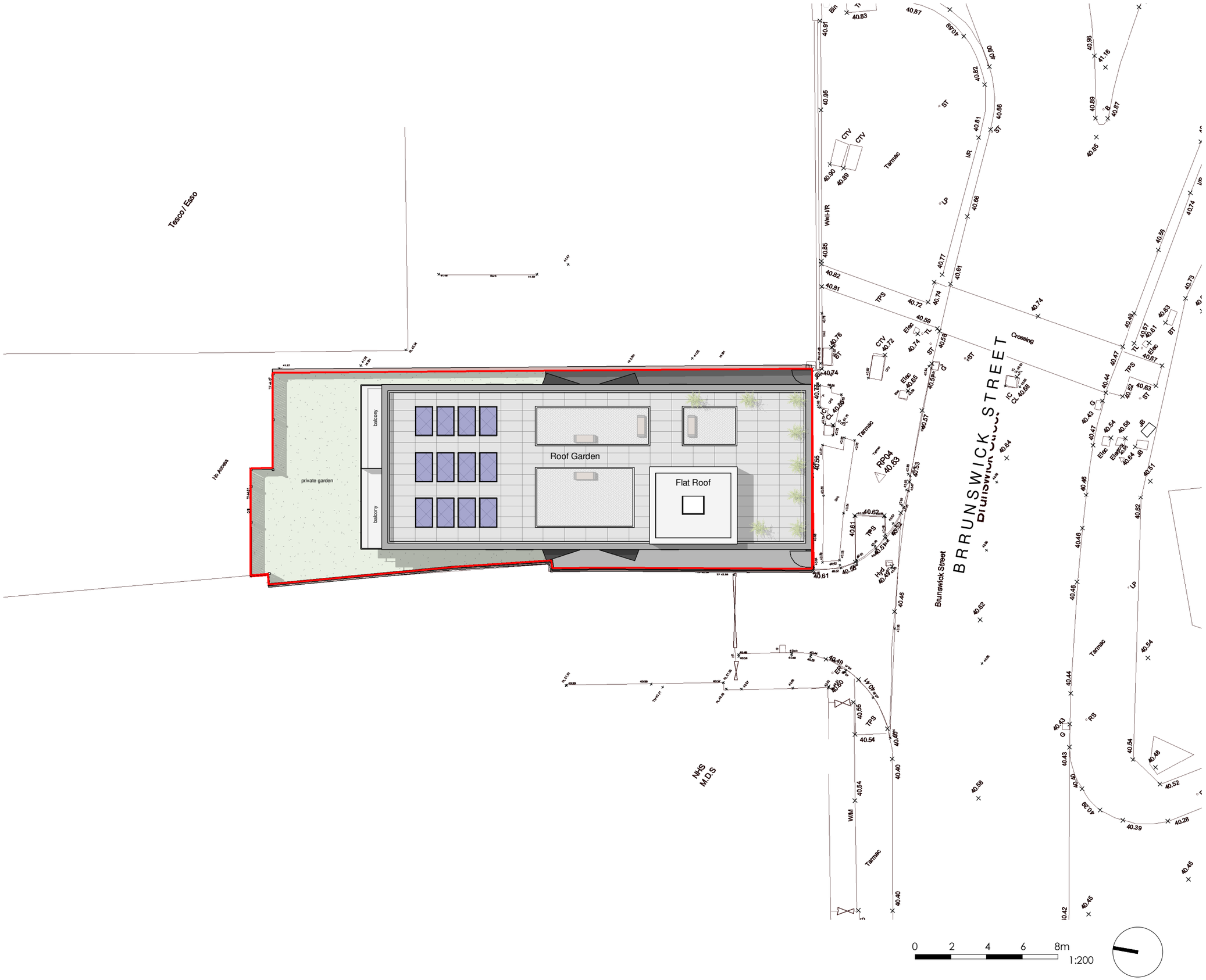
APPENDIX B:



RIBA
Chartered Practice

General Notes

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LEGEND

Site Boundary

No.	Date	Dwn	Chk	App	Revision or reason for issue
F	16/04/21	SA	SH		Amended Proposed
E	28/03/21	SA	SH		Amended Proposed
D	08/03/21	SA	SH		Amended Proposed
C	04/03/21	SA	SH		Amended Proposed
B	25/02/21	SA	SH		Amended Proposed
A	19/02/21	SA	SH		Amended Proposed
-	16/02/21	SA	SH		Initial Issue

Client
Brunswick Living Ltd

create it studios
Architects & Designers

Create It Studios (NW) Ltd
Universal Square
Devonshire Street North
Manchester M12 6JH
0161 974 6165
www.createitstudios.co.uk
info@createitstudios.co.uk

Project Title
Brunswick Street

Scale / North Point
1 : 200

Drawing Title
Proposed Site Plan

Drawing Number
A1324(02)001

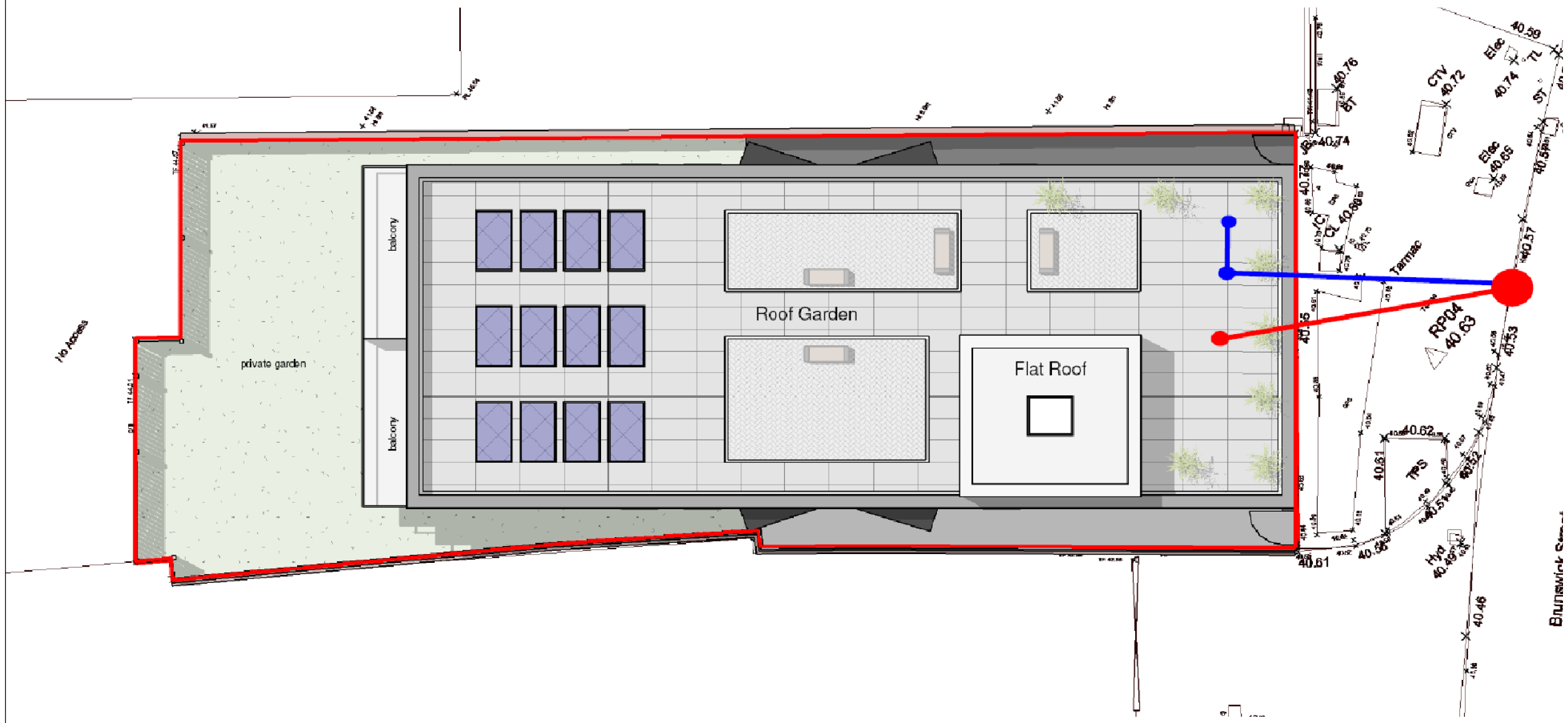
Revision
F

Drawing Status
Preliminary

APPENDIX C:

Key:

- Existing Combined Sewer
- New Storm Connection
- New Foul Connection
- Storm Access Chamber
- Foul Access Chamber



Notes:

1. DETAILED DESIGN INFORMATION TO BE OBTAINED FORM FULL DESIGN.
2. BOTH THE SURFACE AND FOUL WATER ARE DISCHARGED INTO EXISTING COMBINED SEWER AT A DISCHARGE RATE 5 l/s.
3. POSITIONS AND LEVELS OF ALL EXISTING DRAINS AND SEWERS ARE TO BE CONFIRMED ON SITE BY THE CONTRACTOR IN ADVANCE OF ANY CONSTRUCTION, INCLUDING THOSE PIPELINES WHICH ENTAIL ADVANCE TRIAL PITTING TO CONFIRM DETAILS. ANY VARIATION FOUND TO THE INFORMATION ON THIS DRAWING IS TO BE REPORTED TO THIS OFFICE FOR FURTHER INSTRUCTION.
4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK ALL ONSITE EXISTING GROUND LEVELS PRIOR TO COMMENCING AND IF THERE ARE ANY DISCREPANCIES THE CONTRACTOR MUST REPORT TO THE ENGINEER IMMEDIATELY.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE DRAINAGE AUTHORITY OF THE COMMENCEMENT OF ANY DRAINAGE WORKS AND TO COMPLETE ANY REQUIRED SEWER CONNECTION FORMS INCLUSIVE OF PAYING ANY REQUIRED FEES. THE CONTRACTOR MUST ALLOW FOR THE SUPERVISION OF THE SEWER CONSTRUCTION WORKS BY THE LOCAL AUTHORITY AND NOTIFY THE SUPERVISING OFFICER, GIVING NOTICE WHICH IN ACCORDANCE WORTH THE L.A REQUIREMENTS.
6. BEFORE COMMENCING ANY WORKS ON SITE, THE CONTRACTOR MUST CONTACT THE RELEVANT UTILITY COMPANY AND BE IN POSSESSION OF THE LATEST AVAILABLE DRAWINGS DETAILING THEIR SERVICES/APPARATUS.
THE CONTRACTOR MUST CONFIRM THE EXACT LOCATION AND DEPTH OF ALL SERVICES/APPARATUS THIS CAN BE DONE BY THE USE OF ELECTRO-LOCATION OR SIMILAR DEVICES, OR WHERE NECESSARY BY HAND DUG TRIAL HOLES, IN ACCORDANCE WITH THE AFFECTED UTILITY COMPANY SAFETY PROCEDURES. MECHANICAL EXCAVATOR, POWER TOOLS ETC. MUST NOT BE USED TO LOCATE EXISTING SERVICES/APPARATUS.

Rev:	Description:	Date:	By:	Chkd:
B	SITE LAYOUT UPDATED	21.04.21	MP	SF
A	SITE LAYOUT UPDATED	01.02.17	MA	CT

Status: PRELIMINARY

Client: REC

Project: BRUNSWICK STREET MANCHESTER

Drg Title: CONCEPT DRAINAGE DESIGN

ELLUC Projects

ELLUC PROJECTS
760 MANDARIN COURT
CENTRE PARK
WARRINGTON
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WA1 1GG

Phone: (01925) 24 3333
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Website: www.ellucprojects.co.uk

Scale:	Size:	First Issue:	Drawn:	Checked:	Rev:
1:50	A1	20.01.2017	MA	CT	B

Drawing No: ELL-617-REC-B-100

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APPENDIX D

Charles Townsend - Elluc Projects

From: Harrison, William <William.Harrison1@uuplc.co.uk>
Sent: 13 January 2017 08:13
To: Charles Townsend - Elluc Projects
Cc: Wastewater Developer Services
Subject: Repeat DE3031: 17 Brunswick, Ardwick, Manchester

Morning Charles,

Apologies. In light of your reply I would be willing to accept both the surface and foul water into the combined sewer network at a rate of no more than 6.5 l/s.

Kind Regards,

Will Harrison BSc (Hons)
Assistant Developer Engineer
Developer Services & Planning
Operational Services
United Utilities

T : 01925 679319
E : Wastewaterdeveloperservices@uuplc.co.uk

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United Utilities Water Ltd. - Developer Services and Planning
Warrington North Wastewater Treatment Works
Barnard Street Off Old Liverpool Road
Gatewarth Industrial Estate
Warrington
WA5 1DS

From: Charles Townsend - Elluc Projects [mailto:charles@ellucprojects.co.uk]
Sent: 11 January 2017 10:39
To: Harrison, William <William.Harrison1@uuplc.co.uk>
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: DE3031: 17 Brunswick, Ardwick, Manchester

Hi Will, thank oyu very much for your speedy response it got me out of a bind, so thank you.

I think I sent not a very good location plan. Please see below the site, in light of this does it make any difference to you comments:

Sorry for the confusion.

Kind regards
Charles

Cheshire
WA1 1GG

Tel: (01925) 243333

Email: charles@ellucprojects.co.uk
Web: www.ellucprojects.co.uk

Also offices in:

ELLUC Projects Ltd (Midlands)
7 Regents Courts, Far Moor Lane, Redditch, West Midlands, B98 0SD

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From: Harrison, William [mailto:William.Harrison1@uuplc.co.uk]
Sent: 11 January 2017 10:20
To: Charles Townsend - Elluc Projects <charles@ellucprojects.co.uk>
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: DE3031: 17 Brunswick, Ardwick, Manchester

Good Morning Charles,

Happy new year to you also, I hope you had a good one.

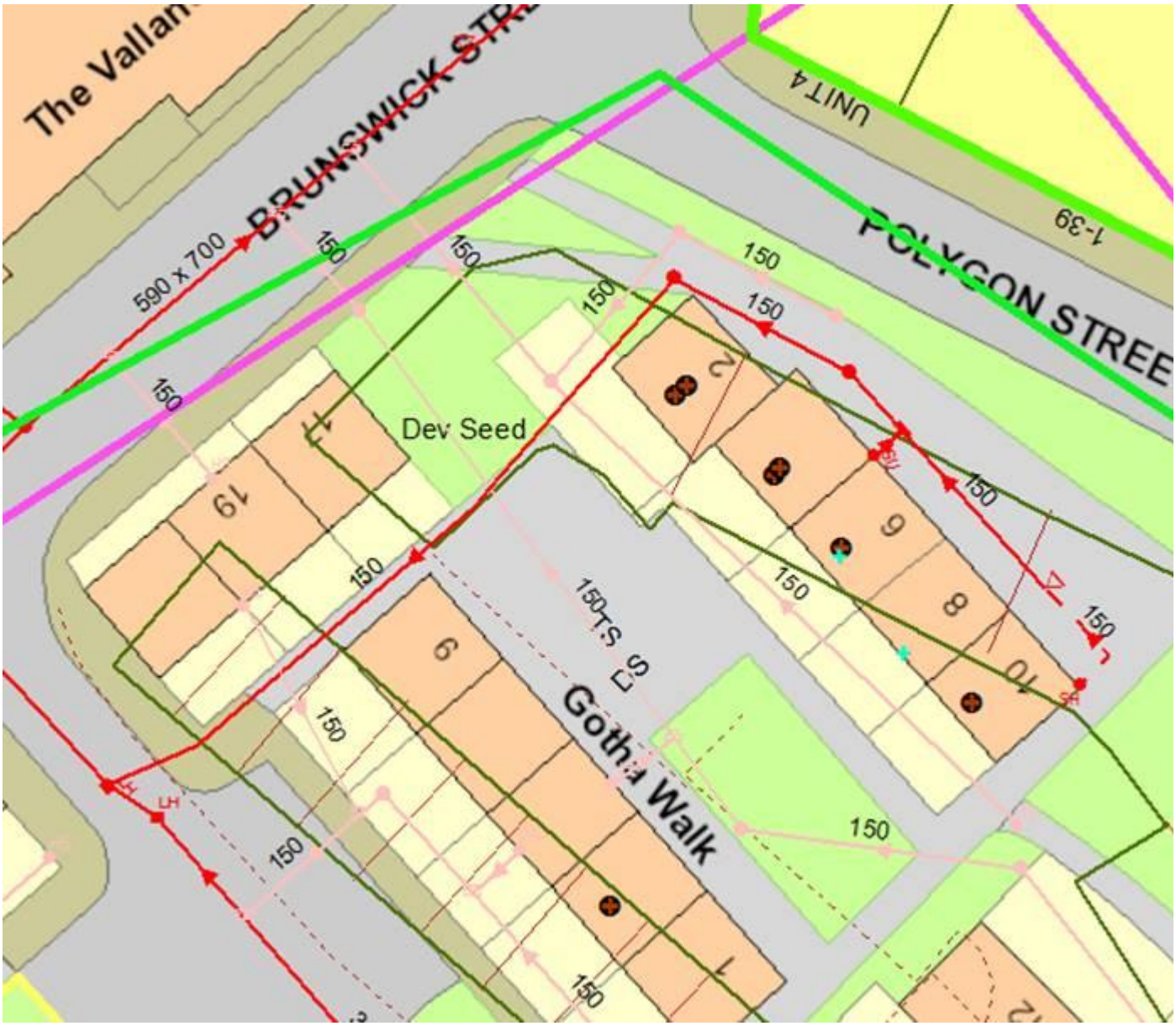
Foul will be allowed to drain to the public combined sewer network at a unrestricted rate and at a point convenient to yourself.

Surface water from this site must drain to soak away or some other form of infiltration system but if ground conditions confirm that this is not a viable solution all surface water can drain to the public combined sewerage system at a point that is convenient to yourself but at a restricted rate of 6.5 l/s.

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

http://www.unitedutilities.com/connecting-public-sewer.aspx

A public sewer crosses this site and we will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 3m as per buildin regulationd which is measured from the centre line of the pipe. If you cannot achieve this then you may wish to consider diverting the public sewer. From our sewer records I note that there is a number of existing small diamter sewers crossing the site as per the sewer extract below (indicative only)



Please refer to the link below to obtain full details of the processes involved in sewer diversion:

http://www.unitedutilities.com/sewer-diversion.aspx

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Kind Regards

Will Harrison BSc (Hons)
Assistant Developer Engineer
Developer Services & Planning
Operational Services
United Utilities
T : 01925 679319
E : Wastewaterdeveloperservices@uuplc.co.uk

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United Utilities Water Ltd. - Developer Services and Planning
Warrington North Wastewater Treatment Works
Garnard Street Off Old Liverpool Road
Gatewarth Industrial Estate
Warrington
WA5 1DS

From: Wastewater Developer Services
Sent: 06 January 2017 11:39
To: Harrison, William <William.Harrison1@uuplc.co.uk>
Subject: DE3031: Brunwick, due 27/1/17

Samantha Mottram
Key Developer Manager
Developer Services & Planning
Operational Services
United Utilities
T: 01925 679313 (internal 79313)
M: 07920 819509 (mobex 80889)
unitedutilities.com

From: Charles Townsend - Elluc Projects [mailto:charles@ellucprojects.co.uk]
Sent: 06 January 2017 11:35
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Brunwick,

Dear all, hope you all had a good Christmas.

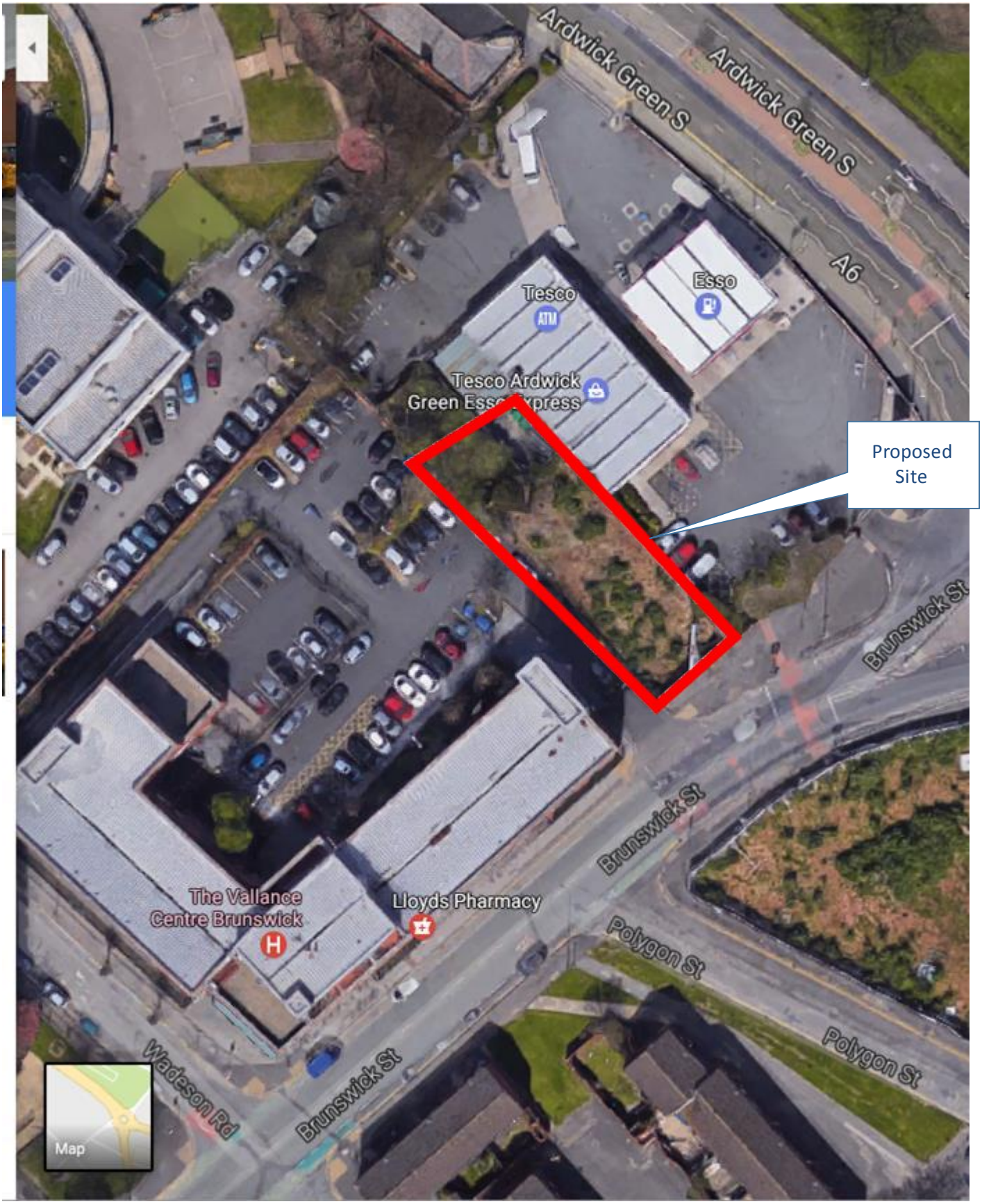
Please can I agree a discharge for a new site I have at 17 Brunswick Street, Manchester, M13 9SU. I would Like to discharge 5l/s into your infrastructure.

I have investigated soakaways however we believe they will not work because they is a petrol station next door so it is likely that the ground is contaminated.

If you have any further questions please do not hesitate to contact me.

Kind regards
Charles

Charles Townsend
Senior Hydrologist



Charles Townsend
Senior Hydrologist

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Centre Park
Warrington

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APPENDIX B

Proposed Drainage Drawings

SVP & RWP SETTING OUT

SVP AND RWP LOCATIONS ARE INDICATIVE FOR DETAILED SETTING OUT REFER TO ARCHITECTS/ BUILDING SERVICES ENGINEERS DRAWINGS. ALL CAPILLARY DRAINAGE IS IN ABEYANCE UNTIL SETTING OUT OF ALL SVPs, STACKS AND RWPs IS CONFIRMED BY THE ARCHITECT AND BUILDING SERVICES ENGINEER

ALL CONNECTIONS BETWEEN ABOVE GROUND DRAINAGE AND BELOW GROUND DRAINAGE TO BE SIZED TO SUIT ABOVE GROUND DRAINAGE.

EXTERNAL WORKS SETTING OUT

FOR PROPOSED SITE LEVELS REFER TO LANDSCAPE DRAWINGS. CHANNELS/ GULLY LOCATIONS TO LANDSCAPE ARCHITECT SPECIFICATION UNLESS NOTED OTHER WISE.

COVER LEVELS

LANDSCAPE ARCHITECT TO VALIDATE COVER LEVELS IN ALL EXTERNAL AREAS. ARCHITECT TO VALIDATE COVER LEVELS IN ALL INTERNAL AREAS.

TREES

THE DESIGN OF LANDSCAPING SHOULD BE UNDERTAKEN AT THE SAME TIME AS THE DESIGN OF THE DRAINAGE SO THAT THE IMPACT OF TREE ROOTS ON THE DRAINAGE CAN BE CONSIDERED. A SEWER OR LATERAL DRAIN SHOULD NOT BE LOCATED CLOSER TO TREES/BUSHES/SHRUBS THAN THE CANOPY WIDTH AT MATURE HEIGHT, EXCEPT WHERE SPECIAL PROTECTION MEASURES ARE PROVIDED, IN ACCORDANCE WITH B7.6 OF THE SEWER SECTOR GUIDANCE APPENDIX C. A TREE SHOULD NOT BE PLANTED DIRECTLY OVER SEWERS OR WHERE EXCAVATION ONTO THE SEWER WOULD REQUIRE REMOVAL OF THE TREE.

LANDSCAPE ARCHITECT INPUT

THE DRAINAGE INDICATED ON THIS DRAWING HAS BEEN PRODUCED WITH NO INPUT FROM THE LANDSCAPE ARCHITECT. ALL LEVELS, GULLEY CHANNEL DRAIN AND MANHOLE LOCATIONS ARE ALL INDICATIVE SUBJECT TO ADJUSTMENT AND ALTERATION IN ACCORDANCE WITH SPECIFICATION BY OTHERS

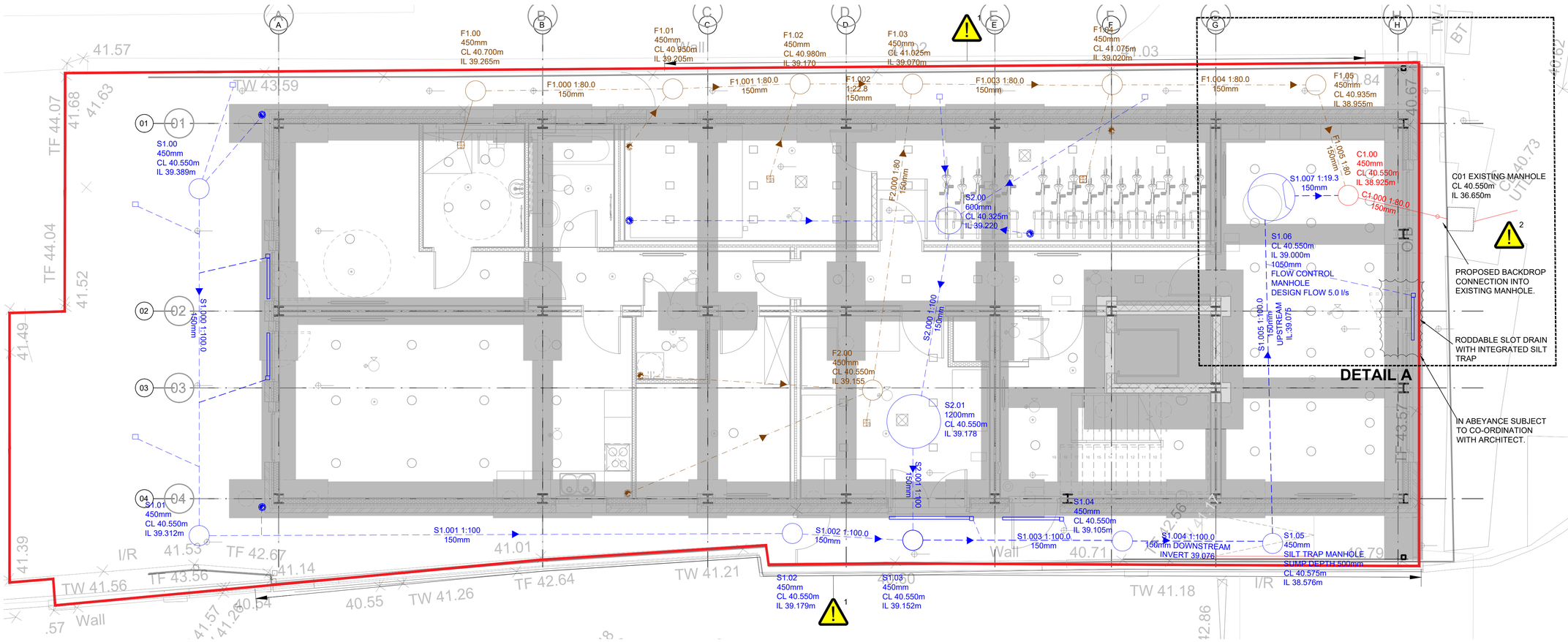
OUTSTANDING COORDINATION

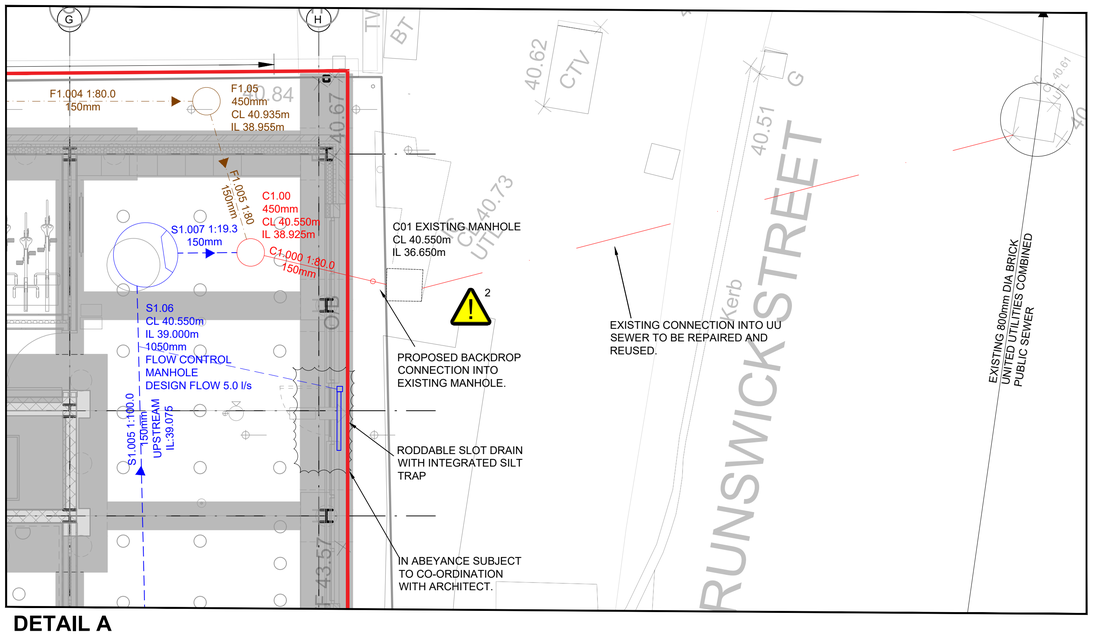
THE FOLLOWING ARE ITEMS THAT HAVE NOT BEEN COORDINATED BEFORE ISSUE OF THIS DRAWING. THESE ITEMS MAY RESULT IN REDESIGN AND/OR ABORTIVE WORKS ON SITE. RENAISSANCE HAVE HIGHLIGHTED THIS TO THE PROJECT MANAGER AND CONTRACTOR PRIOR TO ISSUE OF THIS DRAWING.

- EXTERNAL DRAINAGE TO LANDSCAPING AND DOOR THRESHOLDS IS INDICATIVE AS THIS HAS HAD NO LANDSCAPE ARCHITECT INPUT.
- IT IS UNKNOWN WHETHER THE M&E ENGINEER RESPONSIBLE FOR ABOVE GROUND SERVICES HAS REVIEWED THE POP-UP LOCATIONS SET OUT BY THE ARCHITECT.
- THE BUILDING CONTROL CONSULTANT HAS RAISED ISSUES REGARDING THE LAYOUTS AND DETAILS FROM A BUILDING REGULATIONS PERSPECTIVE. IT IS UNDERSTOOD THAT THESE ARE TO BE CLOSED OUT BY THE PROJECT MANAGER. CHANGES TO LAYOUTS MAY AFFECT POP-UP LOCATIONS IF SERVICE ROUTES NEED TO CHANGE.
- DRAWINGS PROVIDED BY THE LGSF CONTRACTOR DO NOT MATCH THE ARCHITECTURAL LAYOUTS.
- THE LATEST M&E DRAWINGS PROVIDED TO RENAISSANCE DO NOT MATCH THE ARCHITECTURAL LAYOUTS OR THE LGSF CONTRACTOR LAYOUTS.
- SETTING OUT TO GLOBAL COORDINATES HAS NOT BEEN PROVIDED.

1 RISK OF UNDERMINING EXISTING WALL DURING DRAINAGE INSTALLATION. UNDERPINNING MAY BE REQUIRED TO PREVENT COLLAPSE.

2 NEW CONNECTION TO U.U. SEWER TO BE CO-ORDINTED WITH ALL EXISTING SERVICES WITHIN THE PUBLIC FOOTPATH.





DETAIL A

DRAWING LEGEND

- PLANNING BOUNDARY
- PROPOSED SURFACE WATER DRAINAGE (150mm DIAMETER UNO)
- PROPOSED FOUL WATER DRAINAGE (150mm DIAMETER UNO)
- PROPOSED COMBINED SEWER
- EXISTING UNITED UTIL ITIES COMBINED SEWER
- G GULLY
- CHANNEL DRAIN TO LANDSCAPE ARCHITECTS SPECIFICATION UNO
- RAINWATER PIPE/ SOIL VENT PIPE
- PROPOSED BACKDROP
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED SURFACE WATER INSPECTION CHAMBER (450mm DIAMETER UNO)
- PROPOSED SURFACE WATER MANHOLE w/FLOW CONTROL DEVICE
- PROPOSED FOUL WATER MANHOLE
- PROPOSED FOUL WATER INSPECTION CHAMBER (450mm DIAMETER UNO)
- PROPOSED COMBINED MANHOLE

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RENAISSANCE, ARCHITECTS, LANDSCAPE ARCHITECTS AND BUILDING SERVICES ENGINEERS DRAWINGS.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE BELOW GROUND DRAINAGE DETAILS SHOWN ON DRAWING SERIES C-03100 & C-03101 TO C-03103.
3. FOR ALL ABOVE GROUND DRAINAGE AND ASSOCIATED PUMPS REFER TO BUILDING SERVICES AND ARCHITECT'S DRAWINGS.
4. ALL BELOW GROUND DRAINAGE WORKS TO BE IN ACCORDANCE WITH RELEVANT BUILDING REGULATIONS AND SEWER SECTOR GUIDANCE APPENDIX C- DESIGN AND CONSTRUCTION GUIDANCE. IF DISCREPANCIES ARE NOTED BETWEEN SSG AND DRAWINGS, THESE SHOULD BE BROUGHT TO THE ATTENTION OF RENAISSANCE FOR REVIEW.
5. RWPs, SVPs, SSs AND FLOOR GULLEYS ARE TO HAVE RODDABLE ACCESS POINTS ABOVE GROUND FLOOR TO BUIL DING SERVICES DETAILS.
6. THE CONTRACTOR IS TO UNDERTAKE A FULL CCTV SURVEY AT COMPLETION OF THE PROJECT TO DEMONSTRATE THAT THE DRAINAGE IS CLEAN. ANY DEFECTS ARE TO BE CORRECTED BY THE CONTRACTOR PRIOR TO HANDOVER OF THE SYSTEM TO THE CLIENT.
7. THE CONTRACTOR IS TO KEEP A RECORD SET OF THE AS INSTALLED DRAINAGE ON SITE AND PROVIDE THIS TO RENAISSANCE UPON COMPLETION OF THE WORKS TO ALLOW FOR PRODUCTION OF A 'FINAL CONSTRUCTION' ISSUE DRAWING.
8. DURING THE WORKS ALTERATIONS TO THE DRAINAGE LAYOUT ARE TO BE MARKED UP BY THE CONTRACTOR AND AGREED WITH RENAISSANCE IN WRITING.
9. THE CHAMBER SIZE OF PCC MANHOLES WITH MORE THAN ONE CONNECTION IN THEM MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTIONS AND BENDS.
10. MANHOLE COVERS ARE TO BE ACCORDANCE WITH BS EN 124 FOR THE RATING INDICATED IN THE MANHOLE SCHEDULE. THE CONTRACTOR IS TO SUBMIT DETAIL S FOR THE PROPOSED MANHOLE COVERS TO THE ENGINEER AND LANDSCAPE ARCHITECT FOR REVIEW PRIOR TO INSTALLATION.
11. ALL INTERNAL COVERS TO BE RECESSED AND TRIPLE SEALED
12. COVER SLABS MUST CARRY THE BSI KITEMARK. WHERE THE CLEAR OPENING OF THE KITEMARKED PRODUCT IS DIFFERENT TO THAT OF THE COVER AND FRAME, A LOAD BEARING REDUCING SLAB SHOULD BE FITTED ABOVE THE COVER SLAB TO BRING THE SIZE DOWN TO REQUIRED SIZE.
13. ALL SEWERS TO BE BSI KITEMARK (CERTIFIED TO WIS 4-35-01)
14. ALL CONCRETE PIPES TO BE TO ES EN 1916 CLASS 120 (54kN/m).
15. BEDDING AND BACKFIL L MATERIAL TO CONFORM TO THE REQUIREMENTS OF THE WATER INDUSTRY SPECIFICATION 4-08092 (TABLE A2).
16. IF PLASTIC PIPES ARE TO BE USED THEN THE FOLLOWING MUST APPLY:
    A. BSI KITEMARK (CERTIFIED TO BS EN 13476-1 AND WIS 4-35-01)
    B. PIPES LESS THAN OR EQUAL TO 500mm DIA
    C. BEDDING AND BACKFIL L MATERIAL TO CONFORM TO THE REQUIREMENTS OF THE WATER INDUSTRY SPECIFICATION 4-08092 (TABLE A2)
17. THE MINIMUM CRUSHING STRENGTH FOR CLAY PIPES SHOULD BE AS FOLLOWS: 100mm DIA. 40kN/m, 150mm DIA. 40kN/m, 225mm DIA. 45kN/m AND 300mm DIA. 72kN/m.
18. THE MINIMUM CRUSHING STRENGTH FOR CONCRETE PIPES SHOULD BE - (CLASS 120 TO EN 1916/BS5911-1 2002). PLASTIC PIPES SHOULD CONFORM TO WIS 4-35-01 AND BS EN13476.
19. SULPHATE RESISTANT CEMENT (C20-DC2) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDED PROVIDING THAT SUCH PRECAUTIONS ARE NOT NECESSARY.
20. SEWER PIPES TO BE LAID IN MAXIMUM 3 METER LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER PIPES, AND THIS IS AGREED BY THE CONTRACTOR WITH THE PIPE MANUFACTURER.
21. RAINWATER PIPE LOCATIONS ARE INDICATIVE AND SUBJECT TO CONFIRMATION FROM ARCHITECT/ BUIL DING SERVICES ENGINEER. THIS MAY IMPACT PIPE SIZES SUBJECT TO LOCATIONS.
22. ALL COVER LEVELS ASSUMED. SCHEME DEVELOPED WITHOUT INPUT FROM LANDSCAPE ARCHITECT.
23. ALL CHANNEL LOCATIONS, MANHOLE AND DRAINAGE LOCATIONS SUBJECT TO RECEIPT OF STACK LOCATIONS AND CONFIRMATION OF FLOW RATE / DISCHARGE UNITS BY BUIL DING SERVICES ENGINEER.
24. ALL FOUL AND SURFACE WATER BELOW GROUND SYTEMS ARE TO BE VENTED WITHIN THE ABOVE GROUND DRAINAGE TO THE BUIL DING SERVICES ENGINEERS DETAILS.
25. DRAINAGE POP-UP SETTING OUT BASED OFF ARCHITECT'S DRAWING NUMBER SK02 REV B2 BY CREATE IT STUDIOS (NW) Ltd. M&E ENGINEER TO REVIEW AND CONFIRM ACCEPTABILITY WITH ABOVE GROUND DRAINAGE DESIGN.

CDM NOTES

1. REFER TO BELOW GROUND SURVEYS AND UTILITY RECORDS DRAWINGS FOR KNOWN PAVEMENT SERVICES. DESIGN ASSUMES THAT SERVICES CAN BE TEMPORARILY SUPPORTED OR DIVERTED TO ALLOW INSTALLATION OF DRAINAGE WHERE THERE ARE CONFLICTS. MANHOLE POSITIONS HAVE BEEN LOCATED TO AVOID EXISTING KNOWN SERVICES.
2. FOR GROUND CONDITIONS, REFER TO REC PHASE II SITE ASSESSMENT BRUNSWICK STREET, MANCHESTER, M13 9SU, REC REFERENCE: LA102867P2R1, REPORT PREPARED FOR: BRUNSWICK LIVING LTD, DATED SEPTEMBER 2017

Rev:	Description:	Date:	By:	Chkd:
C01	CONSTRUCTION ISSUE	23.11.23	HW	SH

renaissance

Renaissance Associates Ltd
Carvers Warehouse
77 Dale Street
Manchester
M1 2HG

Project:

BRUNSWICK STREET, MANCHESTER

Drawing Title:

BELOW GROUND DRAINAGE PLAN

Status:

STAGE 5

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	NOV 23	HW	HW	SH

Scale: 1:50 | Project No: 2004-04

Project:	Originator:	Volume:	Level:	Type:	Role:	Category/Number:	Rev:
BSM-	REN -	00 -	FN -	DR -	C -	01000 -	C01

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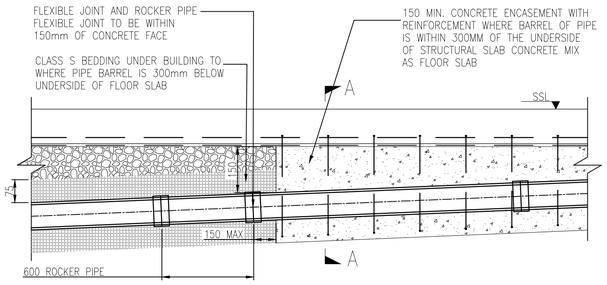
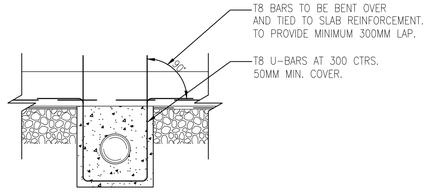
NOTES:

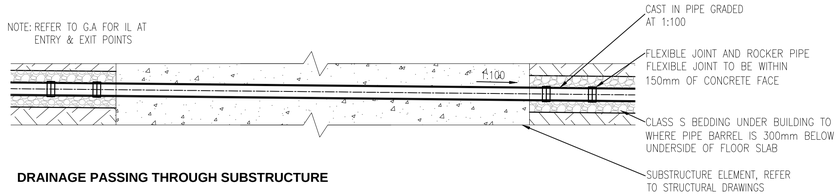
1. FOR GENERAL NOTES REFER TO RENAISSANCE DRAWING BSM-REN-00-FN-DR-C-01000. FOR DRAINAGE NOTES REFER TO BSM-REN-ZZ-FN-DR-C-03101.
2. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS TO BE CHECKED/ VERIFIED ON SITE.



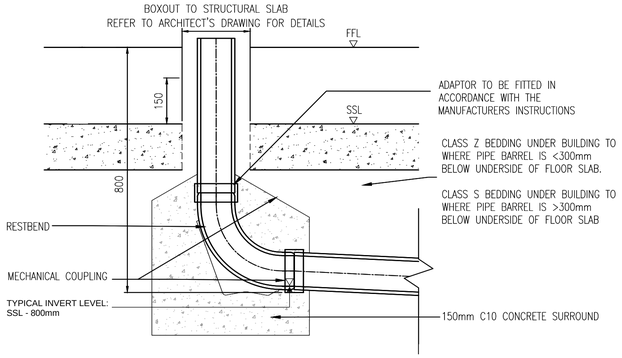
PIPE WORK BENEATH STRUCTURAL SLAB



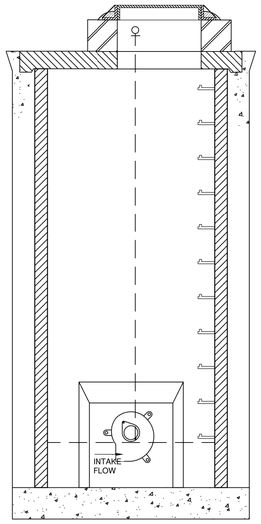
SECTION 'A-A'



DRAINAGE PASSING THROUGH SUBSTRUCTURE



TYPICAL REST BEND DETAIL



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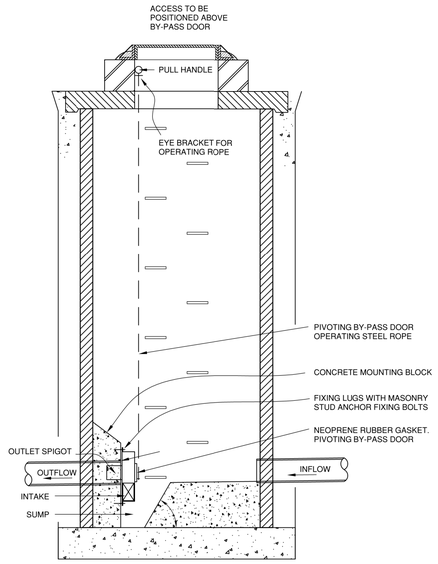
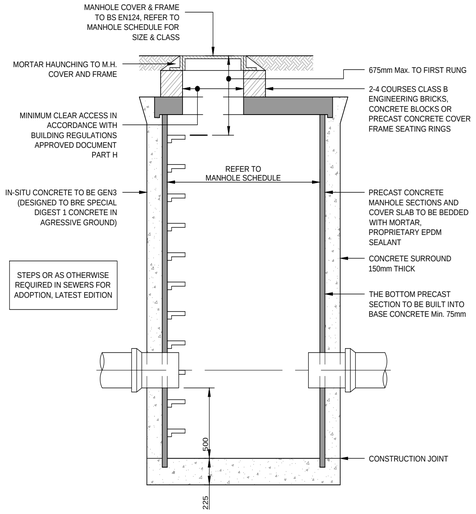
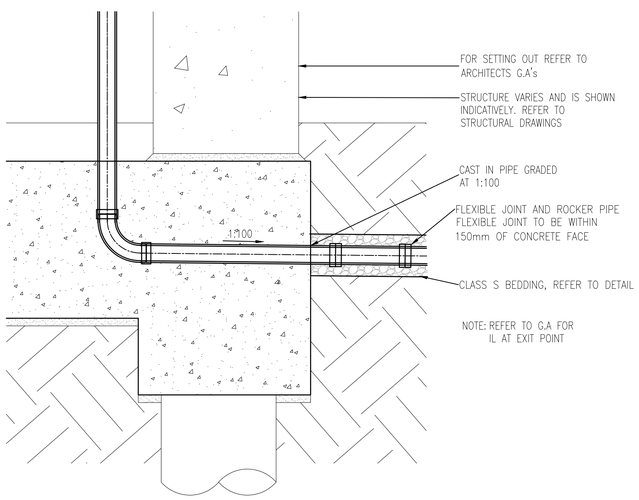


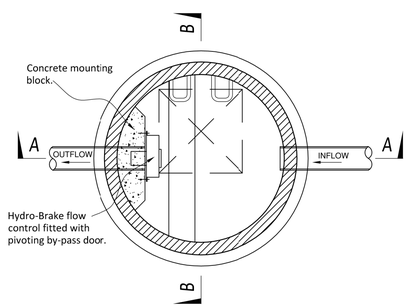
SECTION B-B



MANHOLE - SILT TRAP



RWP/SVP/GULLEY/STACK CAST INTO FOUNDATION



TYPICAL PLAN OF HYDRO-BRAKE MANHOLE

Rev:	Description:	Date:	By:	Chkd:
C01	STAGE 5 ISSUE	24.11.23	SA	SH

renaissance

Renaissance Associates Ltd
Carvers Warehouse
77 Dale Street
Manchester
M1 2HG

Project:

BRUNSWICK STREET, MANCHESTER

Drawing Title:

BELOW GROUND DRAINAGE DETAILS SHEET 2

Status:

STAGE 5

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	NOV 23	SA	--	SH

Scale:	Project No:
NTS	2004-04

Project - Originator - Volume - Level - Type - Role - Number:	Revision:
BSM-REN-ZZ-FN-DR-C-03104	C01

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Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.200	5.000
Flush-Flo™	0.283	4.989
Kick-Flo®	0.663	3.810
Mean Flow		4.297

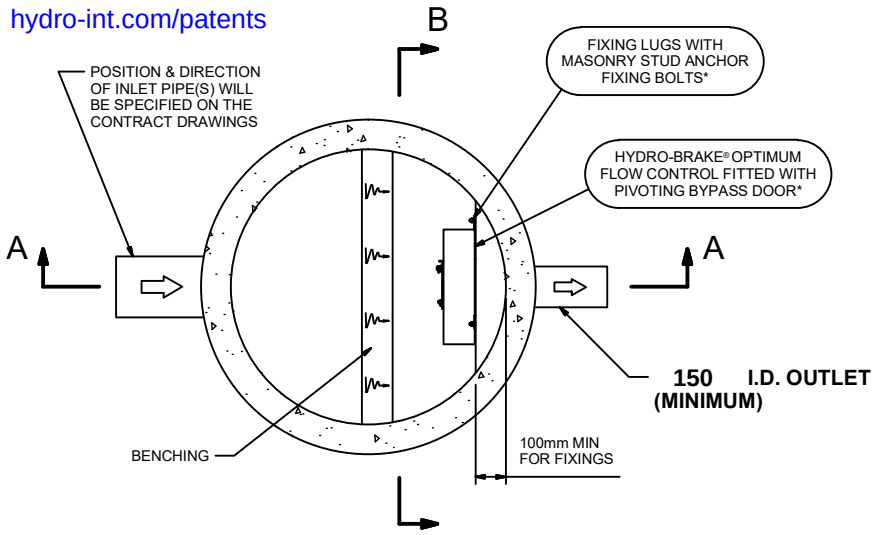
Hydro-Brake® Optimum Flow Control including:

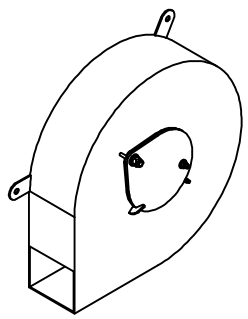
- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 10 kg

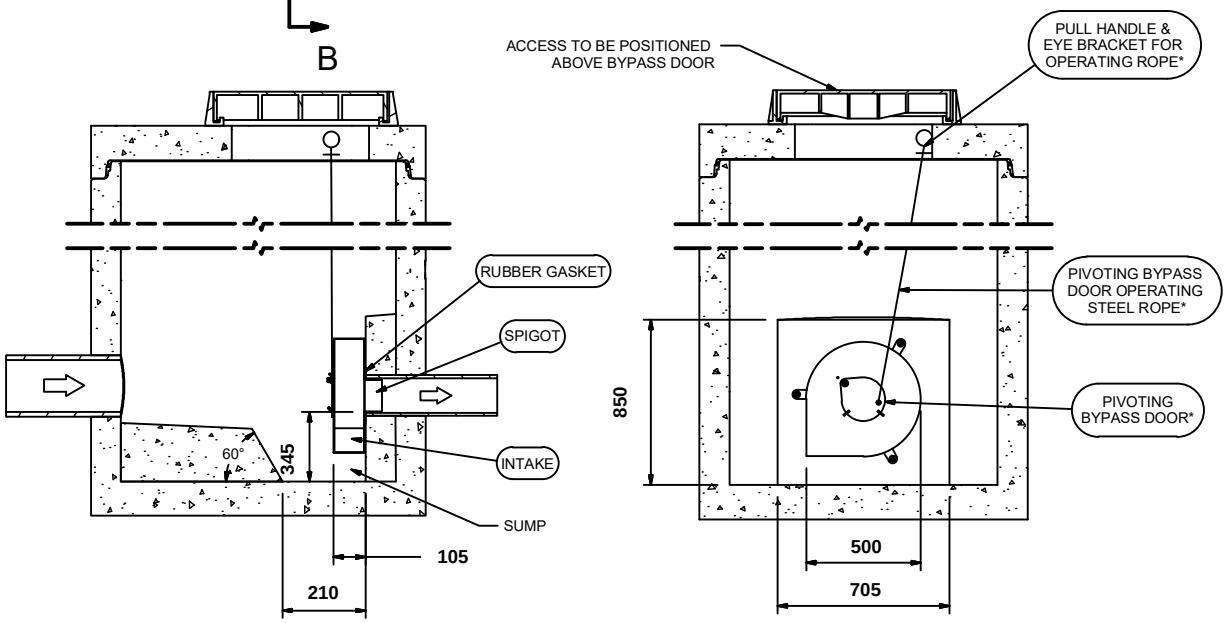
BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

wrc approved PT/503/0422 Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents







SECTION A-A

SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !

The head/flow characteristics of this SCL-0097-5000-1200-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International A CRH COMPANY

DATE	13/12/2023 17:28
SITE	
DESIGNER	Joe Bullough
REF	

SCL-0097-5000-1200-5000

Hydro-Brake® Optimum

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joebullough@renaissance-ltd.com

APPENDIX C

Proposed Surface Water Drainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.360	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.022	4-8	0.008

Total Area Contributing (ha) = 0.030

Total Pipe Volume (m³) = 0.841

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	7.743	0.077	100.0	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	13.242	0.132	100.0	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	2.690	0.027	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	4.546	0.044	103.6	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	2.654	0.027	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.13	39.389	0.002	0.0	0.0	0.0	1.00	17.8	0.3
S1.001	50.00	5.35	39.312	0.003	0.0	0.0	0.0	1.00	17.8	0.4
S1.002	50.00	5.39	39.179	0.003	0.0	0.0	0.0	1.00	17.8	0.4
S2.000	50.00	5.08	39.222	0.024	0.0	0.0	0.0	0.99	17.4	3.2
S2.001	50.00	5.12	39.178	0.024	0.0	0.0	0.0	1.00	17.8	3.2

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.003	4.679	0.047	99.6	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.004	2.901	0.029	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	7.687	0.077	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	1.450	0.015	96.7	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.003	50.00	5.47	39.152	0.029	0.0	0.0	0.0	1.01	17.8	3.9
S1.004	50.00	5.52	39.105	0.029	0.0	0.0	0.0	1.00	17.8	3.9
S1.005	50.00	5.65	39.076	0.029	0.0	0.0	0.0	1.00	17.8	3.9
S1.006	50.00	5.67	38.999	0.030	0.0	0.0	0.0	1.02	18.1	4.1

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.002	0.002	0.002
1.001	-	-	100	0.001	0.001	0.001
1.002	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.024	0.024	0.024
2.001	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.002	0.002	0.002
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.001	0.001	0.001
				Total	Total	Total
				0.030	0.030	0.030

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	40.550	38.984	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S1.06, DS/PN: S1.006, Volume (m³): 1.5

Unit Reference	MD-SCL-0097-5000-1200-5000
Design Head (m)	1.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise blockage risk
Application	Surface
Sump Available	Yes
Diameter (mm)	97
Invert Level (m)	38.999
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0
Flush-Flo™	0.283	5.0
Kick-Flo®	0.663	3.8
Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	1.200	5.0	3.000	7.7	7.000	11.4
0.200	4.9	1.400	5.4	3.500	8.2	7.500	11.8
0.300	5.0	1.600	5.7	4.000	8.8	8.000	12.2
0.400	4.9	1.800	6.0	4.500	9.3	8.500	12.5
0.500	4.7	2.000	6.3	5.000	9.7	9.000	12.9
0.600	4.3	2.200	6.6	5.500	10.2	9.500	13.2
0.800	4.2	2.400	6.9	6.000	10.6		
1.000	4.6	2.600	7.2	6.500	11.0		

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.361
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 400.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1.00	15 Winter	1	+0%	100/15 Summer				39.400
S1.001	S1.01	15 Winter	1	+0%	100/15 Summer				39.327
S1.002	S1.02	15 Winter	1	+0%	30/15 Summer				39.205
S2.000	S2.00	15 Winter	1	+0%	30/15 Winter				39.270
S2.001	S2.01	15 Winter	1	+0%	30/15 Summer				39.231
S1.003	S1.03	15 Winter	1	+0%	30/15 Summer				39.203
S1.004	S1.04	15 Winter	1	+0%	30/15 Summer				39.162
S1.005	S1.05	15 Winter	1	+0%	30/15 Summer				39.124
S1.006	S1.06	15 Winter	1	+0%	30/15 Summer				39.098

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	-0.139	0.000	0.02			0.2	OK	
S1.001	S1.01	-0.135	0.000	0.02			0.3	OK	
S1.002	S1.02	-0.125	0.000	0.03			0.4	OK	
S2.000	S2.00	-0.102	0.000	0.22			2.9	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.001	S2.01	-0.097	0.000	0.27			2.9	OK	
S1.003	S1.03	-0.099	0.000	0.25			3.4	OK	
S1.004	S1.04	-0.093	0.000	0.32			3.4	OK	
S1.005	S1.05	-0.102	0.000	0.22			3.4	OK	
S1.006	S1.06	-0.051	0.000	0.32			3.5	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.361
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 400.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1.00	15 Winter	2	+0%	100/15 Summer				39.404
S1.001	S1.01	15 Winter	2	+0%	100/15 Summer				39.328
S1.002	S1.02	15 Winter	2	+0%	30/15 Summer				39.212
S2.000	S2.00	15 Winter	2	+0%	30/15 Winter				39.277
S2.001	S2.01	15 Winter	2	+0%	30/15 Summer				39.239
S1.003	S1.03	15 Winter	2	+0%	30/15 Summer				39.211
S1.004	S1.04	15 Winter	2	+0%	30/15 Summer				39.171
S1.005	S1.05	15 Winter	2	+0%	30/15 Summer				39.160
S1.006	S1.06	15 Winter	2	+0%	30/15 Summer				39.148

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	-0.135	0.000	0.02			0.3	OK	
S1.001	S1.01	-0.133	0.000	0.03			0.4	OK	
S1.002	S1.02	-0.117	0.000	0.04			0.5	OK	
S2.000	S2.00	-0.095	0.000	0.28			3.7	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.001	S2.01	-0.089	0.000	0.34			3.7	OK	
S1.003	S1.03	-0.091	0.000	0.33			4.5	OK	
S1.004	S1.04	-0.084	0.000	0.41			4.5	OK	
S1.005	S1.05	-0.066	0.000	0.28			4.3	OK	
S1.006	S1.06	0.000	0.000	0.38			4.2	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.361
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 400.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1.00	15 Winter	30	+0%	100/15 Summer				39.408
S1.001	S1.01	15 Winter	30	+0%	100/15 Summer				39.374
S1.002	S1.02	15 Winter	30	+0%	30/15 Summer				39.372
S2.000	S2.00	15 Winter	30	+0%	30/15 Winter				39.384
S2.001	S2.01	15 Winter	30	+0%	30/15 Summer				39.377
S1.003	S1.03	15 Winter	30	+0%	30/15 Summer				39.372
S1.004	S1.04	15 Winter	30	+0%	30/15 Summer				39.363
S1.005	S1.05	15 Winter	30	+0%	30/15 Summer				39.358
S1.006	S1.06	15 Winter	30	+0%	30/15 Summer				39.346

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	-0.131	0.000	0.04			0.6	OK	
S1.001	S1.01	-0.088	0.000	0.06			0.9	OK	
S1.002	S1.02	0.043	0.000	0.11			1.2	SURCHARGED	
S2.000	S2.00	0.012	0.000	0.52			6.8	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.001	S2.01	0.048	0.000	0.56			6.1	SURCHARGED	
S1.003	S1.03	0.070	0.000	0.52			7.0	SURCHARGED	
S1.004	S1.04	0.109	0.000	0.60			6.5	SURCHARGED	
S1.005	S1.05	0.133	0.000	0.38			5.9	SURCHARGED	
S1.006	S1.06	0.197	0.000	0.46			5.0	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.361
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 400.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1.00	30 Winter	100	+40%	100/15 Summer				40.060
S1.001	S1.01	30 Winter	100	+40%	100/15 Summer				40.059
S1.002	S1.02	30 Winter	100	+40%	30/15 Summer				40.057
S2.000	S2.00	30 Winter	100	+40%	30/15 Winter				40.069
S2.001	S2.01	30 Winter	100	+40%	30/15 Summer				40.061
S1.003	S1.03	30 Winter	100	+40%	30/15 Summer				40.057
S1.004	S1.04	30 Winter	100	+40%	30/15 Summer				40.048
S1.005	S1.05	30 Winter	100	+40%	30/15 Summer				40.042
S1.006	S1.06	30 Winter	100	+40%	30/15 Summer				40.030

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	0.521	0.000	0.05			0.8	SURCHARGED	
S1.001	S1.01	0.597	0.000	0.07			1.1	SURCHARGED	
S1.002	S1.02	0.728	0.000	0.18			1.9	SURCHARGED	
S2.000	S2.00	0.697	0.000	0.67			8.7	FLOOD RISK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.001	S2.01	0.733	0.000	0.63			6.8	SURCHARGED	
S1.003	S1.03	0.755	0.000	0.49			6.7	SURCHARGED	
S1.004	S1.04	0.793	0.000	0.58			6.3	SURCHARGED	
S1.005	S1.05	0.817	0.000	0.39			6.0	SURCHARGED	
S1.006	S1.06	0.881	0.000	0.46			5.0	SURCHARGED	

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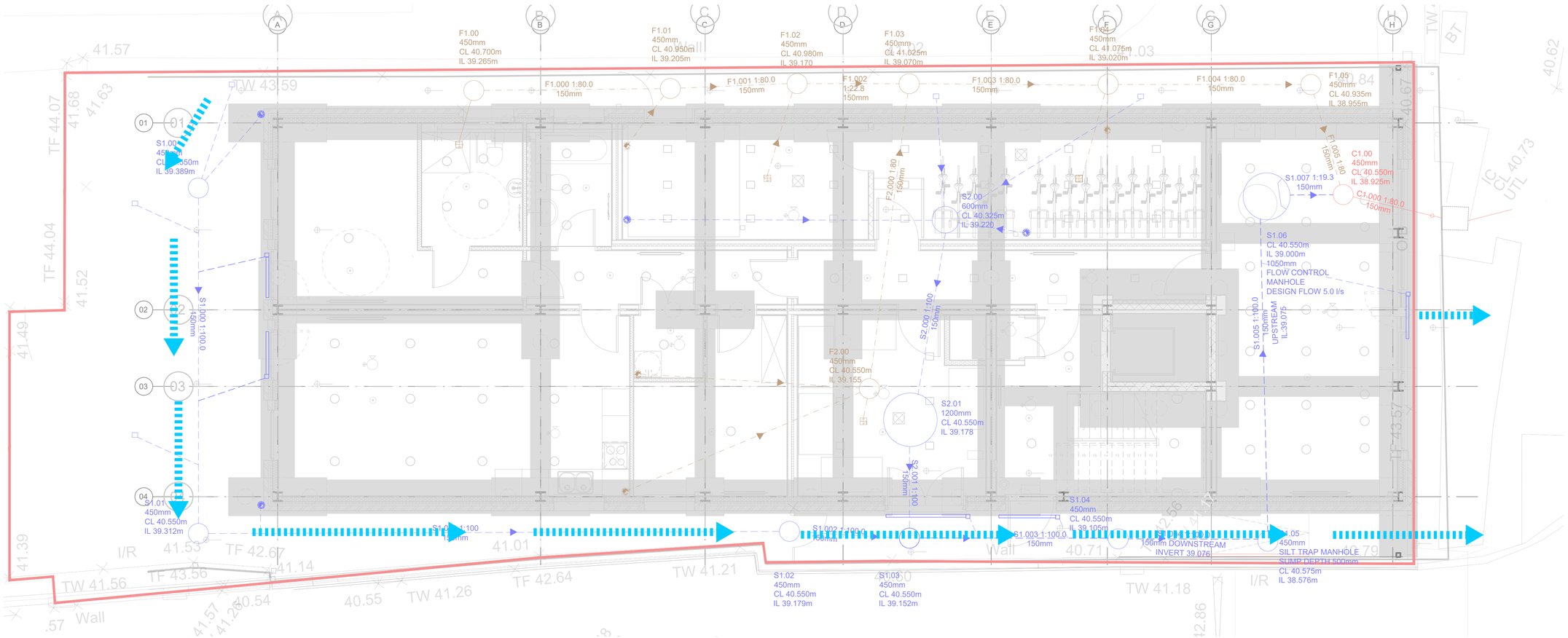
APPENDIX D

Overland Flood Flow Routes

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RENAISSANCE, ARCHITECTS, LANDSCAPE ARCHITECTS AND BUILDING SERVICES ENGINEERS DRAWINGS.
2. THE DRAINAGE SYSTEM HAS BEEN DESIGNED TO ACCOMMODATE RAINFALL EVENTS UPTO 1 IN 100 YEAR + 40% CLIMATE CHANGE AND AS SUCH THIS DRAWING INDICATES THE OVERLAND FLOW ROUTES FOR AN EXCEEDANCE EVENT OF THE DRAINAGE SYSTEM.
3. THE DRAWING ALSO INDICATES THE SAFE EGRESS ROUTE OFF SITE IN AN EXCEEDANCE EVENT



DRAWING LEGEND

- PLANNING BOUNDARY
- EXCEEDANCE FLOOD FLOW ROUTES

Rev:	Description:	Date:	By:	Chkd:
P01	FIRST ISSUE	13.12.23	JB	SH

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BRUNSWICK STREET, MANCHESTER

Drawing Title:

OVERLAND EXCEEDANCE FLOOD FLOW ROUTES

Status:

FOR INFORMATION

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	DEC 23	JB	N/A	SH

Scale:	Project No:
1:50	2004-04

Project - Originator - Volume - Level - Type - Role - Number:	Revision:
BSM-REN-00-XX-SK-C-09100	P01

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