

Flood Risk Assessment and Drainage Strategy

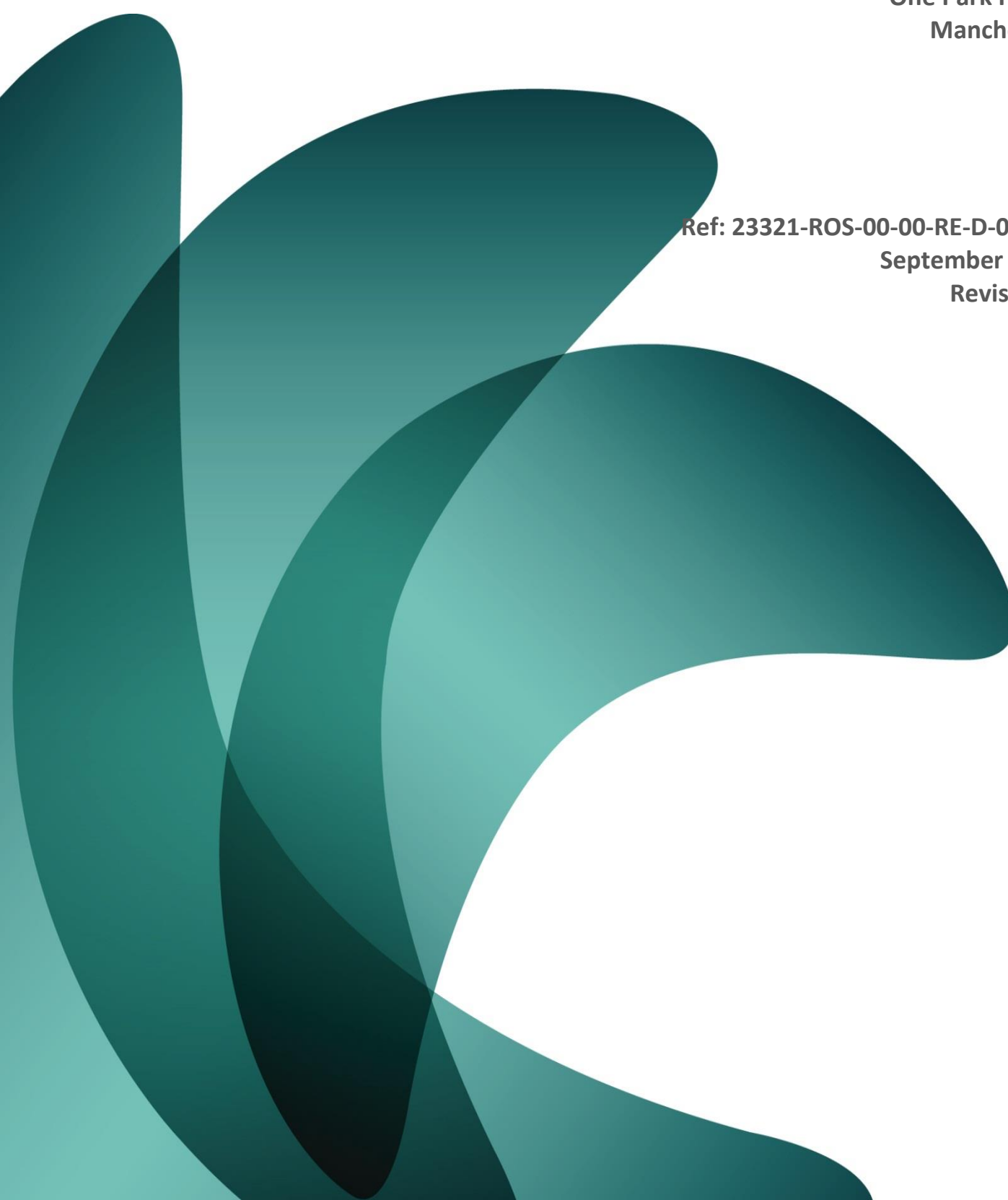
for

One Park Place,
Manchester

Ref: 23321-ROS-00-00-RE-D-09001

September 2023

Revision 2



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1 Introduction

- 1.1 This Drainage Strategy report has been prepared on the instruction of BENJAMIN PROPERTY LTD in support of the planning application for the proposed development at One Park Place, Manchester.
- 1.2 The main purpose of the report is to establish best means of providing foul and surface water drainage to the development considering statutory requirements.
- 1.3 The appendices to this report cover the following items:

Appendix I	Existing Topographical Site Survey
Appendix II	Architectural Layouts of Proposed Development
Appendix III	Existing United Utilities Sewer Records
Appendix IV	Proposed Drainage Strategy Drawing
Appendix V	InfoDrainage Attenuation Calculations
Appendix VI	Drainage and SuDS Maintenance Schedule

Table 1 – Report Appendices

2 Site Location and Description

- 2.1 The site is located at the corner of 24 Cheetham Hill Rd and 1 Park Place, Cheetham Hill, Manchester M4 4FY.
- 2.2 Vehicle access to the site is provided from two kerbed priority junctions on Park Place to the buildings service shutters, and a further kerbed priority junction is provided on Park Place to the gated service yard to the rear. Vehicle access is also provided from a dropped kerb crossover on Cheetham Hill Road. The site has a total site area of approximately 0.105Ha.
- 2.3 The site is presently brownfield land, The brownfield being utilised as a light industrial unit before demolition.
- 2.4 The existing topographical site survey is included in appendix I.
- 2.5 The immediate surrounding land uses are:

Direction	Description
North	Park PI then ICICI Bank UK
South	Imperial Home & Multi Goods then Skip PI
East	A665
West	Parking

Table 2 – Land uses surrounding the site

3 Development Proposals

- 3.1 It is proposed to Demolition of existing building and erection of a part 25 and part 15 storey residential building comprising 154 units with ground floor commercial units (Use Class E), with associated residents amenity space, cycle parking, substation, servicing, and associated landscaping works.
- 3.2 The development will also include outside seating area and soft/hard landscaped areas, in association with the main building.
- 3.3 The proposals are shown in more detail on the appended architectural layouts (appendix II).
- 3.4 The architect has also confirmed that 154 new apartments are to be constructed, it is proposed 46 one bedroom (30%), 95 two bedroom-three person (62%), and 13 two bedroom-four person (8%).

4 Existing Sewers and Drainage

- 4.1 Existing sewers in the surrounding area to the site have been researched (a copy of these records is attached in appendix III) and there appears to be:
- A 600mm combined sewer that is located within Park PI to the North.
 - A 600mm combined sewer located to the East within the A665.
- 4.2 Given that the site is presently brownfield, it is currently expected that the existing site utilised separate surface and foul water runs until a ultimately outfall for both sewers into the combined public 600mm sewer within Park PI.
- 4.3 A CCTV survey is to be carried out to confirm that the existing sewers drained as expected into the combined sewer within Park PI.

5 Proposed Drainage Strategy

- 5.1 According to the National Planning Practice Guidance, surface water runoff should be disposed of according to the following hierarchy:
1. Into the ground (infiltration)
 2. To a surface water body
 3. To a surface water sewer, highway drain, or other drainage system
 4. To a combined sewer
- 5.2 The site investigation is yet to be carried out, based upon existing projects based within the Manchester City Centre region, it is anticipated that infiltration will not be a viable option. However, this can only be confirmed, by means of soakaway tests in accordance with BRE 365 guidelines once the car park can be closed.
- 5.3 As such, with no reliable infiltration data at this time, a guaranteed strategy of using ground infiltration (as a means of surface water disposal) cannot be relied upon, however it will be established later in the design process whether this is suitable.
- 5.4 Based on the SuDS hierarchy, the next best means of surface water discharge is to a watercourse, however, there are no nearby rivers, streams, or brooks to which the surface water can be connected into. The River Irwell is the closest watercourse, and this is approximately 450m away and as such cannot be used for the discharge of surface water.
- 5.5 Therefore, the next viable means of discharging surface water, at this current time, would be to connect to an existing Untied Utilities sewer. As there are no surface water sewers in the vicinity of the site, as noted in section 4, the only option would be to connect surface water to the 600mm combined sewer located within Park Pl.
- 5.6 Following best practice in accordance with the CIRIA C753 “The SuDS Manual”, an assessment of the most practical and suitable SuDS drainage solutions has been undertaken and is detailed in table 5.

SuDS Device	Description	Constraints/Comments	Suitable for Site
Infiltration Devices and Soakaways	Captures water and allows it to be stored and released back into the ground by means of natural infiltration	Until BRE365 infiltration tests have been carried out, the use of infiltration cannot be relied upon for the surface water drainage strategy.	NO
Discharge to watercourse	Using a nearby watercourse as a final discharge point	The Hebble Brook is the closest watercourse, and this is approximately 600m away and as such cannot be used for the discharge of surface water.	NO
Rainwater harvesting	Reducing the runoff rate from the site by capturing rainwater and using it for non-potable uses	Minimal opportunities for the usage of non-potable water in a private residential environment.	NO
Living/green roofs (source control)	Soft landscaping at roof level to naturally reduce surface water runoff	Minimal roof area not being utilised by other building services	NO
Permeable surfaces	Storm water is allowed to infiltrate through the surfaces	There is proposed planting and verge to be placed where possible	YES
Swales (permeable conveyance)	Shallow and wide channels that receive and store runoff and allow natural infiltration/piped conveyance	Inadequate external spaces to install such features requiring large areas of land	NO
Filter drains and perforated	Trenches filled with granular materials, designed to take flows	Inadequate external spaces to install such features requiring large areas of land	NO

pipes (permeable conveyance)	from impermeable areas and allow natural infiltration where possible		
Filter strips (permeable conveyance)	Wide gently sloping areas of grass or dense vegetation that remove pollutants from run-off of adjacent areas	Inadequate external spaces to install such features requiring large areas of land	NO
Detention basins (end of pipe treatment)	Landscaped depressions that are normally dry except during and immediately following storm events. The outlet is restricted, causing flow attenuation and storage in the basin.	Inadequate external spaces to install such features requiring large areas of land	NO
Wet ponds and constructed wetlands (end of pipe treatment)	Ponds and wetlands are features with a permanent pool of water that provide both attenuation and treatment of surface water runoff	Inadequate external spaces to install such features requiring large areas of land	NO
Attenuation Underground	Oversized drainage pipes to store excess surface water	The primary means of reduction in surface water runoff will be by means of storage attenuation and controlled discharge	YES

Table 5 – Assessment of SuDS features which are viable for the development

- 5.7 As the existing site is completely brownfield, it is considered best practice and in line with United Utilities guidance, to restrict proposed surface water runoff to 30% of existing. This has not been confirmed by United Utilities but is expected to within the pre-development Enquiry that has been submitted.

- 5.8 It is currently anticipated that the existing development has both surface and foul water drainage that adequately disposes of itself to the nearby public United Utilities sewer, located within Park PI, and as such an existing brownfield runoff rate could then be calculated.
- 5.9 This current brownfield runoff rate is based on an existing impermeable area of 0.105 Ha, calculated using the topographical survey.
- 5.10 The modified rational method was used to calculate the brownfield runoff rate in the following formula:

$$Q_P = 2.78 C i A = 2.78 * 1.0 * 50 * 0.105 = \mathbf{14.60l/s}$$

Where;

Q_P = Peak discharge

C = Dimensionless coefficient = 1.0 (area is impermeable)

i = Rainfall intensity = 50mm/hour

A = Total impermeable area = 0.105 Hectares

- 5.11 Based on the existing flow rate of 14.60l/s, it is proposed that the total maximum discharge rate from the site is to be 10.2/s. This provides the required 30% betterment on existing flows.
- 5.12 To ensure this restricted surface water flow is maintained, it is proposed to use an underground attenuation structure and associated vortex flow control device. This can be seen in the proposed below ground drainage drawing in Appendix IV.
- 5.13 InfoDrainage attenuation calculations were carried out which can be seen in appendix V.
- 5.14 For such calculations, given that the proposed development is residential with minimum lifetime of 100 years, a climate change allowance of 45% was used. This is in accordance with the EA's current (last updated 27th May 2022) upper end allowance for a 1:100-year storm event from the River Aire and Calder catchment, which is applicable for developments with a lifetime beyond 2100.
- 5.15 To ensure there is no flooding in such a 1:100-year storm event (plus the 45% climate change allowance) an underground attenuation tank (Volume of 28m³) was required for the new residential development, based on an impermeable catchment of 0.105 Hectares.

- 5.16 In terms of below ground foul drainage, this is to be collected at discrete external points in a separate new foul network before connecting into the combined sewer in Park Pl. It is proposed to re-use the existing connections offsite if CCTV confirms location / connection and condition.
- 5.17 Based on the schedule of accommodation provided by the architect and detailed in table 3, foul water flows could be estimated in accordance with BS EN 752-4 and BS EN 752-4 Annex B. This states that a flow of 150-300 litres per person per day can be expected and a peak flow factor of 6 should be utilised. For this design an average flow of 225 litres per person per day will be used. The full calculation can be seen in table 6. It is assumed that there will be 2 occupants per room.

Type of Apartment	Number of Rooms	Number of Occupants	Average Flow (litres per day)	Peak flow (litres per day)
One bedroom	46	46	$225 \times 46 = 10,350$	$10,350 \times 6 = 62,100$
Two Bedroom (3P)	95	285	$225 \times 285 = 64,125$	$64,125 \times 6 = 384,750$
Two bedroom (4P)	13	52	$225 \times 52 = 11,700$	$11,700 \times 6 = 70,200$
TOTAL	154	383	86,175	517,050

Table 6 – Calculation of total and peak foul water flows from development

- 5.18 As can be seen from the table, a total average flow from the new residential building equates to 1l/s and a peak flow of 5.98/s.
- 5.19 The pre-planning sewerage enquiry has been issued to United Utilities. It is proposed to connect the surface water (with 30% betterment on existing brownfield flow) and the foul water into the 600mm public combined sewer located within Park Pl. It is proposed to re-use existing site connections should CCTV confirm suitability. This is provided CCTV confirms positive surface water drainage from the existing site and should infiltration be proven to not be viable.

Long Term Maintenance and Management

- 5.20 As the on-site drainage will remain private for the lifetime of the development, it is to be maintained by an appointed management company.
- 5.21 A summary of the expected maintenance actions and the frequency they are likely to be required is contained in the Drainage and SuDS Maintenance Schedule included in Appendix VI.
- 5.22 The company that will be responsible for funding the inspection and maintenance of the surface water drainage system is noted within this document.

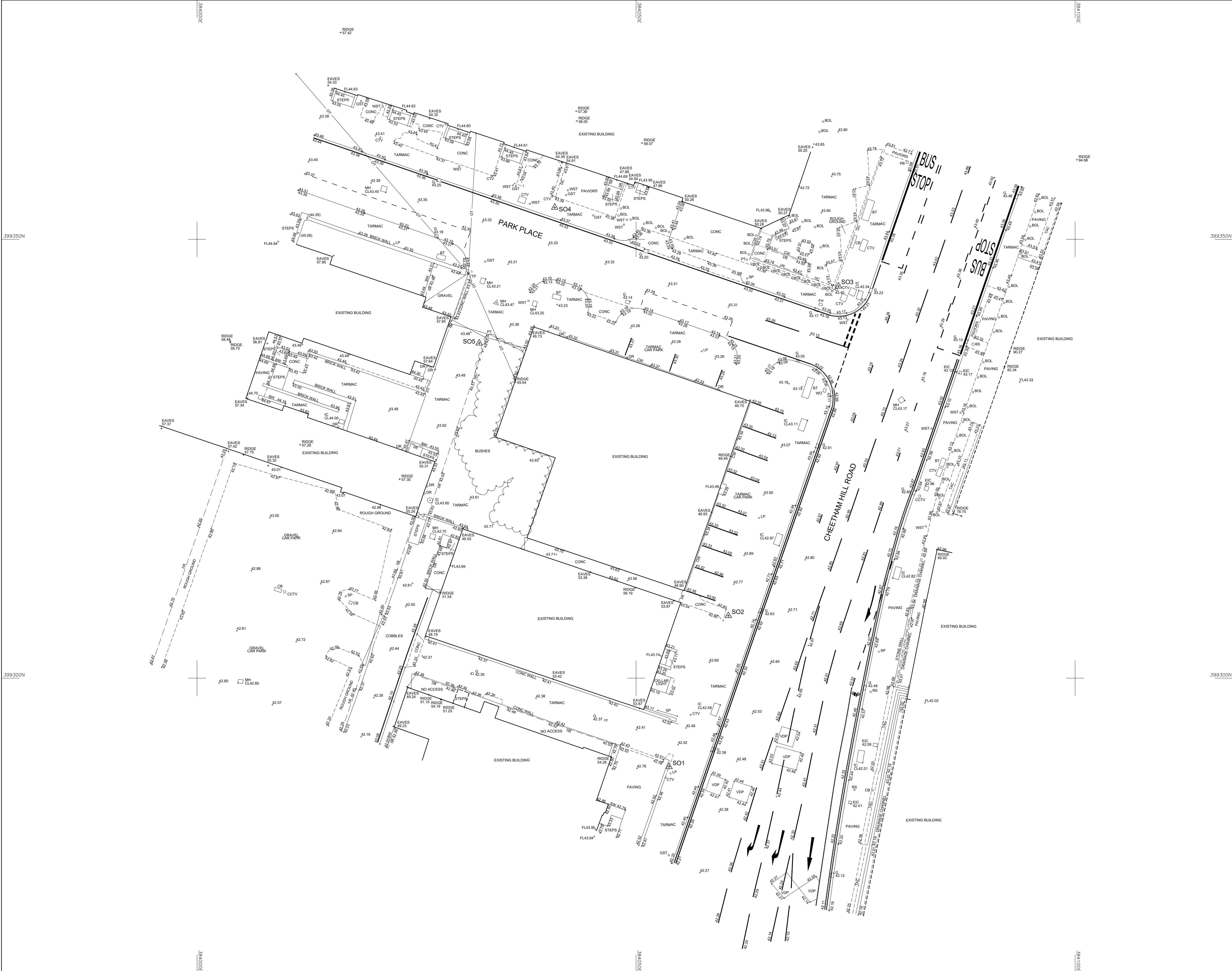
6 Water Quality Management

- 6.1 Treatment of surface water will primarily be provided by means of catchpits and trapped gullies to be used prior to draining surface water into the new attenuation structure. These will help prevent silt and sediment entering the system and being transported downstream.
- 6.2 According to Table 26.2 of CIRIA C753, and the Pollution Hazard Indices noted in this, the overall pollution hazard level will be going from **very low/low** to **very low/low**. This is based on the fact the site use will be changing from “retail” to “residential”.

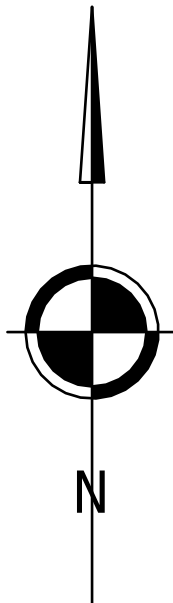
7 Summary and Conclusions

- 7.1 It is proposed to Demolition of existing building and erection of a part 25 and part 15 storey residential building comprising 154 units with ground floor commercial units (Use Class E), with associated residents amenity space, cycle parking, substation, servicing, and associated landscaping works.
- 7.2 The site is located within Flood Zone 1 and as such no sequential testing is to be carried out by an independent consultant.
- 7.3 The development should be allowed to proceed because:
- All residual sources of flooding have been considered and assessed as low, very low or negligible.
 - A suitable drainage strategy has been developed to ensure new surface water flows are capable of not causing flooding in a 1:100-year storm event plus 45% allowance for climate change.
 - Proposed surface water discharge rates for the whole site will be 10.2l/s for all storm events up to a 1 in 100-year event plus 45% for climate change, with excess storm water being stored on site in suitable geo-cellular attenuation tanks. This provides a 30% betterment on existing surface water runoff from the site.
 - Water quality will be maintained using catchpits and trapped gullies to prevent silt/sediment entering the system.

APPENDIX I: Existing Topographical Site Survey



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

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

Levels in parenthesis indicate top of wall.

SURVEY STATIONS			
Name	Easting	Northing	Height
SO1	394053.76	399289.90	42.52
SO2	394060.51	399307.11	42.78
SO3	394073.06	399344.66	43.39
SO4	394040.74	399353.64	43.34
SO5	394032.14	399338.17	43.47



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

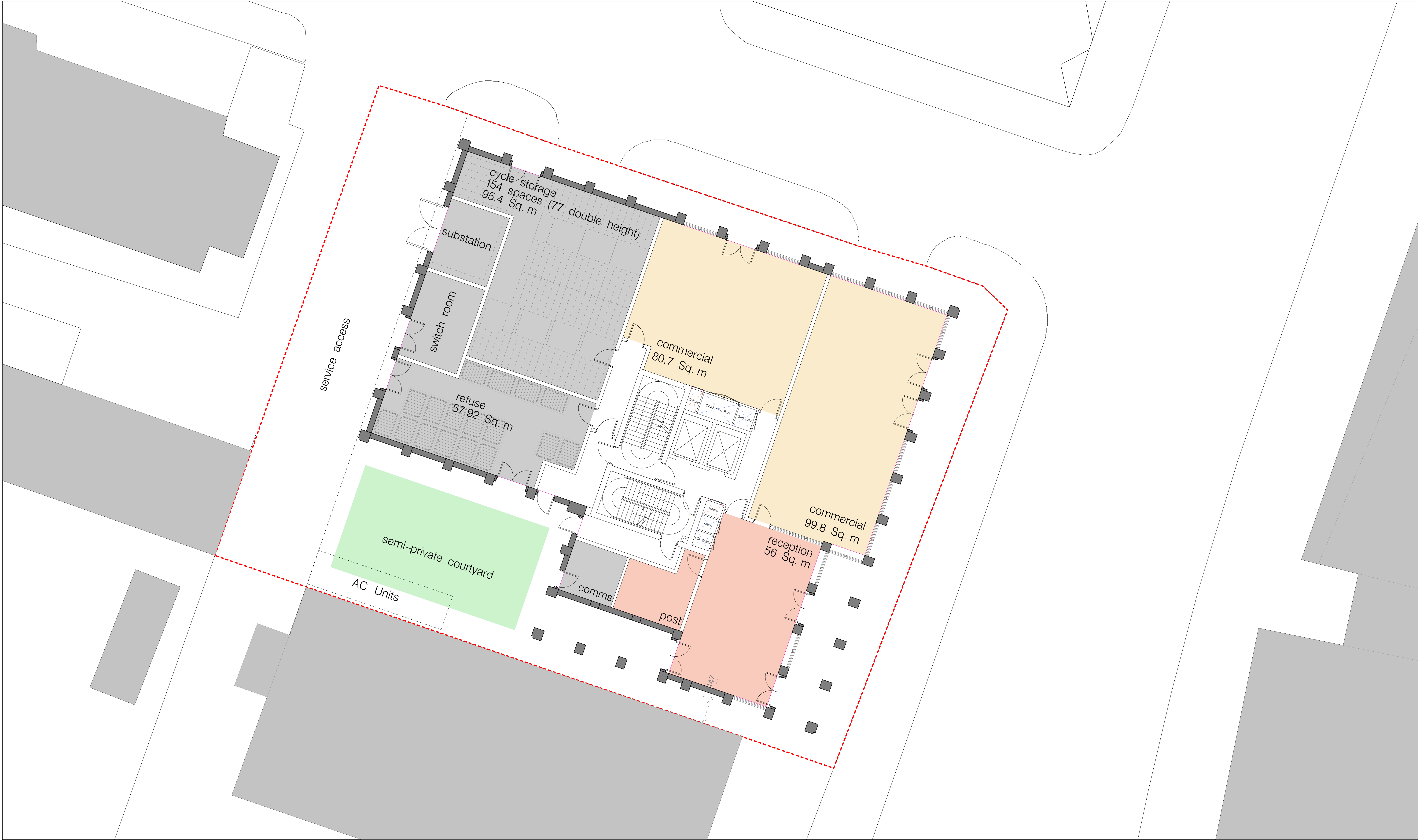
Client
Hodder & Partners

Drawing Title
Topographical Survey of Land at:
Park Place
Manchester

Scale(s)	1:200	Surveyor	SI
Date	Aug 23	Drawn	NR
Job Number	23H039	Checked	TP

Sheet Size & Drg Number & Revision
A1 23H039/001

APPENDIX II: Architectural Layouts of Proposed Development

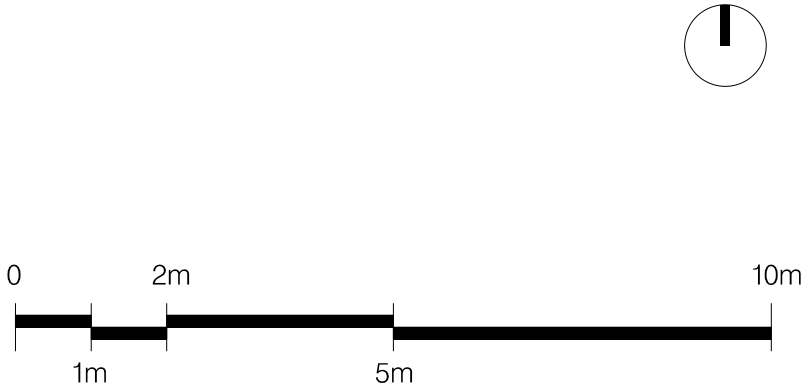


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DO NOT SCALE
Work to annotated dimensions only.
Read drawing in conjunction with relevant specification,
Structural Engineers' and Services Engineers' drawings.
Confirm all dimensions before commencement of any
work on site or fabrication.

revisions + notes:
04082023 Rev A
11082023 Rev B – 2475mm bays
21082023 Rev C – West facade, apartment layout and roof updates
23082023 Rev D – minor layout amendment
25082023 Rev E – Structural column amendments
01092023 Rev F – NE, NW and SE corner apartment updates, GF layout development, North point and scale bar added
04092023 Rev G – Survey topography overlay
06092023 Rev H – Terrace parapet height increase, Level15 and Ground Floor layout coordination with Landscape Architect, NW corner 1b2p apartment update, Levels 01–14 slab dropped by 250mm, facade depth increase by 100mm
13092023 Rev I – M+E amends; Double doors added to IDNO Elec. riser, External AC units indicated



Key:

Management	1B2P
Commercial	2B3P
Plant/Bins/Bikes	2B4P
External Amenity	

client:		date:	
Benjamin Property Ltd.		September 2023	
project:		scale:	drawn by:
Park Place, Manchester		1:200@A3/ 1:100@A1	RC + ET
title:		drawing number:	
Ground Floor Plan		L(—)000	
status:	job number:	revision:	
Planning	0654	I	

APPENDIX III: Existing United Utilities Sewer Records

Jonathon Taylor

**Quayside House
Furnival Road,
Sheffield,
S4 7YA**

FAO:

How to contact us:

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

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: One Park Place
Our Ref: UUPS-ORD-517308
Date: 08/09/2023**

Dear Sirs

Location: Park Place

I acknowledge with thanks your request dated 06/09/2023 for information on the location of our services.

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

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

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

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

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

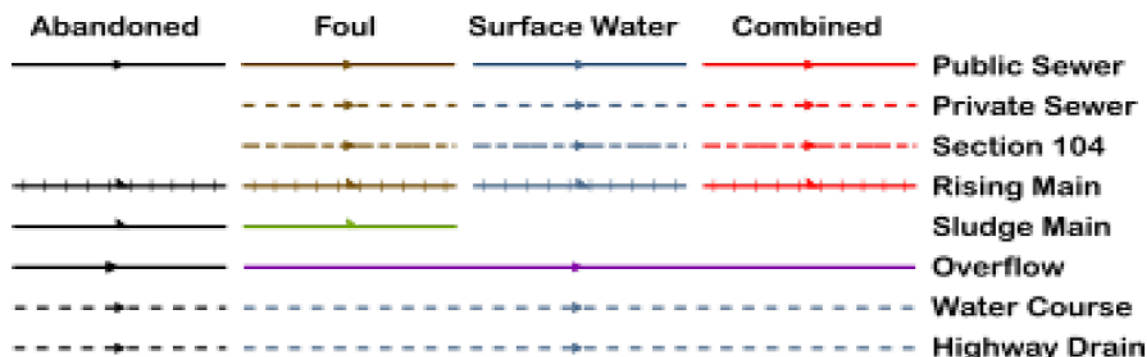
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

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

Wastewater Symbolology



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

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	



SEWER RECORDS

Address or Site Reference

Park Place,

Scale: 1:1250
Date: 08/09/2023

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Clean Water Symbolology

Proposed	Abandoned	Live	
			Distribution Main
			Trunk Main
			Comms Pipe
			Private Pipe
			Concessionary Service
			Raw Water
			LDTM Raw Water
			LDTM Treated Water
			Air Valve
			AC Valve, open
			AC Valve, closed
			CC Valve, open
			CC Valve, closed
			Non Return Valve
			Pressure Management Valve
			OMS Valve
			Stop Tap
			Flow Meter
			Domestic Meter
			Commercial Meter
			Pump
			Hydrant
			Fire Hydrant
			Anode
			Chlorination Point
			De-chlorination Point
			Strainer Point
			Access Point
			Hatch Box
			IP Point
			Sampling Station
			Logger Box
			Bore Hole
			Inlet Point
			Bulk Supply Point
			End Cap
			Site Termination
			Change of Characteristic
			Condition Report
			<u>Property Types</u>
			Water Tower
			Valve House
			Booster Pumping Station
			Intake Pumping Station
			Water Treatment Works
			Supply Reservoir
			Service Reservoir
			Impounding Reservoir
			Pipe Bridge

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



WATER MAIN RECORDS

Address or Site Reference

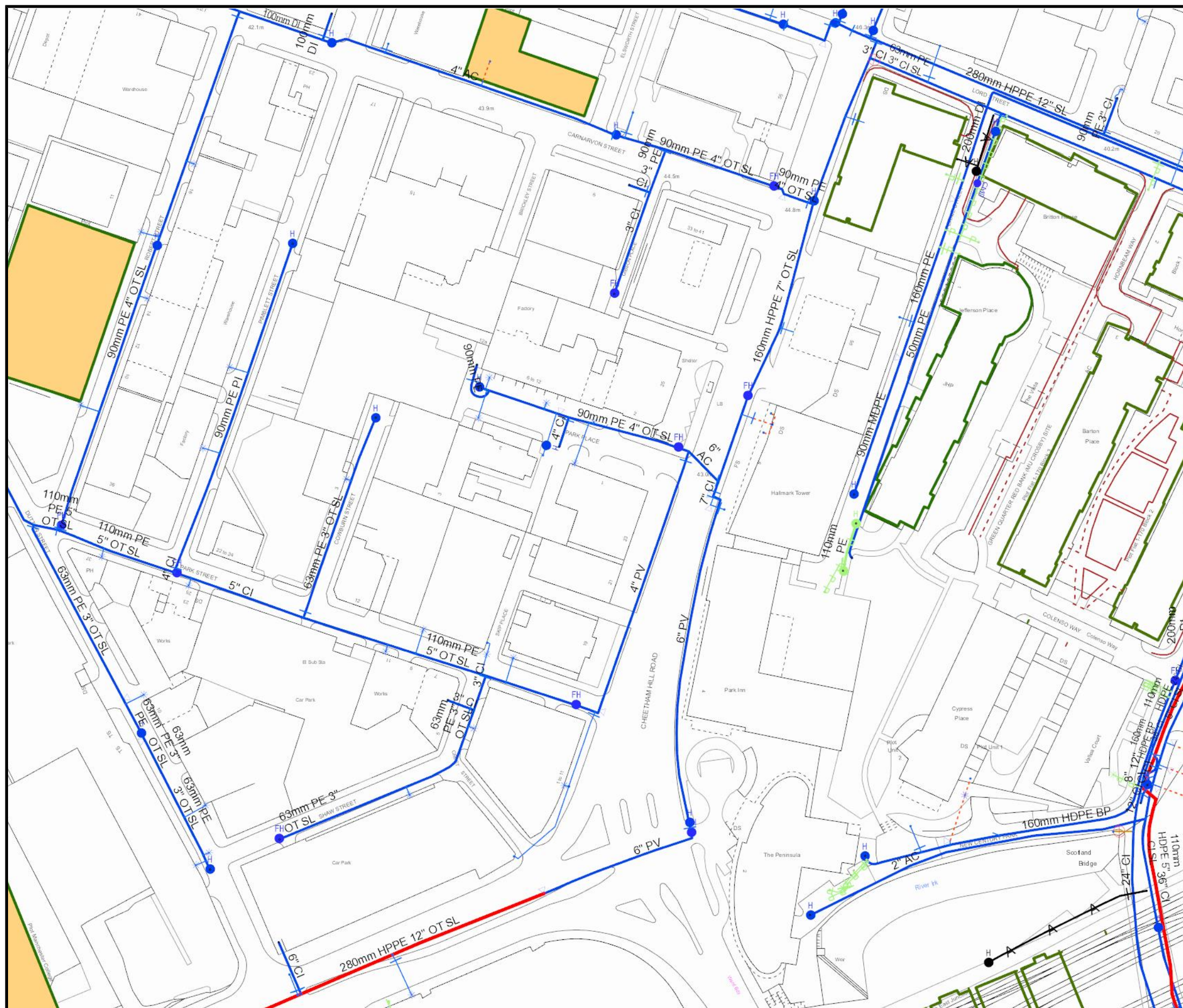
Park Place,

Scale: 1:1250
Date: 08/09/2023

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APPENDIX IV: Proposed Drainage Strategy Drawing

APPENDIX V: InfoDrainage Attenuation Calculations

Project: One Park Place	Date: 22/09/2023		
	Designed by: JT	Checked by: JT	Approved By: AW
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Roscoe		



Catchment Area

Type : Catchment Area

Area (ha)	0.024
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.02
-----------	------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.033
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.015
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: One Park Place		Date: 22/09/2023			
Report Details: Type: Junctions Storm Phase: Phase		Designed by: JT	Checked by: JT		Approved By: AW
		Company Address: Roscoe			

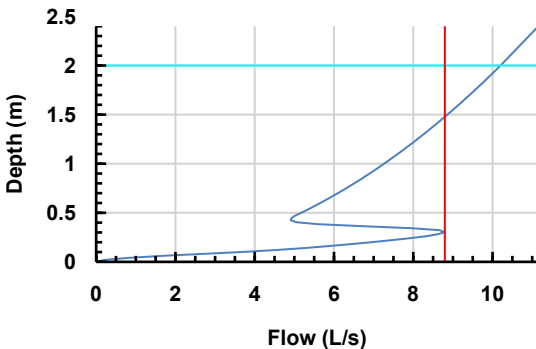
Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
Manhole	Manhole	384042.588	399317.059	43.250	1.250	42.000	Circular	1.200
Manhole (1)	Manhole	384028.593	399321.580	43.500	1.647	41.853	Circular	1.200
Manhole (2)	Manhole	384029.707	399326.162	43.400	1.578	41.822	Circular	1.200
Manhole (3)	Manhole	384034.104	399340.220	43.450	2.398	41.052	Circular	1.200
Manhole (4)	Manhole	384034.599	399343.130	43.500	2.468	41.032	Circular	1.200

Name	Lock
Manhole	None
Manhole (1)	None
Manhole (2)	None
Manhole (3)	None
Manhole (4)	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
Manhole	Inlet	Catchment Area	(None)	No Restriction
Manhole (1)	Inlet	Pipe Catchment Area (1)	(None)	No Restriction
Manhole (2)	Inlet	Pipe (1) Catchment Area (3)	(None)	No Restriction
Manhole (3)	Inlet	Pipe (3)	(None)	No Restriction
Manhole (4)	Inlet	Pipe (4)	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
Manhole	Outlet	Pipe	Free Discharge
Manhole (1)	Outlet	Pipe (1)	Free Discharge
Manhole (2)	Outlet	Pipe (2)	Free Discharge
Manhole (3)	Outlet	Pipe (4)	Hydro-Brake®
	Invert Level (m)	41.052	
	Design Depth (m)	2.000	
	Design Flow (L/s)	10.2	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0123-1020-2000-1020	
			

Project: One Park Place	Date: 22/09/2023			
	Designed by: JT	Checked by: JT	Approved By: AW	
Report Details: Type: Outfall Details Storm Phase: Phase	Company Address: Roscoe			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Manhole (4)	Free Discharge		

Project: One Park Place	Date: 22/09/2023		
	Designed by: JT	Checked by: JT	Approved By: AW
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Roscoe		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow (m³)
Catchment Area	FSR: 100 years: +45 %: 15 mins: Winter	0.02	13.6	6.322
Catchment Area (1)	FSR: 100 years: +45 %: 15 mins: Winter	0.02	11.2	5.197
Catchment Area (2)	FSR: 100 years: +45 %: 15 mins: Winter	0.03	18.4	8.540
Catchment Area (3)	FSR: 100 years: +45 %: 15 mins: Winter	0.02	8.6	3.997

Project: One Park Place	Date: 22/09/2023		
	Designed by: JT	Checked by: JT	Approved By: AW
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Roscoe		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Manhole	FSR: 100 years: +45 %: 60 mins: Winter	43.25 0	42.00 0	42.110	0.110	7.0	0.124	0.000	7.0	11.016	OK
Manhole (1)	FSR: 100 years: +45 %: 60 mins: Winter	43.50 0	41.85 3	42.168	0.315	12.7	0.356	0.000	26.2	21.318	Surcharged
Manhole (2)	FSR: 100 years: +45 %: 60 mins: Winter	43.40 0	41.82 2	42.135	0.313	36.8	0.354	0.000	17.1	31.683	Surcharged
Manhole (3)	FSR: 100 years: +45 %: 60 mins: Winter	43.45 0	41.05 2	42.027	0.975	8.3	1.103	0.000	7.7	37.658	Surcharged
Manhole (4)	FSR: 100 years: +45 %: 15 mins: Summer	43.50 0	41.03 2	41.132	0.100	5.9	0.000	0.000	5.9	8.014	OK

Project: One Park Place	Date: 22/09/2023		
	Designed by: JT	Checked by: JT	Approved By: AW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Roscoe		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Tank	FSR: 100 years: +45 %: 60 mins: Winter	42.114	42.114	1.014	1.014	26.5	22.550	0.000	0.000	8.3	38.591	19	OK

Project: One Park Place	Date: 22/09/2023		
	Designed by: JT	Checked by: JT	Approved By: AW
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Roscoe		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole	Manhole (1)	43.3	42.105	0.113	6.319	0.9	0.74	13.2	OK
Pipe (1)	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	Manhole (1)	Manhole (2)	43.5	42.168	0.225	17.336	1.3	0.62	26.2	Surcharged
Pipe (2)	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole (2)	Tank	43.4	41.895	0.225	15.490	1.2	0.18	32.4	OK
Pipe (3)	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Tank	Manhole (3)	43.4	41.949	0.100	17.980	1.3	2	9.8	Surcharged
Pipe (4)	FSR: 100 years: +45 %: 240 mins: Summer	Pipe	Manhole (3)	Manhole (4)	43.5	41.526	0.100	54.823	1.1	1.79	8.8	Surcharged

Project: One Park Place	Date: 22/09/2023			
	Designed by: JT	Checked by: JT	Approved By: AW	
Report Details: Type: Phase Management Storm Phase: Phase		Company Address: Roscoe		

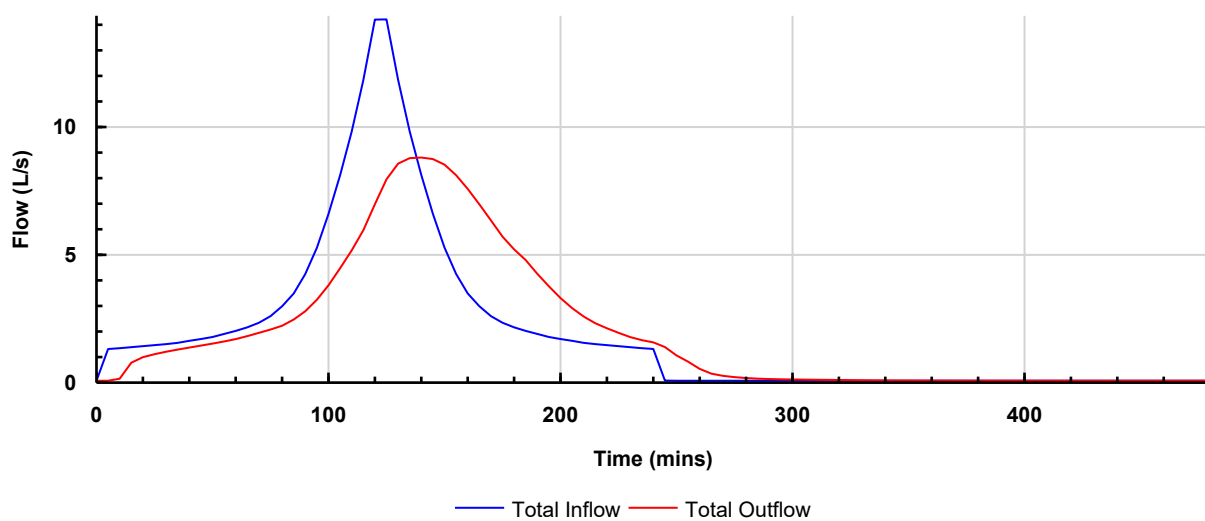

Phase
 FSR: 100 years: Increase Rainfall (%): +45: 240 mins: Summer

Tables

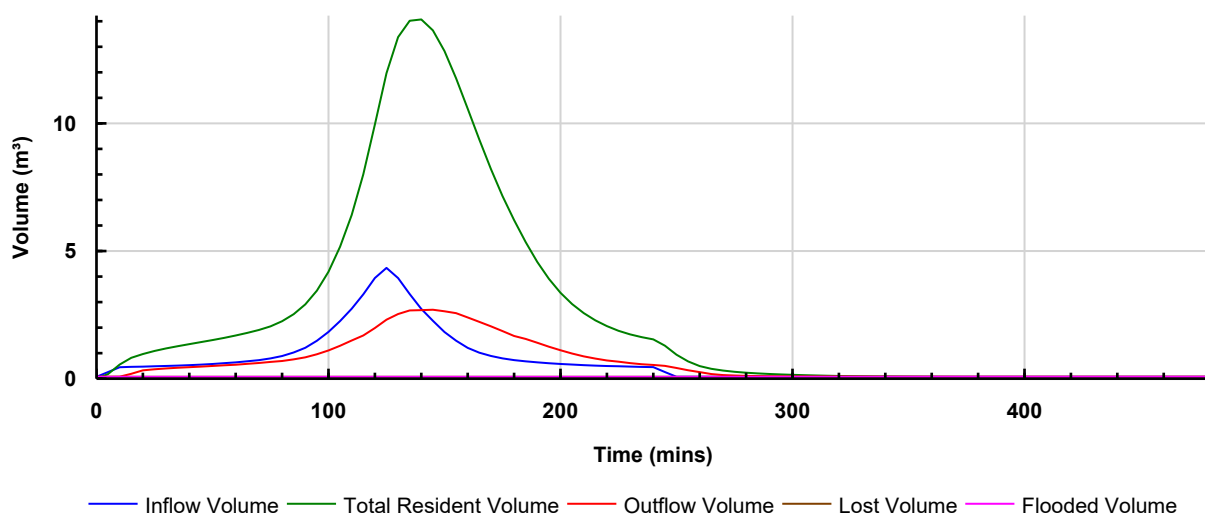
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Manhole (4)			8.8	54.823
TOTAL	14.2	54.872	8.8	54.823

Graphs

Flow Graph



Volume Graph



APPENDIX VI: Drainage and SuDS Maintenance Schedule

APPENDIX VIII – TYPICAL DRAINAGE MAINTENANCE SCHEDULE

Drainage Item	General Requirements	Scheme Specific Requirements
Channel Drains	Annual visual check for blockages and remove as necessary.	
Gullies	Annual removal of any deposits from sump. Check outlets for blockages.	
Drainage pipework	Clean and jet as required.	
Inspection Chambers / Catch pits / Manholes / Rodding Eyes	Remove cover annually to check for any sign of blockage and clear as required. Empty sumps as required.	
Attenuation Tank System	Annual check of all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	
Flow Control Chambers, penstocks, flap valves	Annual removal of any deposits from sump. Check outlets for blockages. Check flow control valve for blockage and remove as necessary.	
Oil separators	Check alarm system for any notifications, complete regular maintenance as per manufacturer requirements	



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