



For: NEXUS ST.MARKS CHURCH LTD
TERM Engineering Ref: 1064/01

Date: July 2025

Brook Hey Drive

Proposed Drainage Strategy

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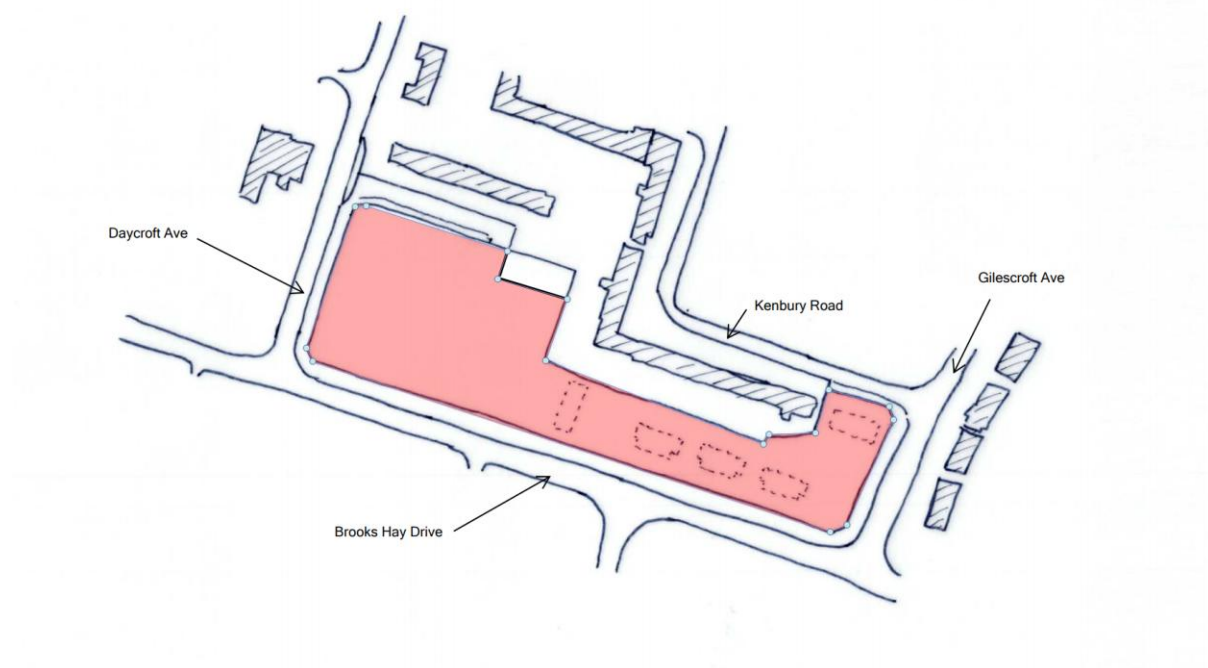
1.0 Introduction

TERM Engineering Ltd has been appointed by NEXUS ST.MARKS CHURCH LTD to provide this drainage strategy for the proposed development of the Brook Hey Drive site to accommodate 90 dwellings in 4 blocks.

The proposed drainage strategy is per the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015), Building Regulations Approved Document H: drainage and waste disposal and Sewers for Adoption requirements.

2.0 Site Summary

The Brook Hey Drive site is bounded by Brook Hye Drive to the South, Gilescroft Avenue to the East, Deycroft Avenue to the West and Daycroft Walk and Kenbury Road to the North. It was formally occupied by the St Marks Church on the West of the site, which has been demolished. On the East side of the site there are 5 partially constructed residential buildings.



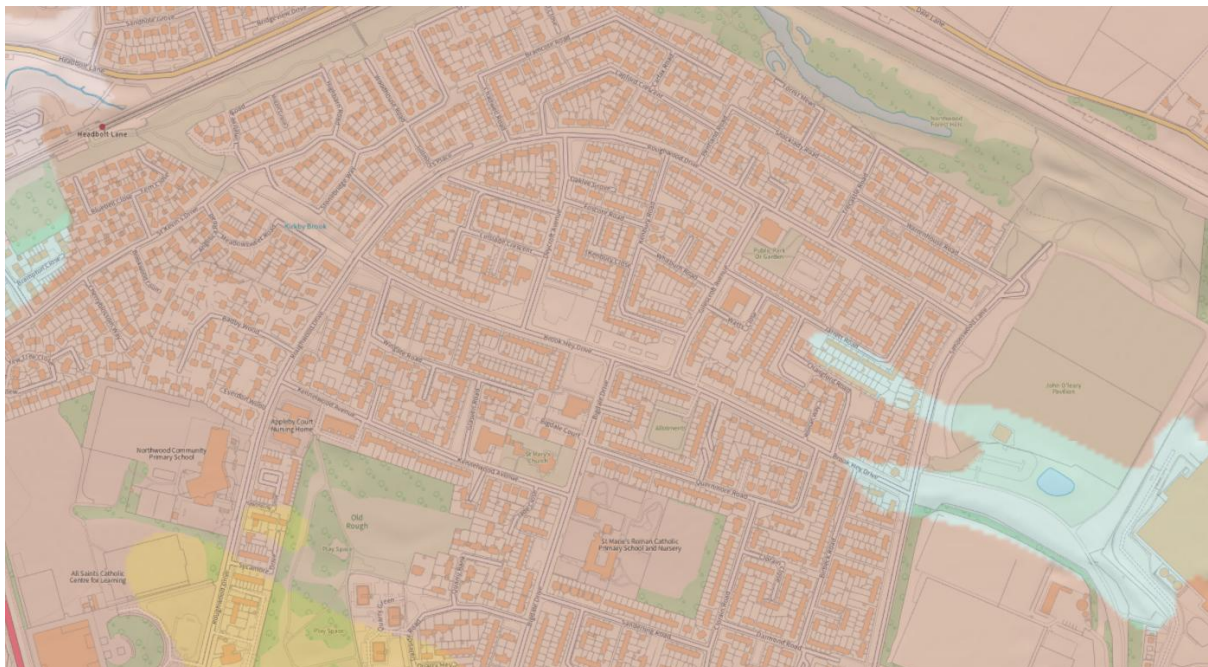
3.0 Site Levels, Geology and Hydrology

Topographic levels to meters Above Ordnance Datum (m AOD) have been derived from a site survey included in Appendix 1.

The existing site has a very slight fall in levels in a Westerly direction, from a peak level of 32.9m AOD on the eastern side of the site to 31.48m on the western side of the site.

A water course has been culverted along the line of Brook Hey Drive to the South of the site. This watercourse emerges from the culvert around 500m to the East, where it flows to the West and South. Local surface water drains connect directly into the culverted water course.

Geological information available from the British Geological Society (BGS) indicates the local geology will consist of made ground overlying sands, overlying sandstone bedrock. The closest borehole log to the site suggests the sandstone will be around 10m below ground level.



A site investigation comprising a series of 5-6 m window samples was carried out on the Eastern end of the site, and found that there were varying layers of made ground, sands and peat overlaying a layer of Clay. See the table below.

Table 3: Summary of Ground Conditions Encountered

Hole	Depth to Stratum (m bgl)				GROUNDWATER (m bgl)
	MADE GROUND	SAND	PEAT	CLAY	
WS01	GL-1.30	1.30-1.95	1.95-2.05	2.05-6.00+	-
WS02	GL-3.50	-	-	3.50-5.00+	-
WS03	GL-1.20	1.20-1.90 2.00-2.30 3.00-4.70	1.90-2.00	2.30-3.00 4.70-5.00+	-
WS04	GL-1.50	-	-	1.50-5.00+	-
WS05	GL-1.50	-	-	1.50-6.00+	-
WS06	GL-0.80	0.80-2.40 2.70-2.90	2.40-2.70	2.90-5.00+	-

No ground water was encountered in any of the window samples during the investigation

4.0 Existing Drainage

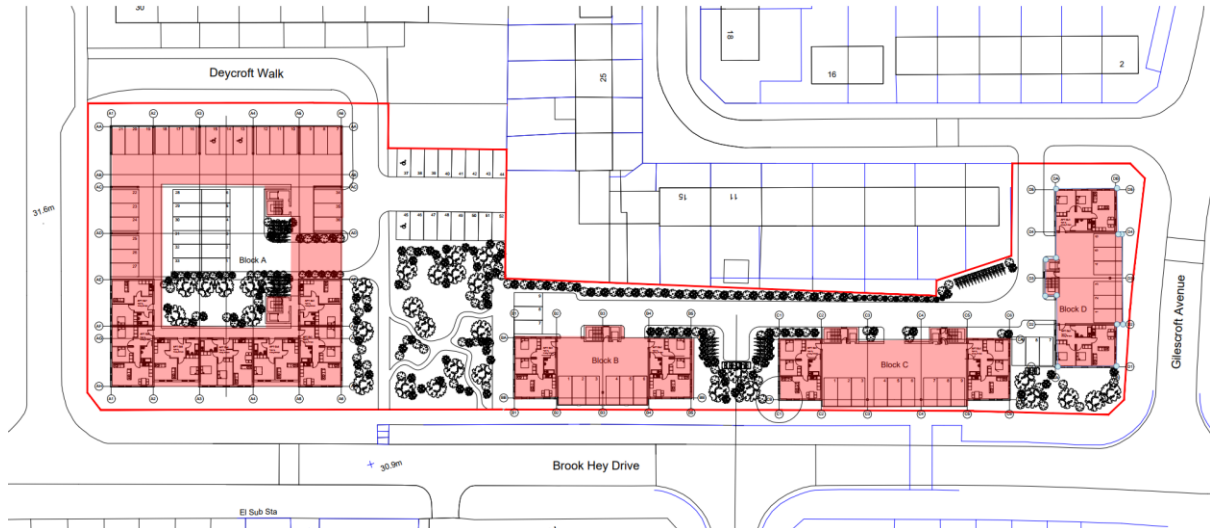
The existing drainage network in the area surrounding the site is shown on the United Utilities Map in Appendix 2.

It is likely that the Church, which formerly occupied the West of the site, drained into the surface and foul water drains in Daycroft Avenue. There is no evidence of historic drain routes on the site where the building has been cleared.

Foul water stacks are visible through the ground floor slabs in the 5 partially constructed buildings on the East of the site. There are no visible surface water pop-ups. There are no visible manholes or other signs of below-ground drainage routes associated with these buildings on the site.

5.0 Proposed Development and Sustainable Drainage Systems (SuDS) Approach

It is proposed to develop the site with 4 blocks of residential houses, with a total of 90 dwellings. Details plans are shown in Appendix 3.



Proposed site plan showing accommodation blocks

As well as the new buildings, there are external areas of hardstanding to form two new access roads onto the site, some areas of permeable paving that will be used for external parking bays, and free-draining areas of planting.

New buildings	-	2525m ²
External hard landscaping	-	1100m ²
External permeable paving	-	425m ²
External green landscaping	-	2500m ²
Total site area	-	6550m²

In accordance with the SuDS Hierarchy, a consideration has been given to the most sustainable way of discharging surface water from the site as set out below.

Method of Discharge	Consideration	Feasible
Discharge to the ground	Given the presence of clay underlying the site, which will form an upper aquifer that feeds into the historic water course to the South of the site, it is highly unlikely that soakaways will be a viable option for dealing with surface water on the site. There is one potential area where soakaways could be installed to maintain a 5 m boundary from the footings of the new buildings, and soakaway testing will be carried out in this location, as shown on the drawing in Appendix 5, to confirm if they are viable or not. This report assumes they will not be.	No
Discharge to surface water body	The nearest open watercourse is the historic watercourse which is culverted beneath Brook Hey Drive. This emerges around 500m to the East. Feeding the surface water from the site directly to the open section of the water course will not be possible due to distance and land ownership rights. It is, however proposed to feed into this water course via the culvert (see below)	No
Discharge to surface water sewer	United Utilities drawings indicate the nearest surface water sewer is the culverted historic water course to the South of the site. Separate surface water drains feed into this culvert from the surrounding streets. We are proposing to form a new connection into the culvert from the site, which will be limited with a hydrobreak to 5l/s (greenfield run-off rates), with adequate attenuation storage onsite to cope with a 1 in 100 year storm event with a 30% allowance for climate change	YES
Discharge to highway drain	There are no specific highway drains in the streets surrounding the site shown on the United Utility Sewer map.	No
Discharge to Combined sewer	It is not proposed to connect the surface water drains to the foul water drains in the area, as there are specific surface water drains adjacent to the site	No

It is proposed to restrict surface water runoffs from the development at rates of 5 l/s to reduce the risk of blockages (Report - SC030219, Environment Agency - Delivering benefits through evidence, Rainfall runoff management for developments).

The proposed development has a hard landscaped catchment area of approximately 3625m², which will be collected via rainwater pipes, channels and filter drains. An offline 188.1m³ attenuation tank (total water volume) will be used to store the rainwater run-off from this catchment area, before discharging into the United Utilities concrete culvert on Brook Hey Drive. The attenuation tank and surface water system will be protected from sewer surcharge events with a non-return valve into the final manhole. Blue roofs will be explored as an option for attenuation as the design is developed, however we understand the client may be looking at options for solar panels on the roofs, and the compatibility of the two will need to be understood. Refer to the proposed drainage layout in Appendix 4

6.0 Approach to foul drainage

Foul drainage from the proposed site is to be directed via new connections to the foul United Utilities sewers in Daycroft Avenue (Block A), Giles Croft Avenue (Blocks B-D).

Block A contains the same number of dwellings as blocks B,C, and D combined. All dwellings have the same provision in terms of Bathrooms and Kitchens. As such, each new outlet into the foul water network will have the following flow rate:

Appliance	No.	DPU	Total
WC 9.0l Cistern	45	2.5	113
Shower	45	0.8	36
Wash basin	45	0.5	23
Washing machine	45	0.8	36
Kitchen sink	45	0.8	36
Bath	45	0.8	36
Total			279
Foul Water			17 l/s

Using table C.1 of BS-EN-702 to calculate the flow, where $k = 0.5$ for dwellings

Total flow = **8.35 l/s**

Refer to the proposed drainage layout in Appendix 4

7.0 Future Maintenance

The maintenance strategy has been devised to prevent siltation and blockages of the system which, if allowed to develop, would reduce its effectiveness. Carpenter Build (Maintenance) Ltd will be responsible for the maintenance of the drainage.

The following elements should be inspected regularly as part of the maintenance strategy:

- Road gullies
- Rainwater gullies
- Catchpits
- Control manholes
- Inspection chambers.
- Air vents

They should also be inspected after every major storm event. Catchpits and interceptors should be emptied regularly to prevent them from becoming full. The frequency of this will be determined by the regular inspections set out in the table below.

Maintenance schedule	Action	Frequency
Regular maintenance	Road gullies and rainwater gullies to be kept clear of debris such as leaves	Annually
	Air vents from the attenuation tanks should be kept clear of debris such as leaves	Annually
	Silt traps prior to inlet pipework should be inspected and cleaned out to minimise debris reaching the tank	Monthly, or as required
	Inspection chambers should be inspected and cleaned out to minimise debris reaching the tank	Monthly, or as required
Remedial actions	Repair/rehabilitation of inlets/outlets, overflows and vents	Annual inspection or as required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey of hardstanding at tank locations for any undulation in the ground indicating loss of structural support to the attenuation tank	Annually, and after large storms

Prepared by Tom Roberts

Issued July 2025

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Appendix 1 - United Utilities Sewer Records



SEWER RECORDS

Address or Site Reference

St Marks site,

Scale: 1:1250
Date: 10/07/2025

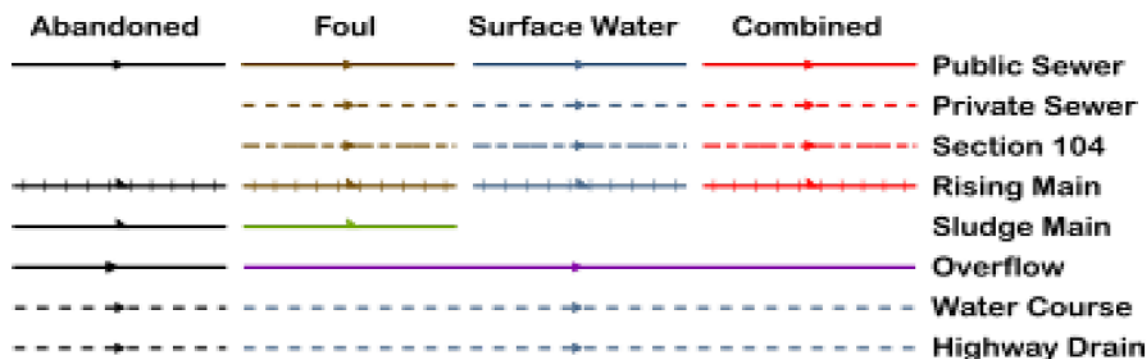
Printed by: Property Searches

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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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	DNM Network Monitoring Point
Drop Shaft	Change of Characteristic
Orifice Plate	

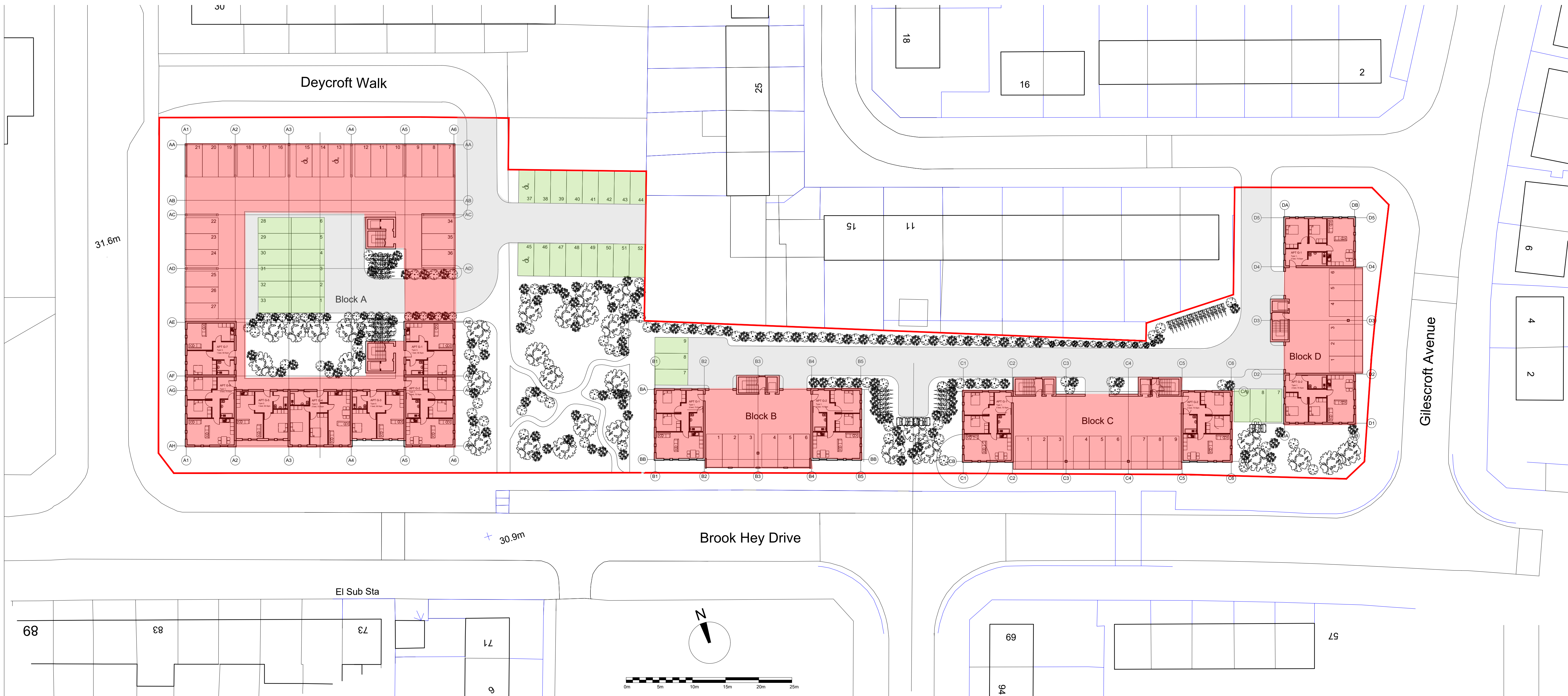
Appendix 2 - Proposed Site Layout

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This drawing must be read in conjunction with all associated architect's, consultants', sub-contractors', specialists' drawings and specifications.

Do not scale from this drawing.

Notes:



- 27/06/25 Originated

Ref	Date	Notes
REVISIONS		

DRAWING NUMBER	REVISION
593-P-01	-

DRAWING STATUS	AUTHOR
Planning Application	IW
SCALE	
1:300 @ A1	

DRAWING TITLE

Site plan

JOB TITLE

Brook Hey Development

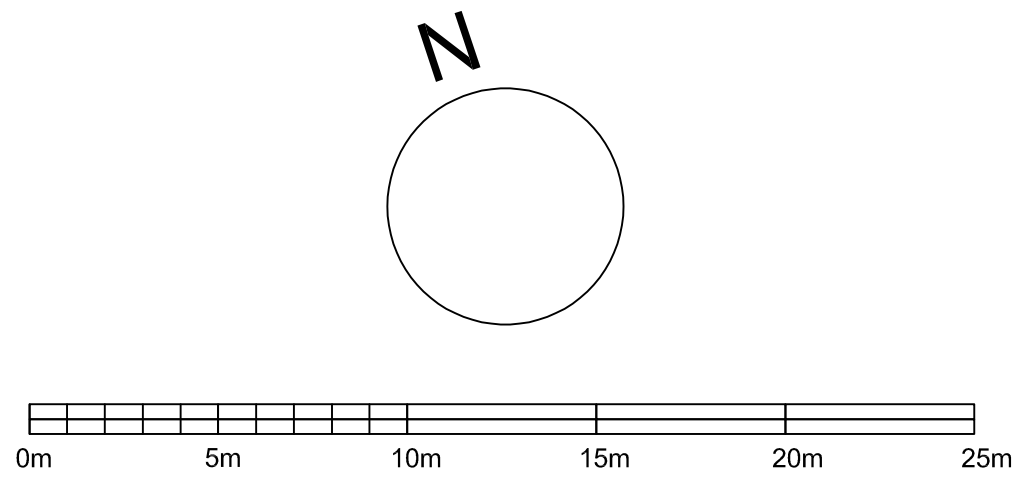
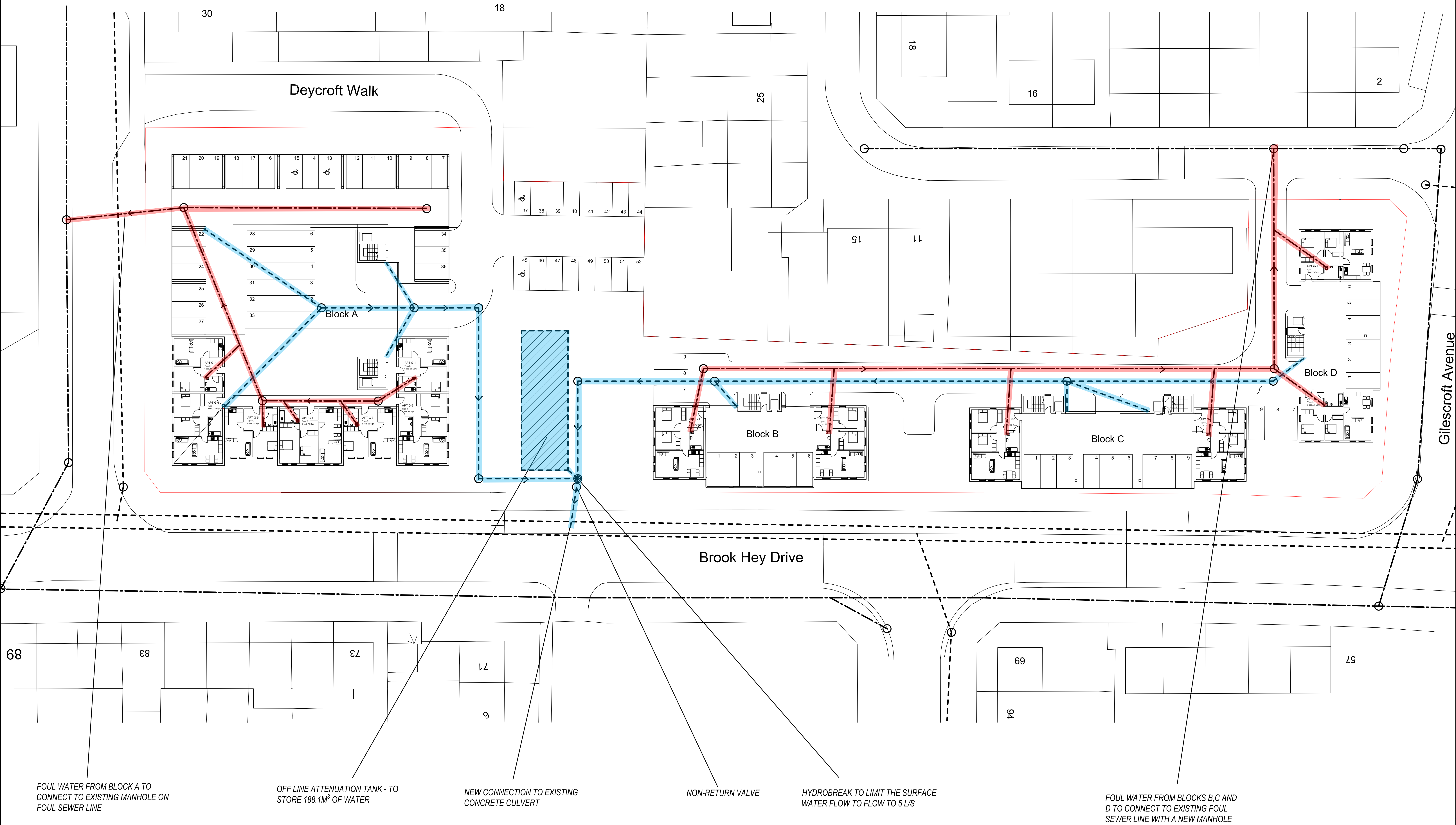
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Appendix 3 - Proposed Drainage Strategy



- NOTES
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATION.
 - FOR GENERAL NOTES AND SCHEDULES REFER TO DRAWING No. 1051/001/999.

JOB BROOK HAY DRIVE KNOWSLEY	
SITE PROPOSED DRAINAGE STRATEGY	
DRAWN TR	CHECKED
DATE JULY 25	SCALE (original - A3) 1:50
TERMENGINEERING STUDIO tel: 07876688437 email: Tom@term-engineering.com web: www.term-engineering.com	
DWG. NO. 1064/001/100	REV. •

Appendix 4 – Drainage calculations

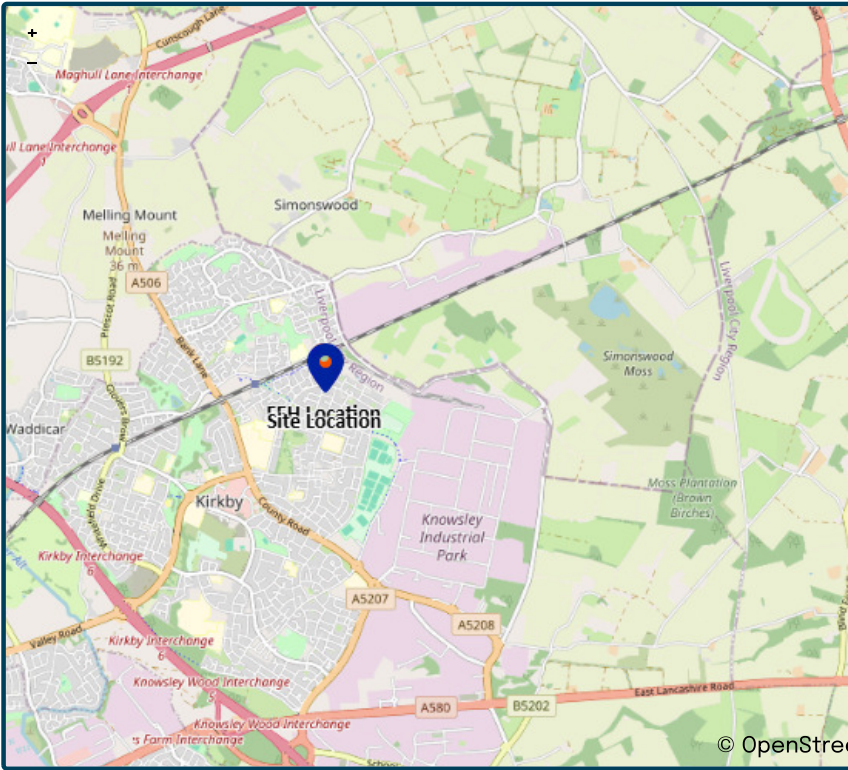
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	14/07/2025
Calculated by	Tom Roberts
Reference	Brook Hay Drive
Model version	2.0.1

Location

Site name	Brook Hay Drive
Site location	Brook Hay Drive, Knowsley



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Site easting	342097
Site northing	399517

Site areas

Total site area (ha)

ha

Roof area

Total roof area (ha)

0.2525

ha

Contributing roof area (ha)

0.2525

ha

Non-contributing roof area (ha)

0

ha

Paved area

Total paved area (ha)

0.1525

ha

Contributing paved area (ha)

0.1100

ha

Non-contributing paved area (ha)

0.0425

ha

Grass / vegetated area

Total grass / vegetated area (ha)

2500

ha

Contributing grass / vegetated area (ha)

0

ha

Non-contributing grass / vegetated area (ha)

2500

ha

Total area

Total contributing area (ha)

0.3625

ha

Contributing areas with urban creep allowance

Urban creep allowance factor

+0% (no creep)

Storage design parameters

Storage base shape

Rectangular / square

Storage base length to width ratio

3:1

Storage design depth (mm)

1500

mm

Storage side slope (1 in x)

Vertical sided

Storage voids ratio (%)

90% (e.g. geocellular crate systems)

Storage volume design return period (years)

1:100 years

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	User specified

User specified discharge

Flow rate (user specified) (l/s)	5	l/s
----------------------------------	--------------	----------------

Final discharge rate

Runoff calculation method	User specified	
Design flow rate (l/s)	5	l/s

Blockage risk

Specify the method	Flow rate		
Minimum discharge flow rate to prevent blockage	2l/s		
	<u>My value</u>		<u>Calculated value</u>
Design orifice diameter (mm)	44	mm	44
Flow rate of orifice (l/s)	4.9	l/s	

Rainfall and runoff

Rainfall input type	FEH22 CSV file		
	FEH_Point_Rainfall_FEH22_AM_342094_399523.csv		
Distance from FEH location to site (km)	0	km	
Climate change allowance factor	130%		
Specify the runoff method from grass / vegetated areas	Fixed percentage - based on rainfall event depth and SPR		
	<u>My value</u>		<u>Map value</u>
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		

Model results

- **Maximum discharge flow rate:** 4.9 (l/s)
- **Outflow orifice diameter:** 44 (mm)
- **Storage base length:** 20.46 (m)
- **Storage base width:** 6.82 (m)
- **Storage base area:** 139.47 (m²)
- **Storage total volume:** 209 (m³)
- **Storage total water volume:** 188.1 (m³)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880 (minutes)

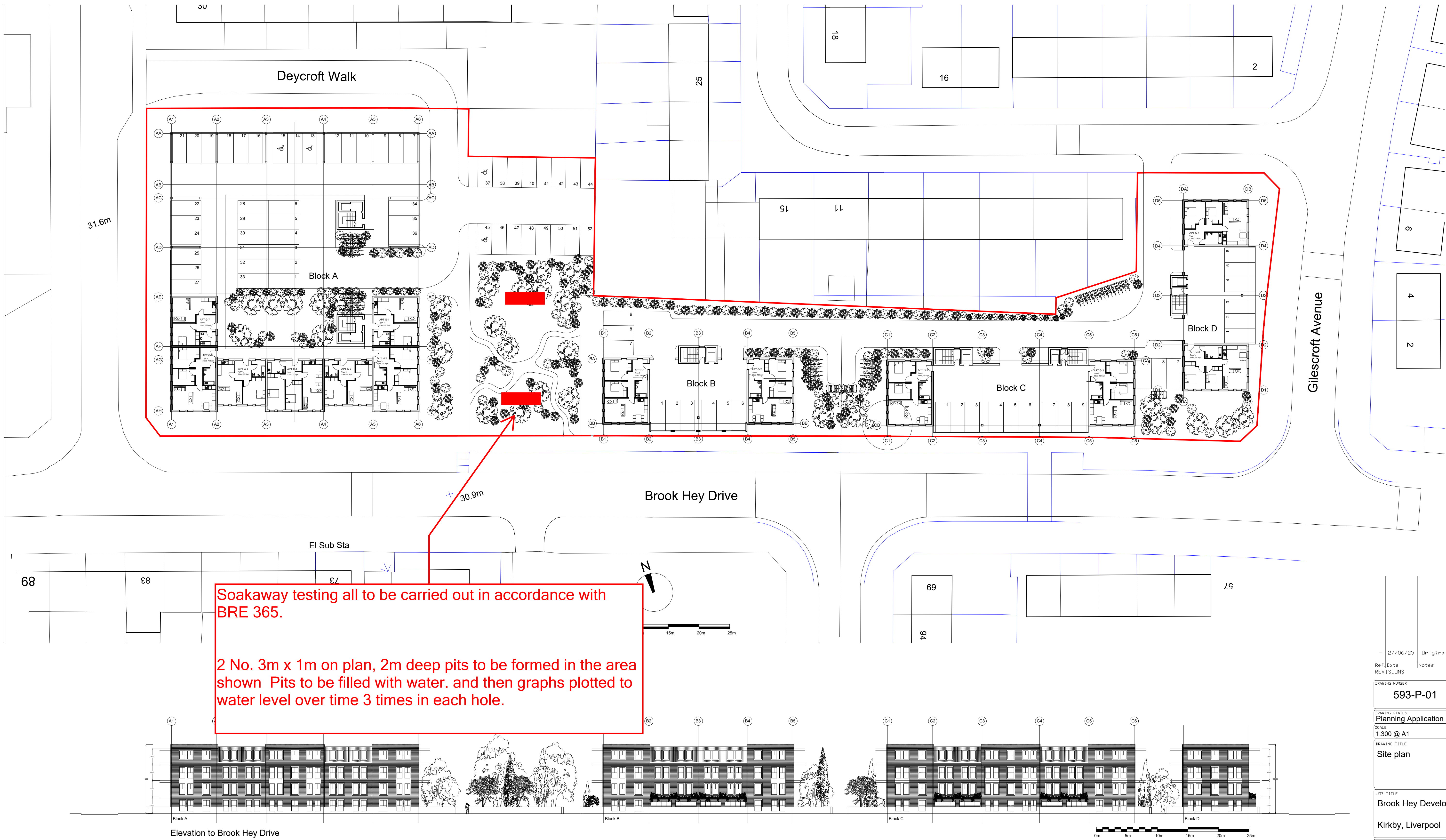
Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m ³)	Max storage volume (m ³)
1	540	2.8	0.52	64.7	71.9
2	540	3.1	0.6	75.3	83.7
10	360	3.9	0.94	117.9	131
30	360	4.4	1.18	147.9	164.3
<u>100</u>	<u>540</u>	<u>4.9</u>	<u>1.5</u>	<u>188.1</u>	<u>209</u>
200	540	5.3	1.72	219.5	243.9

Disclaimer

This report was produced using the surface water storage volume design tool (2.0.1) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate surface water storage volumes for the whole site based on a limiting discharge rate from the site. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

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Appendix 5 – Soakaway testing requirements



TERM Mark-up
Soakaway testing requirements

Ref	Date	Notes
-	27/06/25	Originated
REVISIONS		
DRAWING NUMBER	593-P-01	REVISION
DRAWING STATUS	Planning Application	AUTHOR
SCALE	1:300 @ A1	IW
DRAWING TITLE		
Site plan		
JOB TITLE		
Brook Hey Development		
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WD Architects		
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