Drainage Strategy

for

Devonshire Street,
Ardwick,
Manchester
M12 4EL

Client Name: JIGSAW HOMES
Our Ref: 33494/LRD
Date: October 2023

Liverpool Head Office
18-20 Harrington Street
Liverpool
L2 9QA

T: 0151 227 3155
E: enquiries@sutcliffe.co.uk
www.sutcliffe.co.uk

Manchester Office
T: 0161 817 5180

North Wales Office
T: 01978 664 071

London Office
T: 020 8016 4320

@Sutcliffe_1985 Sutcliffe1985 Sutcliffe

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Drainage Strategy

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Prepared by:

Name:	**James Whelby**
Title:	**Civil Infrastructure Technician**
Qualifications:	**HND**

Checked / Approved by:

Name:	**Andy Day**
Title:	**Executive Director**
Qualifications:	**BEng(Hons)**

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1. Introduction

1.1. As part of the proposed development at DEVONSHIRE STREET, ARDWICK a Drainage strategy is required.

1.2. The development site area is 0.22 hectares.

1.3. The proposals seek to develop a greenfield site into residential and non-residential site composed of apartment blocks, office space and a shared car park.

1.4. The development site is currently a undeveloped piece of land.

1.5. The following documents have been referred to in the preparation of this document:

1.5.1. The National Planning Policy Framework
1.5.2. The Technical Guidance to the National Planning Policy Framework
1.5.3. Manchester City Council Local Floor Risk Management Strategy (2014)
1.5.4. Manchester City Council Preliminary Flood Risk Assessment (2011)
1.5.5. Manchester City Council Surface Water Management Plan (2012)

1.6. The proposed site plan is provided in Appendix A for reference.

1.7. The development site sits on the corner of Devonshire Street and Coverdale Crescent, its exact location is:

Post Code:	**M12 4EL**		
Grid Reference:	SJ 85753 96758		
Coordinates:	X: 385753	Y: 396758	
Latitude:	53°28'03"N	**Longitude:**	002°12'58"W
What3Words:	spends.branded.deputy		

Table 1: Development Location Data



Figure 1: Site Location (Google Maps)

1.8. Flood risk information for planning has been obtained from the Environment Agency (EA) website and is provided in Appendix C. The EA data confirms the site falls within Flood Zone 1.

1.9. The site appears to be in a flood zone affected by infrastructure failure however reservoirs in England and Wales are regulated under the Reservoirs Act 1975, as amended by the Flood and Water Management Act 2010, and this is enforced by the Environment Agency in England. Therefore, the likelihood of a reservoir failing and causing flooding is extremely low. In the unlikely event of a failure, local warning systems will be triggered.

2. Climate Change

2.1. Paragraph 153 of the National Planning Policy Framework (NPPF) requires that plans should take a proactive approach to mitigating and adapting to climate change.

2.2. Paragraph 161 of the NPPF requires all plans to adopt a risk based approach taking into account all sources of flood risk and future impacts of climate change.

2.3. To appropriately mitigate the increased flood risk caused by climate change the Government has published guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) related to the appropriate climate change allowances.

2.4. The proposed development, situated within the Ardwick area of Manchester falls into the Irwell Management Catchment Climate change allowances for peak rainfall in England (data.gov.uk)

3.3% Annual Exceedance Rainfall Event		
Epoch	**Central Allowance**	**Upper End Allowance**
2050s	20%	35%
2070s	25%	40%
1% Annual Exceedance Rainfall Event		
Epoch	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

Table 2: Management Catchment Peak Rainfall Allowances

2.5. For development with a lifetime between 2061 and 2125 the 2070s epoch data should be used.

2.6. To mitigate the impact of climate change on the development the upper end allowances should be considered for both the 1% and 3.3% annual exceedance probability events and the development should be design for the 1% annual exceedance probability event so that:

2.6.1. There is no increased flooding elsewhere.

2.6.2. And the development is safe from surface water flooding.

3. Definition of the Flood Hazard

3.1. The NPPF outlines the forms of flooding that may affect development as fluvial (rivers), tidal, surface water, ground water, and infrastructure failure. The following have been identified as potential sources of flooding that may affect the development: fluvial, surface water, groundwater, and infrastructure failure. Flooding from tidal sources will not affect the site as the site is not in close proximity to the sea.

3.2. Sources of Flooding

3.2.1. Fluvial (River) Flooding

The nearest water body is River Medlock, approximately 900m to the north-west of the site.

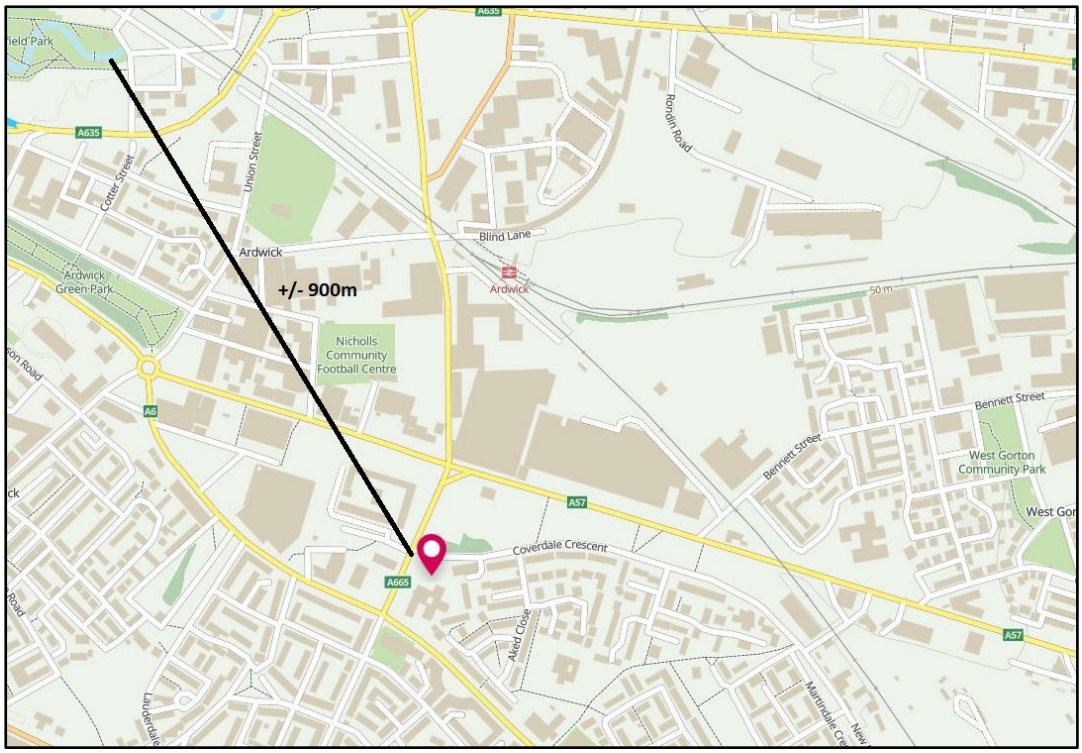


Figure 2: OS Map Location

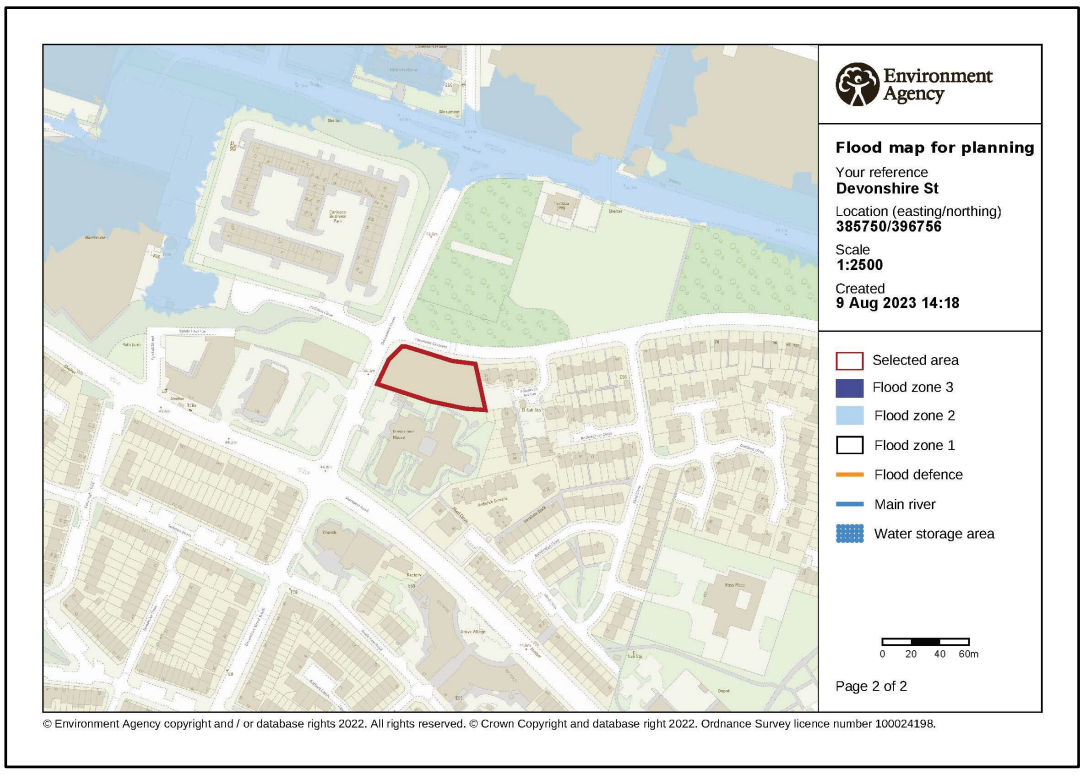


Figure 3: Flood Zone Map

Based on this information the site is categorised as being in Flood Zone 1 and at low risk of fluvial flooding.

3.2.2. Surface Water

Sources of surface water flooding are typically sheet flow from adjacent land or surface flow caused by surcharged sewers.

The Surface Water Flood Maps, Figure 4 and Appendix B, indicate that the site is outside of risk of flooding from surface water.



Figure 4: Extract from Surface Water Flood Map: Risk of Flooding from Surface Water

Proposed site levels and finished floor levels, 150mm above the proposed ground levels, will further mitigate any residual flood risk affecting the properties, while facilitating overland flow routes, away from buildings, during exceedance events.

The proposed site drainage will reduce the surface water flooding by managing surface water runoff. The proposed surface water drainage system will also mitigate the potential for the development to contribute to the surface water flood risk off site.

No recorded surface water flooding incidents for the site are recorded in the Manchester Council Flood Risk Assessment.

3.2.3.Flooding from Groundwater

The site is located in an area of negligible risk with regards to groundwater.

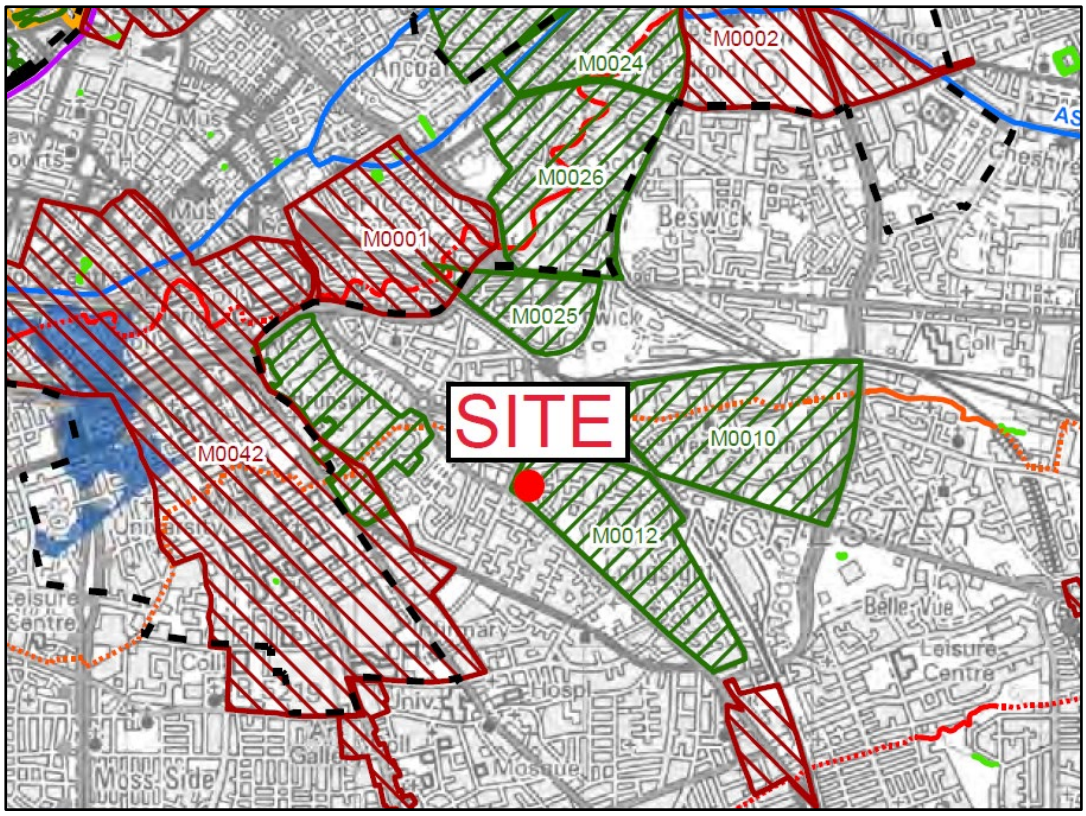


Figure 5: Extract from Map GW_2.1 Groundwater Flooding of the SFRA

Careful consideration of proposed site levels and the general topography of the site will mitigate any future risk.

Once the proposed levels are in place, the risk from groundwater flooding to the site can therefore be considered very low.

3.2.4. Flooding from Sewers

Flooding from the sewers occurs when surcharging during periods of excess flow breaks ground, typically at manholes or road gullies. The proposed development will not increase the risk posed by sewer flooding as the surface water runoff, a primary cause of sewer surcharging, will be controlled prior to discharge to the public sewers within the vicinity.

The surface water runoff will be managed in accordance with the requirements of the NPPF, LLFA and the Statutory Undertaker (United Utilities).

Careful consideration of proposed site levels and the general topography of the site will mitigate any future risk posed by sewer flooding.

The site is deemed to be at low risk of sewer flooding.

3.3. EA Flood maps and the maps contained within the SFRA confirm the development site is in Flood Zone 1. No incidents of historic flooding are noted in the SFRA that affect the site. There are no other known risks to the site.

The NPPF requires the proposed drainage plan ensure that the runoff caused by the development does not contribute to flooding offsite; this approach will help mitigate off site flooding that could be attributed to the site.

3.4. Existing drainage within the site is comprised of private drains.

In line with current best practice and the requirement of the statutory undertaker the proposed drainage will be a separate system with the surface water and foul water discharging into the combined water sewer within the site (see appendix A for drainage strategy).

Extracts from the Public Sewer Record are included in the appendix A for reference

4. Policy Context

4.1. The LLFA expect the surface water management strategy to comply with:

4.1.1. Paragraph 80 of the Planning Practice Guidance (PPG);

4.1.2. Paragraph 167 of the National Planning Policy Framework; and

4.1.3. Standards 2, 4, 7, 8 and 9 of the Non-Statutory Technical Standards for Sustainable Drainage (March 2015).

4.2. Paragraph 80 of the Planning Practice Guide requires that surface water from development be discharged in line discharge hierarchy:

4.2.1. Infiltrate into the ground close to source;

4.2.2. Discharge runoff to a surface water body;

4.2.3. Discharge runoff to a surface water sewer, highway drain or other surface water drainage system.

4.2.4. Discharge to a combined sewer.

4.3. The implementation of the hierarchy will be discussed in greater detail in Section 6.

4.4. Paragraph 80 of the PPG does recognise that particular types of sustainable drainage systems may not be practicable in all locations.

4.5. Paragraph 167 of the National Planning Policy requires major developments to incorporate sustainable drainage systems unless there is clear evidence that their inclusion would be inappropriate. Sustainable drainage systems should:

4.5.1. Take account of advice from the LLFA.

4.5.2. Have appropriate proposed minimum operational standards.

4.5.3. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

4.5.4. Where possible, provide multifunctional benefits.

4.6. Standards 2, 3, 4, 7, 8 and 9 of the Non-Statutory Technical Standards for Sustainable Drainage System (2015) are:

4.6.1. S2 requires, for greenfield developments, the peak runoff rate from the development to any highway drain, sewer, or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.

4.6.2. S3 requires for site that where previously developed the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

4.6.3. S4 requires, where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.

4.6.4. S7 requires the drainage system be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.

4.6.5. S8 requires the drainage system to be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

4.6.6. S9 requires the design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall exceeding a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.

4.7. The requirements of the local and national policy will be addressed by the proposed site layout and proposed drainage system, discussed in detail in Sections 5 and 6.

5. Existing Drainage

5.1. Compliance with policy begins with a review of the existing site and its drainage characteristics.

5.2. As discussed within the introduction the development site is greenfield land classifications. The greenfield sites, by definition, have no defined drainage networks.

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

5.4. There are no existing surface water sewers or drainage within the site boundary.

5.5. The site topography generally directs runoff towards the northwest section of the site, with the levels dropping around 1m across the site

5.6. Discussions where held with United Utilities regarding the management of surface water from the development. United Utilities have requested that any agreed rate does not exceed 5.0 l/s and they will consider a connection to their 450mm diameter public combined sewer within the development.

6. Proposed Site Layout

6.1. A proposed site plan is included in Appendix A for reference.

6.2. An existing 450mm diameter public combined sewer has been identified as crossing the development site, based on united utilities records. CCTV survey was carried out and confirmed the alignment of the sewer. No diversion is required.

7. Proposed Surface Water Drainage

7.1. Planning policy requires that the proposed network manage surface water runoff in line with the discharge hierarchy noted in Section 3.

7.2. The first level of the hierarchy requires that infiltration solutions be considered for the management of surface water runoff.

7.2.1. Infiltration systems can take the form of detention ponds, permeable pavements, bio-retention areas, etc. Testing to BRE 365 is required to confirm the viability of infiltration systems.

7.2.2. Permeable pavements have been considered for surface water management where suitable for the management of surface water, but more generally they can be used as a means of treating runoff and improving water quality. Where possible, this should be combined with tree pits. (See figure 2.)

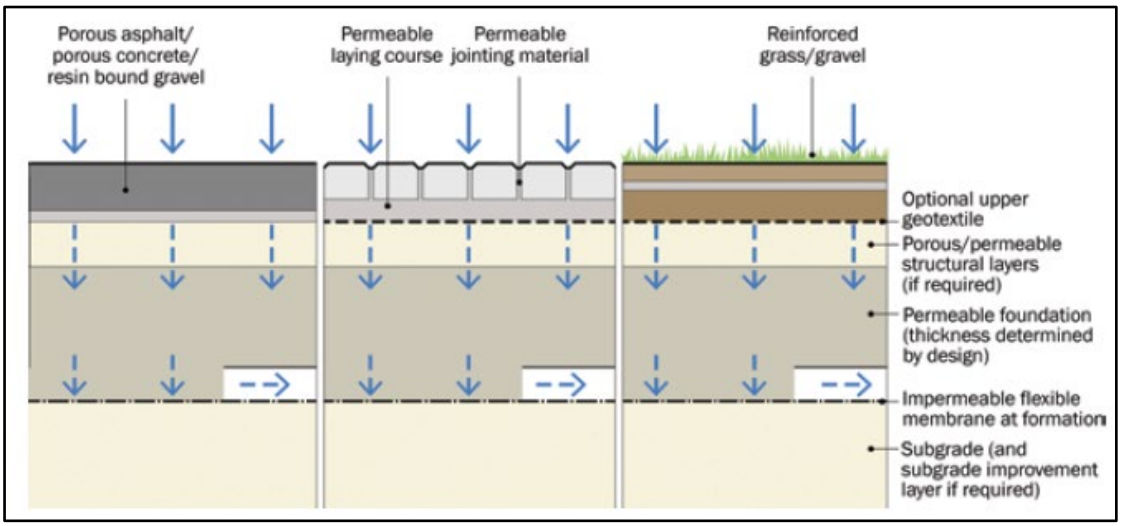


Figure 6: Extract from 'Figure 20.14 Pervious pavement system' of the CIRIA C753 The SuDS Manual

7.2.3. Where possible, the plots should accommodate raised planters to collect filtered water from adjacent roofs to reduce the water concentration in the system and improve the water quality. (See figure 3.)

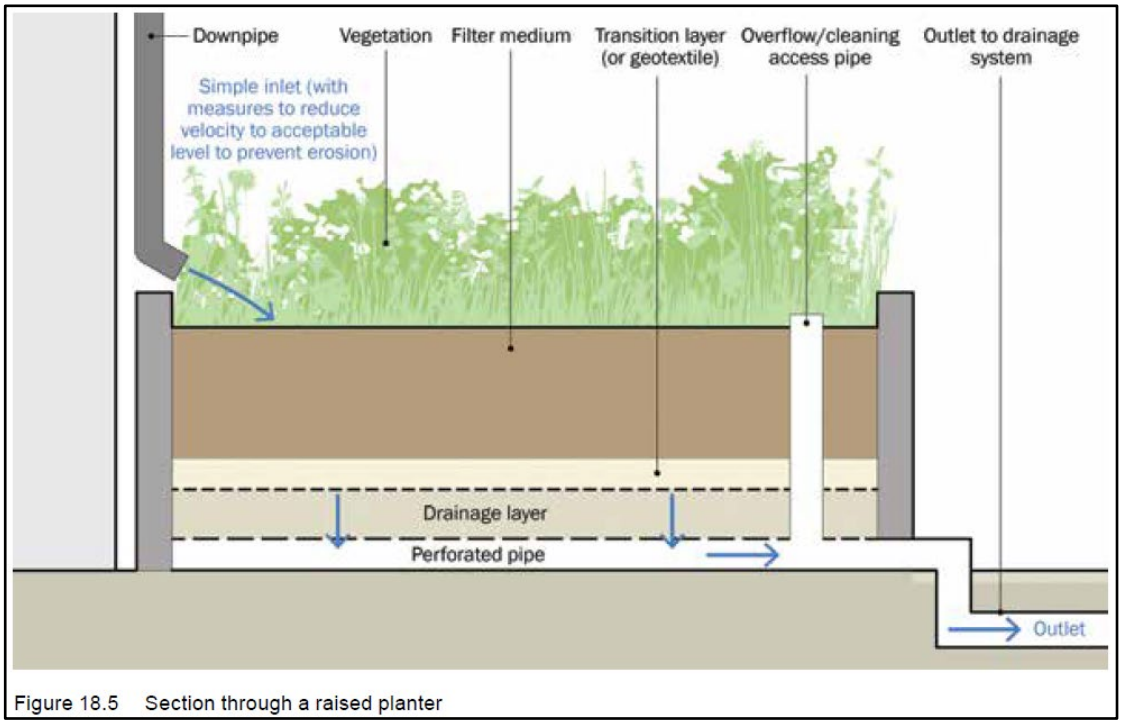


Figure 7: Extract from Figure 18.5 of the CIRIA SuDS Manual

7.2.4. Raised gardens and tree pits can be introduced, where possible, to the planting scheme to manage runoff from small impermeable surfaces i.e. paths and patios around dwelling, and encourage the uptake of run off by the plants and evapotranspiration.

7.3. The second tier of the hierarchy requires surface water to be discharged to a surface waterbody.

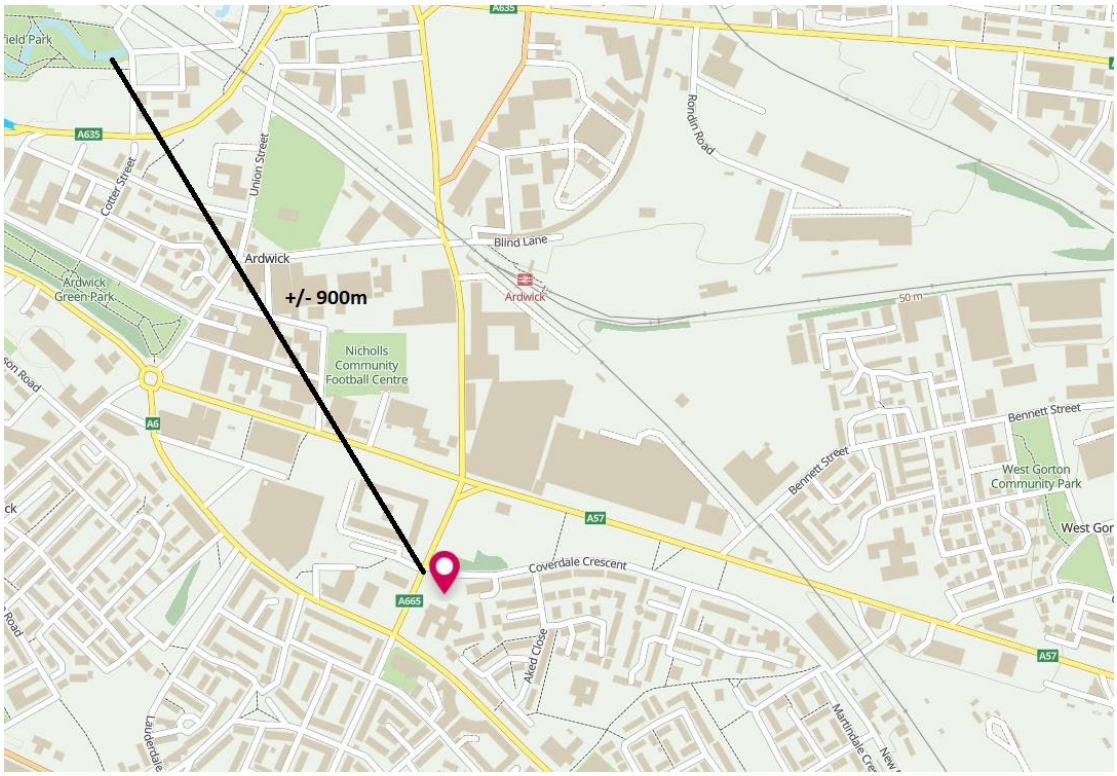


Figure 8: OS Map and distance between site and closest water body

7.3.1. A review of the area surrounding the site has confirmed there is no suitable waterbody to receive managed surface water flows from the site.

7.4. Stage three, discharge to a public surface water sewer is also not a viable solution for this scheme as there are not any close enough to the development to discharge too.

7.5. Therefore, we move to stage four of the Hierarchy. The United Utilities sewer records and CCTV survey have confirmed that there are public combined water sewers in the development area. As infiltration and discharge to a watercourse are not suitable options, surface water should be managed by discharging managed flows to the combined water sewers located on site.

7.6. United Utilities have requested in their response to the predevelopment enquiry that the discharge flow does not exceed 5.0 l/s. This is to be agreed with LLFA.

7.7. The site is considered as greenfield, so the maximum surface water runoff should be restricted to the greenfield runoff rates (QBar, as determine by Micro Drainage calculations -see

Appendix D). The surface water system design will need to include a control device, piped network and attenuation (permeable paving) to ensure that this rate is not exceeded for the design storms. The greenfield runoff rates have been estimated using Micro Drainage, see Table 3 for the greenfield runoff rates.

Return Period	Greenfield Runoff Rate (l/s)
	Total
Q_{BAR}	1.2
1yr	1.0
30yr	2.0
100yr	2.4

Table 3: Greenfield Runoff Rates (from Micro Drainage)

7.8. Based on the existing greenfield runoff rates (1.2 l/s), the minimum discharge rate for the site will be 5.0 l/s, which is considered to be the discharge rate that can be suitably managed throughout the lifetime of the development, in order to mitigate against the risk of blockage due to vegetation/other materials as establish in the Defra / Environment Agency's report "Preliminary rainfall runoff management for developments" (W5-074/A/TR/1 rev. D, 2012).

7.9. The total discharge rate for the proposed works will be 5.0 l/s.

7.10. Details of the proposed drainage strategy are presented on the proposed drainage plans in Appendix A.

7.11. The proposed drainage plans, show that the proposed development discharges via a flow control to the public combined water sewer at a limited discharge rate of 5l/s as per united utilities comments.

7.12. Attenuation is provided in permeable paving where applicable, prior to controlled discharge to combined water sewer.

7.13. The calculations for the proposed drainage strategy network are provided in Appendix B for reference, these confirm the attenuation volume and discharge rates. The calculations confirm the resultant discharges can be managed to satisfy the limiting discharge rates.

7.14. The simulation results confirm that the proposed surface water network satisfies the required design standards for all events up to and including the 100 year plus 45% climate change event.

7.15. Location and levels of existing combined sewer within the site are confirmed, via CCTV survey, so the proposed building footprints is outside the easement of the sewer.

7.16. The proposed combined water drainage network fulfils the policy requirements as far as practicable.

8. Water Quality

8.1. Water quality guidance is set out in Chapter 26 of the SuDS Manual (CIRIA C753). For the anticipated hazards the simple index approach is suitable.

8.2. Pollution hazard indices for the simple index approach are provided in Table 26.2 of the SuDS Manual. The development site primarily consists of residential roofs, individual property driveways, residential car parks and low traffic roads. The pollution hazard from these land use classifications range from very low to low.

8.3. As the proposed development is a residential and office based development it is considered a low pollution risk environment. The first port of defence will be the permeable paving.

8.4. Table 26.2 of the SuDS Manual (C753) indicates the pollution hazard indices for various land use classifications. The classifications relevant to the proposed development are summarised in Table 4.

Land Use	**Pollution Hazard Indices**		
	TSS	Metals	Hydrocarbons
Residential Roof - Very Low Pollution Hazard	0.2	0.2	0.05
Private Drives, Residential Car Parks and Low Traffic Roads – Low Pollution Hazard	0.5	0.4	0.4

Table 4: Land Use Pollution Hazard Indices.

8.5. SuDS components that can be included in the proposed development include permeable paving, and tree pits and raised gardens where possible.

8.6. Mitigation indices for bioretention systems and permeable pavements are provided in Table 5. The final mitigation is dependent on the treatment train used although the listed mitigation offers sufficient treatment.

	Mitigation Indices		
Type of SuDS Component	**TSS**	**Metals**	**Hydrocarbons**
Permeable Pavement	0.7	0.6	0.7

Table 5: SuDS Mitigation Indices

8.7. The individual SuDS components provide mitigation that meets or exceeds the anticipated pollution risk.

9. Proposed Foul Water Network

9.1. The proposed foul water network will be designed in accordance with the requirement of Approved Document H and the Sewer Design and Construction Guide.

9.2. The foul drainage will be discharged into the combined public sewer that runs adjacent to the site. Final discharge will need to be agreed with United Utilities.

10. Maintenance and Management

10.1. All proposed drainage network features will be managed through a management company set up to manage the shared open spaces within the development.

10.2. The SuDS features within the public open spaces throughout the development will be managed and maintained by the management company.

10.3. Table 19.3 of the SuDS Manual (C753) shows the operation and maintenance requirements for trees and tree pits, while Table 20.15 of the SuDS Manual (C753) identifies the operation and maintenance requirements of permeable pavements.

TABLE 19.3 Operation and maintenance requirements for trees (after CRWA, 2009)

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Figure 9: Operation and maintenance requirements for Trees (Source: C753)

TABLE 20.15 Operation and maintenance requirements for pervious pavements		
Maintenance schedule	**Required action**	**Typical frequency**
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Figure 10: Operation and maintenance requirements for Permeable Pavements (Source: C753)

11. Surface Water Management summary and Conclusion

11.1. The proposed drainage network manages surface water runoff up to the 100-year plus 45% climate event.

11.2. Runoff rates are controlled to comply with standards S2 and S3 of the Non-Statutory Technical Standards for Sustainable Drainage Systems through the inclusion of flow controls in accordance with CIRIA C753 and storage within the permeable paving.

11.3. Surface water discharge will be managed to the rate of 5.0 l/s, to be agreed by the LLFA.

11.4. The proposed drainage network includes SuDS as far as practicable given the layout of the site and constraints set by the existing infrastructure.

11.5. Through the implementation of the proposed drainage strategy the site does not increase flooding within or downstream of the catchment including an allowance for climate change.

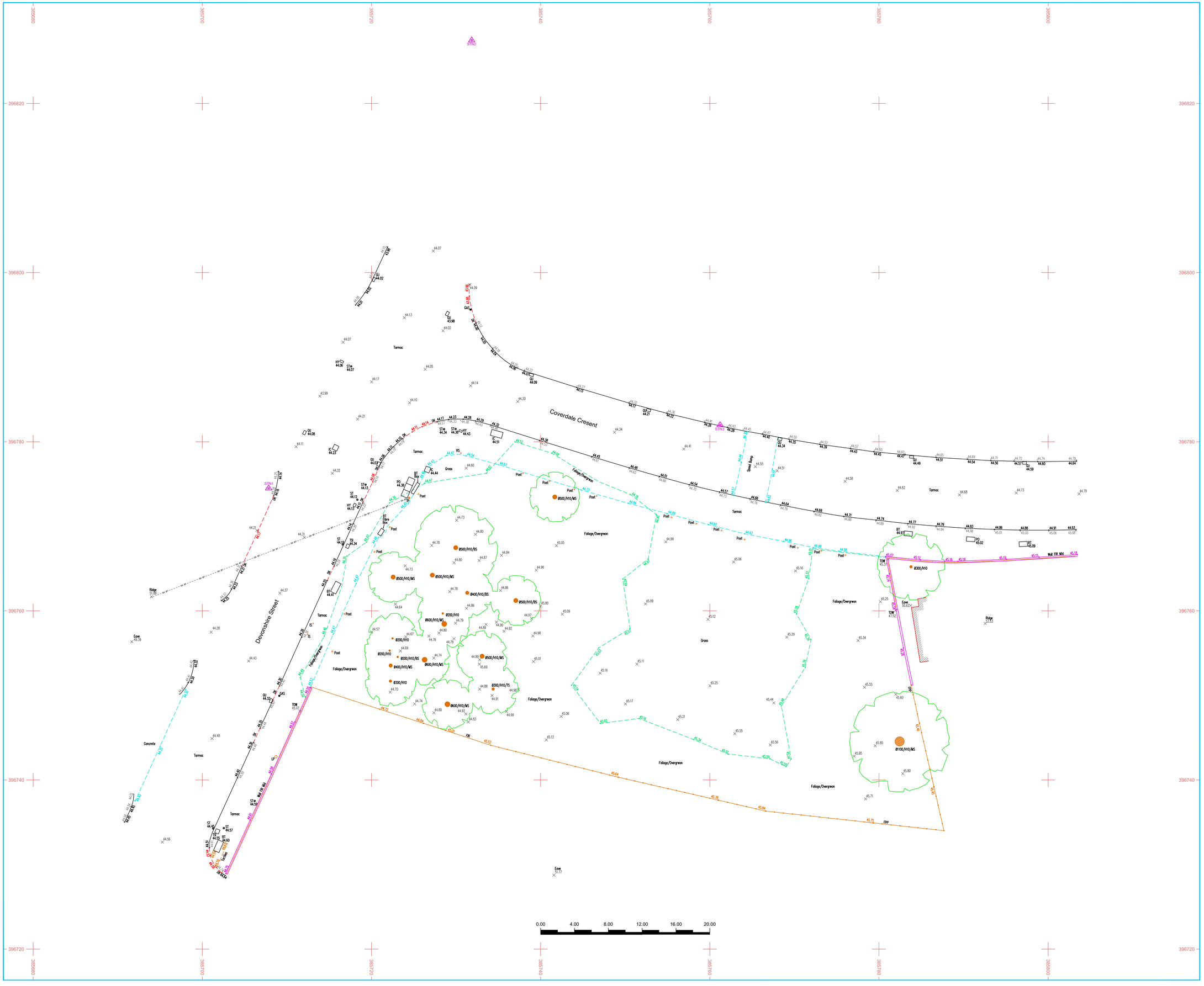
11.6. The proposed drainage network is considered to satisfy the requirement of local and national planning policy.

12. Appendices

12.1. Appendix A

Drawings:

1. Topographical Survey
2. Site Layout
3. Existing Areas
4. Proposed Areas
5. Flood Routing Plan
6. Drainage Strategy
7. United Utilities Sewer Records



Abbreviations where applicable:

AB	Air Brick	JTN	Junction Box
AV	Air Valve	KL	Keep Left
BB	Belisha Beacon	KO	Kerb Gulley
BC	Building Canopy	LFB	Lifebuoy
BH	Borehole	LP	Lamp Post
BL	Bed Level	MB	Mooring Bollard
BM	Bench Mark	ME	Meter Manhole
BNDY	Boundary	MH	Manhole
BO	Bollard	MK	Marker
BS	Bi-Stem (Tree)	MS	Multi-Stem (Tree)
BST	Bus Stop	MY	Mercury Manhole
BT	British Telecom Manhole	NP	Notice Board
BW	Brick Wall	NP	Road Name Plate
C	Crest	OB	Out Building
CCTV	Closed Circuit Television	OS	Ordnance Survey
CL	Ceiling Level	PB	Pillar Box
CONC	Concrete	PED	Pedestrian Pad
CP	Concrete Post	PI	Pipe
CR	Cycle Rack	PM	Parking Meter
CTV	Cable Television Manhole	PO	Post Office Manhole
CUL	Culvert	PP	Power Point
DK	Drop Kerb	RE	Rodding Eye
DP	Drain Pipe	RS	Road Sign
DPC	Damp Proof Course	RTW	Retaining Wall
DR	Drain	RWP	Rainwater Pipe
DWB	Dog Waste Bin	SDP	Stand Pipe
EB	Electricity Box	SK	Soakaway
EL	Electricity Manhole	SOF	Soffit Level
EP	Electricity Pole	SMH	Surface Water Manhole
ER	Earthing Rod	ST	Stop Tap
FB	Flower Bed	SU	Stump (Tree)
FBR	Foot Bridge	SV	Stop Valve
FCL	False Ceiling Level	SVP	Soil Vent Pipe
FFL	Finished Floor Level	SW	Surface Water
FIR	Fence Iron Railing	SY	Stay (Eg. Pylon, TP)
FL	Floor Level	TBM	Temporary Benchmark
FMH	Foul Water Manhole	TCB	Telephone Call Box
FP	Flag Pole	TH	Threshold Level
FPC	Fence Post & Chain	TL	Traffic Light
FPP	Fence Post & Panel	TOW	Top of Wall
FPR	Fence Post & Rail	TP	Telegraph Pole
FPW	Fence Post & Wire	TPT	Trial Pit
FSB	Fence Safety Barrier	TS	Tri-Stem (Tree)
FW	Foul Water	TSI	Traffic Signal Manhole
FWM	Fence Wire Mesh	UB	Under Beam
GAS	Gas Valve	UTR	Unable To Raise
GL	Ground Level	VP	Vent Pipe
GP	Gate Post	WB	Waste Bin
GU	Gulley	WCL	Window Cill Level
H	Height	WHL	Window Head Level
HY	Hydrant	WL	Wall Level
IS	Information Sign	WM	Water Meter

General Legend:

Tree Ø0.35/MS/H6 · Survey Station STNx · OSBM/TBM · Gate · Hedge · Borehole · Trial Pit

Survey Control:

	-E/X-	-N/Y-	-Ht/Z-
STN1	385707.839	396774.492	44.269
STN2	385731.849	396827.478	43.965
STN3	385761.217	396781.979	44.425

Relative to Ordnance Survey grid via Active Network RTK GPS Plane Table Grid

Sheet Layout:

A1

Disclaimer - West Coast Geomatics Limited 2023:

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Additional Notes:

N W E S

Amendments:

WEST COAST GEOMATICS
LAND & MEASURED BUILDING SURVEYORS

Address:
Suites 3 & 4 Orchard House
Halsall Business Centre
Lancashire
L39 8RG

Contact details:
Tel: +44 (0) 1704 840 938
Email: info@wcgeo.co.uk
Web: www.wcgeo.co.uk

Client:
DK Architects

Drawing Title:
Topographical Survey

Rev: -

Site Address / Project Reference:
Land @ Coverdale Crescent
Ardwick
M14 8HJ

Surveyed:	NF	Document No.	WCG 23-1995-T-1:1
Processed:	RM	Plotted Scale:	ISO_A1_@_1:200
Checked & QA:	SN	Date of Issue	August 2023

Devonshire Street
Jigsaw Homes



Drawing Title: Proposed Site Plan
Date: 06/06/2023
Drawing no: 1326-100
Scale: 1:500 @ A3
Drawn: NS

revision: B
revision notes:
A 20/09/2023 Building position updated due to drainage easement
B 25/09/2023 Building position adjusted to suit easement.

N

0m 5m 10m 25m 50m

DK-Architects
26 Old Haymarket
Liverpool
L1 6ER
0151 231 1209 T
mail@dk-architects.com E
www.dk-architects.com W

GENERAL NOTES

1. THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
4. ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS AND WHERE APPLICABLE LOCAL AUTHORITIES REQUIREMENTS.

KEY

SITE BOUNDARY (2065 m²)

PERMEABLE AREA: 2065 m² (0.21ha)

N

Coverdale Cresent

Street

SCALE BAR 1:250

0 5 10 15 20 25

Sutcliffe

Structural & Civil Engineering
Geotechnical & Environmental Investigations
Building Surveying
Pre Planning Services

Liverpool Head Office: 0151 227 3155
Manchester Office: 0161 817 5180
North Wales Office: 01978 664 071
London Office: 020 8016 4320

www.sutcliffe.co.uk

Drawing Status

PRELIMINARY DRAWING

Client

JIGSAW HOMES

Project

DEVONSHIRE STREET
ARDWICK

Drawing Title

EXISTING CATCHMENT PLAN

Rev	Description	Date	By	Chkd
P01	PRELIMINARY ISSUE	25.08.23	JG	AD

Date	Drawn By	Checked By
AUG. 23	JG	AD

Scale at A3	Project Number
1:250	33494

Sheet Number	Revision
33494-SUT-ZZ-XX-DR-C-6000	P01

GENERAL NOTES

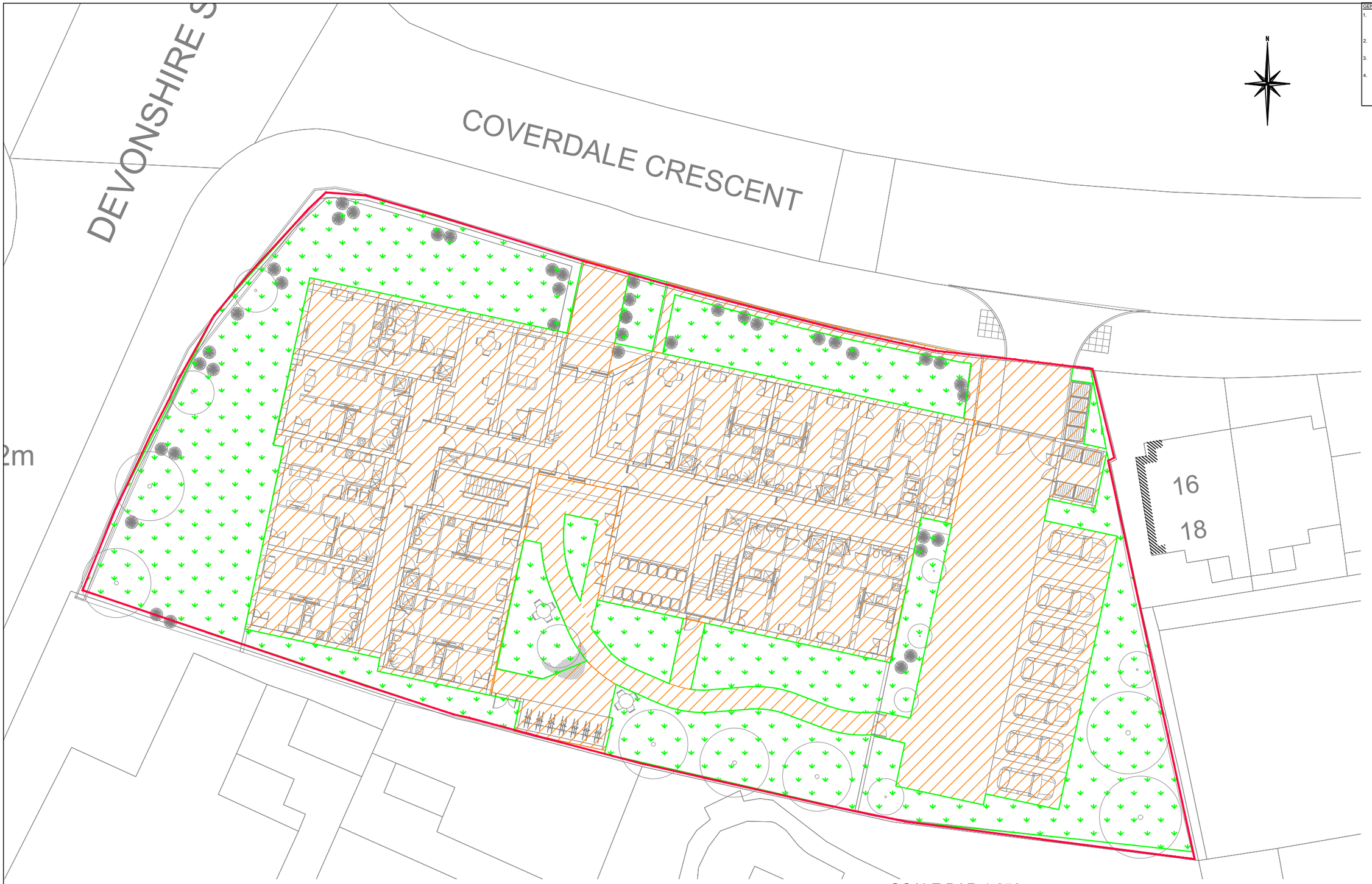
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KEY

SITE BOUNDARY (2065 m²)

IMPERMEABLE AREA: 1220m² (0.122ha)

PERMEABLE AREA: 845 m² (0.08ha)



SCALE BAR 1:250

0 5 10 15 20 25

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Drawing Status

PRELIMINARY DRAWING

Client

JIGSAW HOMES

Project

DEVONSHIRE STREET
ARDWICK

Drawing Title

PROPOSED CATCHMENT PLAN

Rev	Description	Date	By	Chkd
P01	PRELIMINARY ISSUE	05.10.23	JW	AD

Date	Drawn By	Checked By
AUG. 23	JG	AD

Scale at A3	Project Number
1:250	33494

Sheet Number	Revision
33494-SUT-ZZ-XX-DR-C-6001	P01

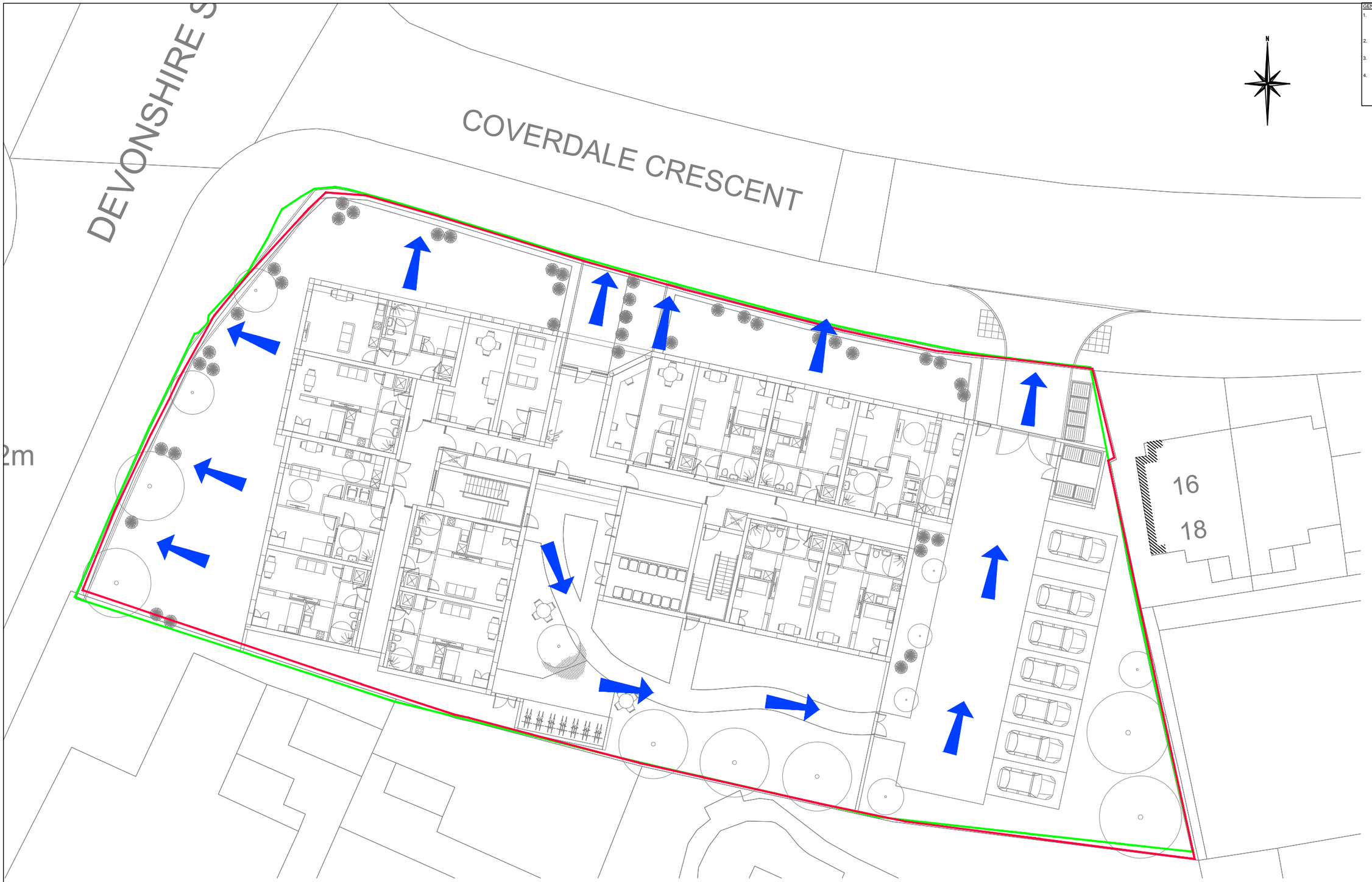
GENERAL NOTES

1. THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
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KEY

SITE BOUNDARY

FLOOD FLOW ROUTE



SCALE BAR 1:250

0 5 10 15 20 25

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Drawing Status

PRELIMINARY DRAWING

Client

JIGSAW HOMES

Project

DEVONSHIRE STREET
ARDWICK

Drawing Title

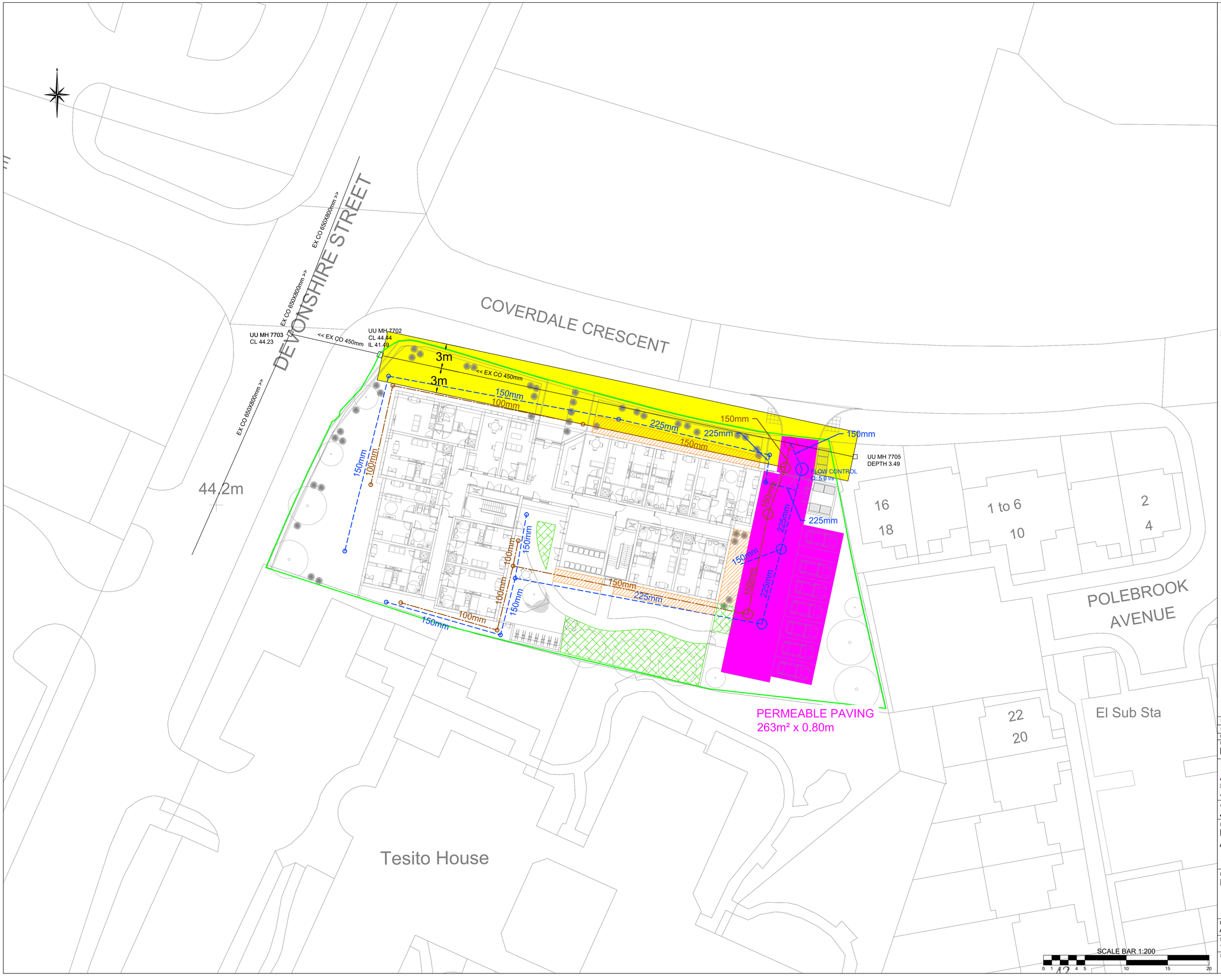
FLOOD FLOW ROUTE PLAN

Rev	Description	Date	By	Chkd
P01	PRELIMINARY ISSUE	05.10.23	JW	AD

Date	Drawn By	Checked By
AUG. 23	JW	AD

Scale at A3	Project Number
1:250	33494

Sheet Number	Revision
33494-SUT-ZZ-XX-DR-C-6002	P01



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DRAINAGE KEY

- SITE BOUNDARY
- SURFACE WATER DRAIN / MH
- FOUL WATER DRAIN / MH
- COMBINED WATER SEWER / MH
- EXISTING COMBINED WATER SEWER / MH
- PERMEABLE PAVING
- POTENTIAL TREE PITS
- POTENTIAL RAISED GARDENS
- EASEMENT (AS DIMENSIONED)

DRAINAGE NOTES

1. PERMEABLE PAVING WILL BE USED TO STORAGE SURFACE WATER RUNOFF.
   TREE PITS AND RAISED GARDENS WILL BE INTRODUCED WHERE POSSIBLE.

Rev	Description	Date	By	Chkd
P02	SITE LAYOUT AND DRAINAGE UPDATED	02.10.23	JG	AD
P01	ISSUE FOR INFORMATION	09.08.23	JG	AD

Drawing Status
PRELIMINARY DRAWING

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London Office: 020 8014 4220
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Client
JIGSAW HOMES

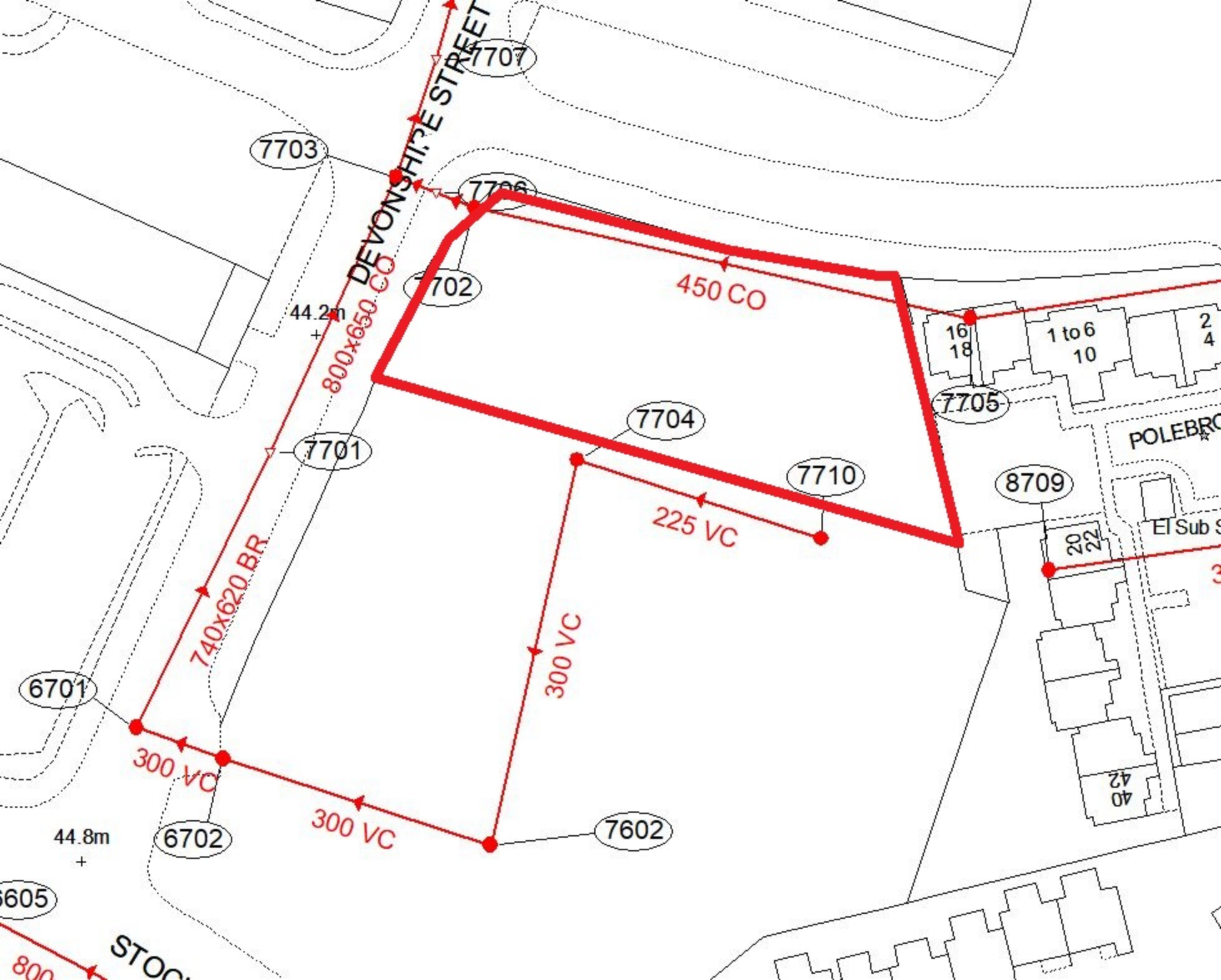
Project
DEVONSHIRE STREET
ARDWICK

Drawing Title
INDICATIVE DRAINAGE LAYOUT

Date	Drawn By	Checked By
AUG. 23	JG	AD

Scale at A1	Project Number
1:200	33494

Sheet Number	Revision
33494-SUT-ZZ-XX-DR-C-6020	P02


7707
7703
7706
DEVONSHIRE STREET
800x650 CO
7702
450 CO
44.2m
16
18
1 to 6
10
2
4
7705
7704
7701
7710
8709
POLEBRO
225 VC
El Sub S
20
22
740x620 BR
300 VC
6701
300 VC
300 VC
40
42
44.8m
6702
7602
6605
STOC

12.2. Appendix B

Calculations

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 91 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	43.606	0.406	0.0	4.7	4.7	31.0	O K
30 min Summer	43.723	0.523	0.0	4.8	4.8	40.2	Flood Risk
60 min Summer	43.807	0.607	0.0	5.0	5.0	46.9	Flood Risk
120 min Summer	43.821	0.621	0.0	5.0	5.0	48.0	Flood Risk
180 min Summer	43.803	0.603	0.0	5.0	5.0	46.6	Flood Risk
240 min Summer	43.780	0.580	0.0	4.9	4.9	44.8	Flood Risk
360 min Summer	43.726	0.526	0.0	4.9	4.9	40.5	Flood Risk
480 min Summer	43.674	0.474	0.0	4.8	4.8	36.4	O K
600 min Summer	43.623	0.423	0.0	4.7	4.7	32.4	O K
720 min Summer	43.575	0.375	0.0	4.6	4.6	28.6	O K
960 min Summer	43.488	0.288	0.0	4.5	4.5	21.8	O K
1440 min Summer	43.355	0.155	0.0	4.3	4.3	11.2	O K
2160 min Summer	43.240	0.040	0.0	4.1	4.1	2.2	O K
2880 min Summer	43.200	0.000	0.0	3.8	3.8	0.0	O K
4320 min Summer	43.200	0.000	0.0	2.7	2.7	0.0	O K
5760 min Summer	43.200	0.000	0.0	2.2	2.2	0.0	O K
7200 min Summer	43.200	0.000	0.0	1.8	1.8	0.0	O K
8640 min Summer	43.200	0.000	0.0	1.6	1.6	0.0	O K
10080 min Summer	43.200	0.000	0.0	1.4	1.4	0.0	O K
15 min Winter	43.606	0.406	0.0	4.7	4.7	31.0	O K
30 min Winter	43.723	0.523	0.0	4.8	4.8	40.3	Flood Risk
60 min Winter	43.812	0.612	0.0	5.0	5.0	47.3	Flood Risk
120 min Winter	43.827	0.627	0.0	5.0	5.0	48.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	123.207	0.0	36.3	24
30 min Summer	82.373	0.0	48.9	36
60 min Summer	52.627	0.0	63.0	62
120 min Summer	32.545	0.0	78.0	102
180 min Summer	24.251	0.0	87.4	136
240 min Summer	19.566	0.0	93.8	170
360 min Summer	14.331	0.0	103.3	238
480 min Summer	11.497	0.0	110.8	306
600 min Summer	9.684	0.0	116.4	372
720 min Summer	8.412	0.0	121.6	438
960 min Summer	6.731	0.0	129.7	562
1440 min Summer	4.907	0.0	141.5	800
2160 min Summer	3.570	0.0	154.4	1132
2880 min Summer	2.846	0.0	163.8	0
4320 min Summer	2.064	0.0	177.6	0
5760 min Summer	1.641	0.0	187.7	0
7200 min Summer	1.373	0.0	195.7	0
8640 min Summer	1.186	0.0	202.3	0
10080 min Summer	1.048	0.0	207.9	0
15 min Winter	123.207	0.0	36.3	24
30 min Winter	82.373	0.0	48.8	36
60 min Winter	52.627	0.0	62.9	62
120 min Winter	32.545	0.0	78.2	108

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
180 min Winter	43.798	0.598	0.0	5.0	5.0	46.2	Flood Risk
240 min Winter	43.764	0.564	0.0	4.9	4.9	43.5	Flood Risk
360 min Winter	43.682	0.482	0.0	4.8	4.8	37.0	O K
480 min Winter	43.603	0.403	0.0	4.7	4.7	30.8	O K
600 min Winter	43.529	0.329	0.0	4.6	4.6	25.0	O K
720 min Winter	43.462	0.262	0.0	4.5	4.5	19.7	O K
960 min Winter	43.349	0.149	0.0	4.3	4.3	10.8	O K
1440 min Winter	43.215	0.015	0.0	4.1	4.1	0.4	O K
2160 min Winter	43.200	0.000	0.0	3.1	3.1	0.0	O K
2880 min Winter	43.200	0.000	0.0	2.4	2.4	0.0	O K
4320 min Winter	43.200	0.000	0.0	1.8	1.8	0.0	O K
5760 min Winter	43.200	0.000	0.0	1.4	1.4	0.0	O K
7200 min Winter	43.200	0.000	0.0	1.2	1.2	0.0	O K
8640 min Winter	43.200	0.000	0.0	1.0	1.0	0.0	O K
10080 min Winter	43.200	0.000	0.0	0.9	0.9	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
180 min Winter	24.251	0.0	87.4	142
240 min Winter	19.566	0.0	94.1	180
360 min Winter	14.331	0.0	103.3	254
480 min Winter	11.497	0.0	110.6	326
600 min Winter	9.684	0.0	116.5	392
720 min Winter	8.412	0.0	121.4	456
960 min Winter	6.731	0.0	129.4	576
1440 min Winter	4.907	0.0	141.6	758
2160 min Winter	3.570	0.0	154.3	0
2880 min Winter	2.846	0.0	163.8	0
4320 min Winter	2.064	0.0	177.6	0
5760 min Winter	1.641	0.0	187.7	0
7200 min Winter	1.373	0.0	195.7	0
8640 min Winter	1.186	0.0	202.3	0
10080 min Winter	1.048	0.0	207.9	0

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.363	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.122

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.040	4	8	0.041	8	12	0.041

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Model Details

Storage is Online Cover Level (m) 44.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	26.3
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	73.1	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	43.200	Membrane Depth (m)	0

ACO Q-Brake Outflow Control

Design Head (m) 1.800 Design Flow (l/s) 5.0 Diameter (mm) 91 Invert Level (m) 42.000

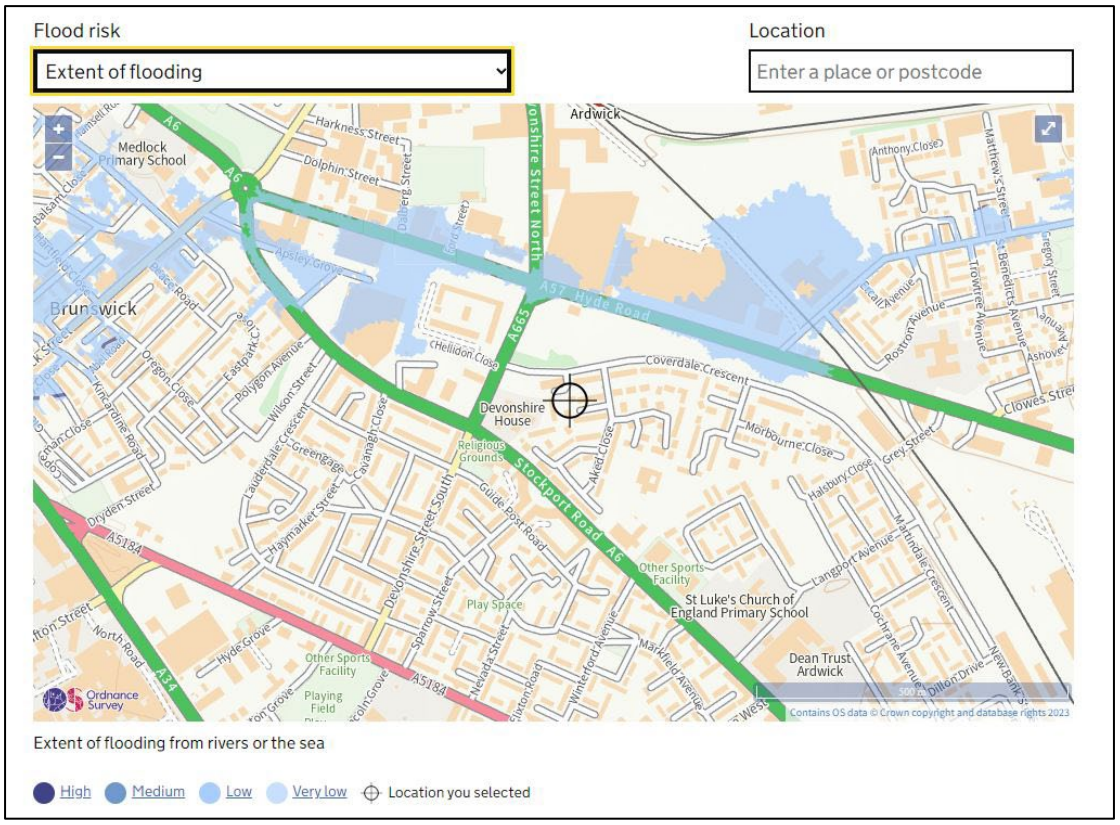
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	0.800	3.3	2.000	5.2	4.000	7.4	7.000	9.8
0.200	4.1	1.000	3.7	2.200	5.5	4.500	7.8	7.500	10.1
0.300	4.8	1.200	4.0	2.400	5.7	5.000	8.3	8.000	10.4
0.400	5.0	1.400	4.4	2.600	6.0	5.500	8.7	8.500	10.8
0.500	4.6	1.600	4.7	3.000	6.4	6.000	9.0	9.000	11.1
0.600	3.8	1.800	5.0	3.500	6.9	6.500	9.4	9.500	11.4

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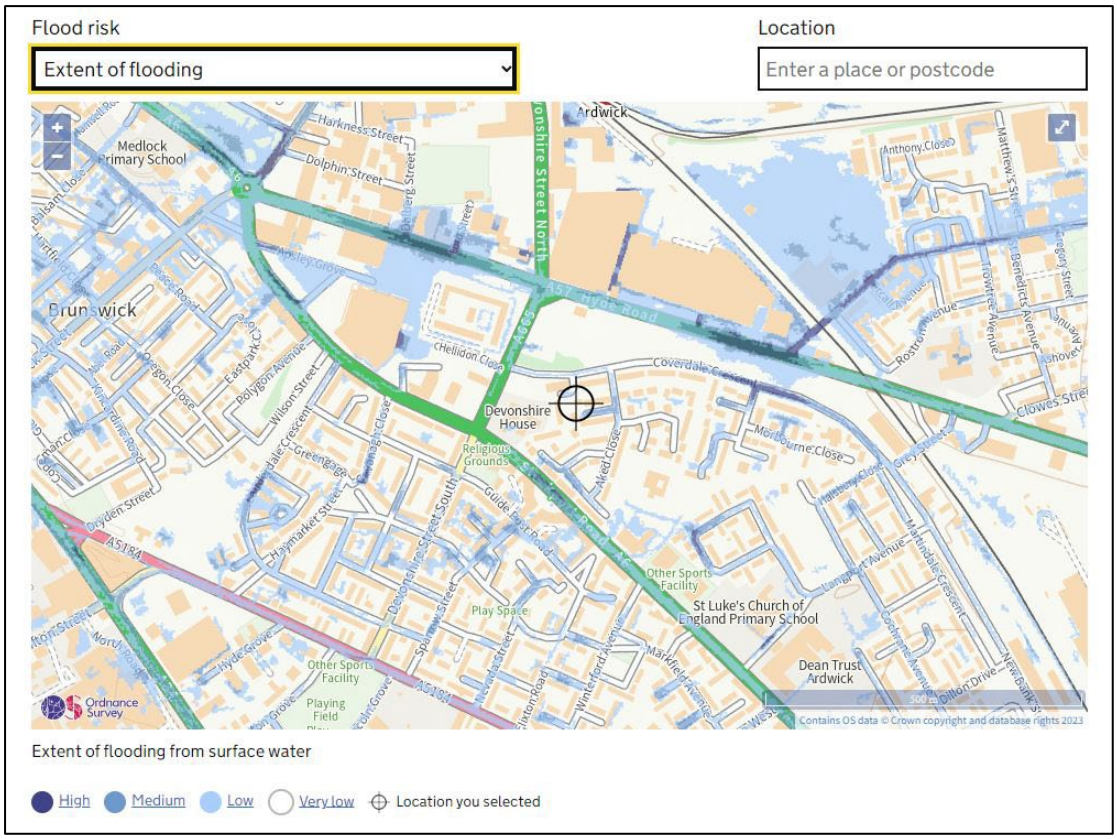
12.3. Appendix C

Environment Agency Flood Risk Maps

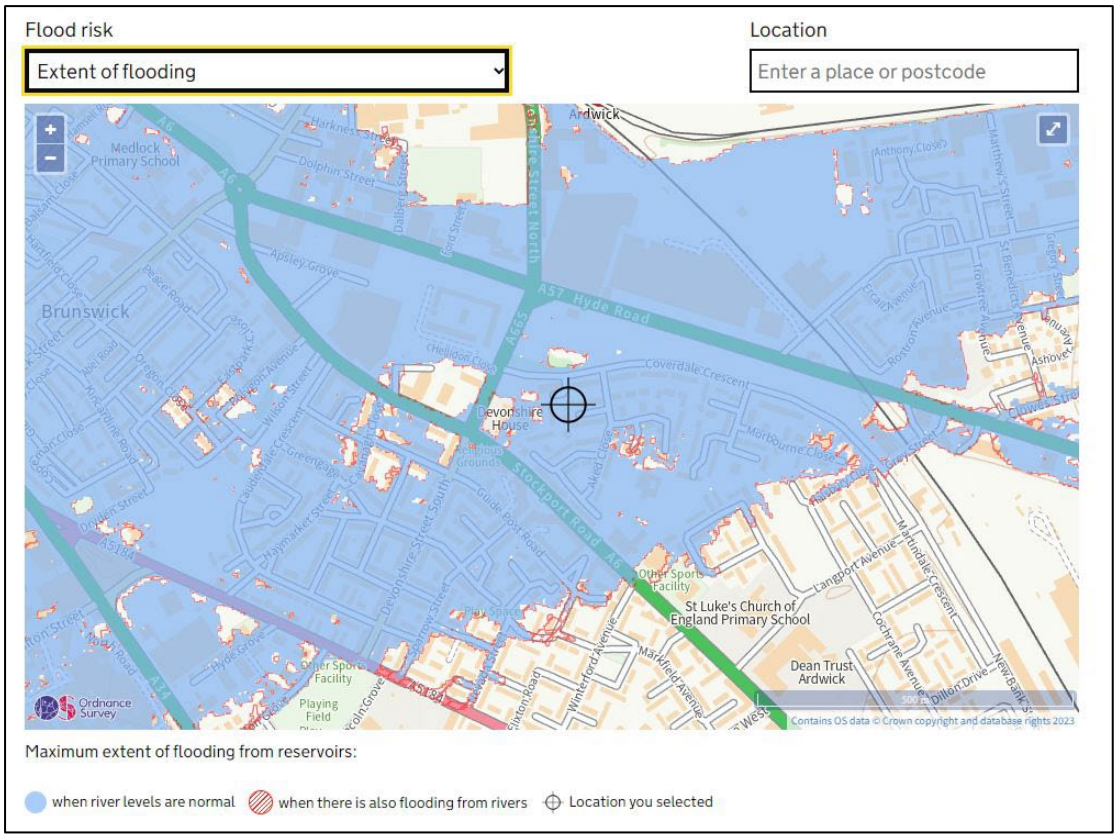
Flood Risk from Rivers or the Sea



Flood Risk from Surface Water



Flood Risk from Reservoirs



12.4. Appendix D

Correspondance

[redacted]

Subject: Pre Development Enquiry for: Devonshire Road, Manchester, M12 4EL 04453030 UU Reference Number :

Date: 09 August 2023 12:40:29

Good afternoon Matt,

Pre Development Enquiry for: Devonshire Road, Manchester, M12 4EL UU Reference Number : 04453030

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.
If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:
https://www.unitedutilities.com/builders-developers/working-near-our-assets/

Foul Water
Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.
Our preferred point of discharge would be to the 450mm diameter public combined sewer within your proposed development at an unrestricted rate.
If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.
In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water
All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.
Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.
The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).
The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration
Surface water runoff generated from this development should discharge to the ground via

infiltration system where feasible.
A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.
Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:
https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs
If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:
https://www.gov.uk/government/publications/groundwater-protection-position-statements
Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody
If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the watercourse located 50m North of the proposed site.
We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage
If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer
In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.
Once evidence is provided as outlined above, United Utilities will consider a connection to the 450mm diameter public combined sewer within your proposed development at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.
As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels
For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage
United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site
According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that

you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.
Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.
Please refer to the link below to obtain full details of the processes involved with sewer diversions:
https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

Existing Water Assets Crossing the Site
It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:
https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/

Connection Application
Although we may discuss and agree discharge points and 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:
https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/
We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.
If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

[redacted]
Assistant Developer Engineer
Developer Services & Metering
Customer Services
[redacted]
unitedutilities.com

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at developerserviceswater@uuplc.co.uk

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