Hydrock

219-227 Sutton High Street

Foul & Surface Water Drainage Strategy

For Reid Homes

Date: *19 February 2021*

Doc ref: *16336-HYD-XX-XX-RP-D-7000-P01*

DOCUMENT CONTROL SHEET

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Client	Reid Homes	
Project name	219-227 Sutton High Street	
Title	Foul & Surface Water Drainage Strategy	
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Document Production Record		
Issue Number	P01	Name
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Checked by		J.Magee
Approved by		M.Griffin

Document Revision Record			
Issue Number	Status	Date	Revision Details
P01	Planning	17/02/21	Issued for Planning

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CONTENTS

Sutton High St - Foul & Surface Water Drainage

Executive Summary

Hydrock Consultants have been appointed by Reid Homes to carry out a drainage constraints overview for 219-227 Sutton High St.

It is the intention that the proposed drainage strategy will be accordance with both local and national guidelines and will incorporate a 'best practice' approach in reducing the impact of the flooding caused by the new development.

The report will highlight the key stakeholders in terms of ownership and maintenance to ensure the drainage system is kept well maintained and reduce the risk of failure. Should the network fail at any point, clearly defined ownership liabilities will ensure that problems can be quickly rectified thereby reducing the impact of potential damage caused by flooding.

The information received has been summarised within this report. In the event that the information is relied upon and is subsequently found to be incorrect, Hydrock Consultants Ltd accepts no responsibility for any direct and/or consequential loss that may occur as a result.

Reference Documents / Design Codes / Guidance

Drainage design reference documentation in accordance with the London Borough of Sutton LPA and LLFA requirements:

- London Borough of Sutton Local Plan policy 32
- London Drainage Action Plan
- DEFRA Non-Statutory Technical Standards for Sustainable Drainage.
- British Standards
- Building Regulations Approved Document Part H - Drainage and waste disposals.
- Sewers for Adoption (where applicable).
- Local Water Authority requirements.
- CIRIA C753 - SuDS Manual.
- National Planning Policy Framework (NPPF).

1. DEVELOPMENT PROPOSALS

Demolition of existing Argos retail unit and redevelop site into 8 storey mixed use commercial and residential development

3D Visual by LOM Architects

2. EXISTING SITUATION

2.1 Site Referencing Information

Site Address	219-227 Sutton High Street, Sutton, SM1 1LB Grid Reference: TQ257645 Easting / Northing: 525780, 164581
Local Authority	London Borough of Sutton
Sewerage Undertakers	Thames Water

2.2 Site Location / Context

Existing Argos retail unit located on Sutton High Street. Development boundary limited to the extents of the existing building. Hardstanding to the north of building assumed to be owned by local authority. Yard area to rear of building not part of development proposals assumed 'private' 3rd party land ownership.

2.3 Description of Existing Site.

Brownfield site consisting of single building across full development area.

Development Area		0.069 ha

3. GROUND CONDITIONS

British Geological Survey (BGS) mapping information positions the development within the Clay, Silt, Sand and Gravel Superficial Deposit Strata over the London Clay Bedrock Formation.

Groundwater levels are currently unknown.

4. FLOOD RISK

The nearest watercourse is the Ply Brook approximately 1 km to the north of the site.

The site has been identified as being in flood Zone 1 and therefore not in any specific risk from tidal or fluvial flooding.

5. SURFACE WATER

5.1 Pre-development Surface Water

The existing (Argos) building has flat roof. All the rainwater pipes are shown to be located on the south elevation adjacent to a small yard area.

Foul and surface water from the existing building is anticipated to collect into a single 100mm diameter 'combined' drain on the western elevation before being directed west where it is anticipated to connect into a public foul sewer network in St Nicholas Way.

There is a small amount of surface water indicated on the topographical / services plan to the north east of the building. It is not known what this drainage serves and whether there are any connections coming from the site.

5.1.1 Catchment Area

The site measures approx. 690m2. There will be no increase in impermeable area as a result of the new development and therefore no increase surface water flow and volume of run-off from the site.

The hard landscaping area to the north of the building is not within the land ownership of the new development and therefore has not been taken into consideration within the surface water drainage strategy.

Pre-Development Catchment	Area (m^2)
Impermeable	
Building / Roof	690
Roads / Hardstanding	0
Permeable	
Soft Landscaping	0
Total Area	**690**

5.1.2 *Pre-development Surface Water Flow Rate*

In order to determine the post-development surface water flows an assessment has been carried out on the pre-development flows to ensure that the flows from the new development will not adversely affect flood risk either within the site boundary, offsite adjacent properties, or the downstream network.

An assessment has been made of the pre-development surface water flows and volumes based on the following rainfall and site characteristics for the site.

5.1.3 *Brownfield Flow Rate*

Consideration has been given to what the surface water discharge rate would be for the whole site calculated for each equivalent storm event assuming the existing drainage system has sufficient capacity within the network.

Storm Event	Maximum discharge rate (l/s) Brownfield
1 in 1 Year	6.0
1 in 30 Year	14.8
1 in 100 Year	19.0

- Based on an existing impermeable area of 0.069 ha.
- Pre-Development brownfield flows have been calculated based on the Modified Rational Method.

5.1.4 *Capacity of Existing Drainage System*

Further assessment has been carried out to determine the capacity of existing downstream drainage system and its potential for re-use as part of the surface water drainage strategy for the new development.

Currently both foul and surface water flows from the development are anticipated to discharge into a 100mm diameter pipe to the west of the building before it is assumed to outflow into a combined (foul) sewer in St Nicholas Way.

Although the exact gradient of the 100mm diameter pipe is unknown though it is not expected to have sufficient capacity based on the brownfield flows calculated above in addition to the anticipated foul flows coming from the existing development.

5.1.5 *Greenfield Equivalent Flow Rate*

It is a requirement that on new developments consideration be given to limit discharge as close a reasonably practical to the equivalent 'Greenfield' rate for the corresponding storm event.

The follow table considers what the maximum surface water discharge from the site would be if the site was 'Greenfield' ie. not developed. In the 'greenfield' situation it is envisaged that most of the rainfall from the lower intensity storm events would infiltrate into the ground and only a small proportion would 'run-off' from the site.

Storm Event	Maximum discharge rate (l/s) Greenfield
1 in 1 Year	0.1
1 in 30 Year	0.2
1 in 100 Year	0.3
QBAR	0.1

5.1.6 Summary of Pre-Development Flows

The appraisal of the existing drainage system confirms that it is unlikely to have sufficient capacity to receive surface water run-off during an extreme storm events in accordance with current standards and therefore considered unsuitable for re-use in the new works.

Should an extreme storm event occur in the pre-developed situation, it is likely that the drainage system would become surcharged and flooding occur locally.

5.2 Post-Development Surface Water

Where applicable, the surface water management strategy will incorporate the recommendations of the 'Non-Technical Standards for Sustainable Drainage' and general 'good practice' in terms of providing a Sustainable Drainage System (SuDS) which does not adversely impact on flood risk either within the site of beyond the development boundary.

There will be no increase in impermeable area and therefore no increase in run-off volume as a result of the new development.

Pre-Development Catchment Area (ha)	Post-Development Catchment Area (ha)	-/+ (ha)	% Betterment
0.069	0.069	0	0 %

As a result of the development the impermeable area will be **equal** to the pre-developed situation.

The drainage system will be designed so that flooding does not occur during the 1 in 100-year rainfall event in any part of the building, or in any utility plant susceptible to water.

An allowance for 40% climate change is to be incorporated into the surface water drainage design.

5.2.1 *Surface Water Run-off Destinations*

The discharge of surface water run-off has been considered in accordance with the hierarchical approach:

Interception / Re-use	Opportunities to re-use rainwater are considered limited due to the type of development.	
Infiltration	The ground conditions, are deemed unsuitable for infiltrating to ground and therefore infiltration has not been considered as the primary means for surface water disposal for the new development.	
Surface water body	There are no surface water bodies in close proximity to the site.	
To dedicated surface water sewer (public, highways or otherwise)	Surface Water run-off from the new development will discharge into the existing public Surface Water Sewer located within Sutton High St by way of a new connection.	✓
To a combined sewer	Not Applicable	
To a foul sewer	Not Applicable	

5.2.2 *Surface Water Flow Rate*

The drainage system will be designed so that flooding does not occur during the 1 in 100-year rainfall event in any part of the building, or in any utility plant susceptible to water.

An allowance for 40% climate change will be incorporated into the surface water drainage design in accordance with the requirements of the London Borough of Haringey LLFA and national planning policy.

It is considered that limiting surface water flows to the pre-development greenfield run-off rate would not be feasible due to the amount of attenuation required within the building footprint as well as the practical issues in restricting flows to such a small rate and subsequent increased risk of blockages. Therefore, a maximum discharge rate of 5 ltr/sec has been proposed for all storms up to and including the 100yr with an allowance for climate change.

5.2.3 *Surface Water Volume Run-off*

In accordance with current guidance where reasonably practicable, for brownfield 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 brownfield runoff volume for the same event.

As the impermeable area does not increase as a result of the new development, it is anticipated that the volume of run-off will remain the same.

5.2.4 *Selecting SuDS Techniques*

All opportunities to implement green/traditional SuDS, have been considered as far as reasonably practicable.

	Description	Setting	Required area	Considered
Green roofs	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation.	Building	Building integrated.	Yes – Part of the roofscape will form a terrace with hard and soft landscaping.
Rainwater harvesting	Rainwater is collected from the roof of a building or from other paved surfaces and stored in an over ground or underground tank for treatment and reuse locally. Water could be used for toilet flushing and irrigation.	Building	Water storage (underground or above ground).	No – Although RWH is feasible it has not been considered on this development due to the multiple tenants and infrastructure required.
Soakaway	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed like a dry well, an underground pit is dug filled with gravel or rubble. Water can be piped to a soakaway where it will be stored and allowed to gradually seep into the ground.	Open space	Dependent on runoff volumes, water table and soils.	No - Site deemed unsuitable for infiltrating to ground due anticipated poor infiltration rates and limited space for soakaways (ie 100% building area)
Filter strip	Filter strips are grassed or planted areas that runoff is allowed to run across to promote infiltration and cleansing.	Open space	Minimum length 5m.	No - Site deemed unsuitable for infiltrating to ground.
Permeable paving	Paving which allows water to soak through. Can be in the form of paving blocks with gaps between solid blocks or porous paving where water filters through the block itself. Water can be stored in the sub-base beneath or allowed to infiltrate into ground below.	Street / open space	Can typically drain double its area.	No – Limited / no external space available.
Bioretention area	A vegetated area with gravel and sand layers below designated to channel, filter and cleanse water vertically. Water can infiltrate into the ground below or drain to a perforated pipe and be conveyed elsewhere. Bioretention systems can be integrated with tree-pits or gardens.	Street / open space	Typically, surface area is 5-10% of drained area with storage below.	No - Due to the type of development and limited space, Bioretention areas are not considered suitable for the new development.
Swale	Swales are shallow depressions designed to convoy and filter water. These can be 'wet' where water gathers above the surface, or 'dry' where water gathers in a gravel layer beneath. Can be lined or unlined to allow infiltration.	Street / open space	Account for width to allow safe maintenance typically 2–3 metres wide.	No - Not considered appropriate due to the type of development and space required.
Hardscape storage	Hardscape water features can be used to store run-off above ground within a constructed container. Storage features can be integrated into public realm areas with a more urban character.	Street / open space	Could be above or below ground and sized to storage need.	No - Not considered appropriate due to the type of development and space required.
Pond / Basin	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to	Open space	Dependent on runoff volumes and soils.	No - Not considered appropriate due to the type of development and space required.

	store water for a period of time before discharge.			
Wetland	Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	Open space	Typically, 5–15% drainage area to provide good treatment.	No - Not considered appropriate due to the type of development and space required.
Underground storage	Water can be stored in tanks, gravel or plastic crates beneath the ground to provide attenuation.	Open space	Dependent on runoff volumes and soils.	Yes – Below ground tanks could be utilised to provide the attenuation required to meet permitted flow rates.

5.2.5 *Surface Water Treatment*

Surface water run-off is considered to be 'low risk' of pollution due to the limited amount of external area being drained.

It is anticipated that the during construction adequate provisions will be put in place to ensure that any construction silts, spillages will be prevented from the entering the downstream drainage network.

5.2.6 *Flood Exceedance*

In the event that flows from rainfall exceed the 1 in 100-year rainfall event or system failure through lack of maintenance, surface water run-off will be directed via exceedance routes away buildings and/or critical infrastructure.

6. FOUL DRAINAGE

6.1 Pre development

Existing foul drainage from the pre-developed site currently discharges into a 100mm diameter 'combined' pipe which is anticipated to discharge into a foul sewer in St Nicholas Way to the west.

Pre-development flows are considered to be relatively low and in keeping with a retail unit of this size limited to staff / customer toilets with kitchenette facilities.

6.2 Post development

Foul drainage for the new development will be via conventional gravity pipe system which connects via a new connection into a foul sewer located within the High Street.

It is expected that foul flows will increase as a result of the development.

Post-development foul flows are anticipated to be 'domestic' ie from toilets, sinks, showers, baths etc. Whilst it is not expected, any requirement from the proposed retails units to discharge 'Trade Effluent' into the public sewer will need to be agreed with Thames Water.

The foul drainage system will be designed in accordance with Building Regulations Approved Document H and the relevant British Standards

7. OWNERSHIP & MAINTENANCE

It is envisaged that foul and surface water drainage system within the development boundary will remain 'private' and will be maintained by a management company appointed by the owner / occupier.

The key elements of the foul and surface water drainage system will require periodic maintenance to prevent failure of the system and/or a reduction in capacity of the networks as a whole. A schedule of maintenance activities which ensure the drainage is kept in good working order. The following matrix sets out the various drainage items to be maintained, identifies whose is responsible and the frequency of maintenance.

7.1 Responsibility Matrix

Responsibility	Feature	Maintenance	Frequency
Owner / Occupier Appointed Management Company	Private Drains	Inspection	CCTV survey every 5-10 years.
		Regular Maintenance	Jet clean system fully every 5-10 years. (Recommend prior to CCTV drainage survey)
		Remedial / Occasional Maintenance	Carry out remedial works as identified in CCTV survey.
	Tank / Interceptors	Inspection	Periodically
		Regular Maintenance	Jet clean system fully every 5-10 years. (Recommend prior to CCTV drainage survey)
		Remedial / Occasional Maintenance	Carry out remedial works as identified in CCTV survey.
	Gullies / Drainage Channels	Inspection	Quarterly
		Regular Maintenance	Remove silt and debris as necessary to prevent build up.
		Remedial / Occasional Maintenance	Carry out remedial works as identified in CCTV survey.

8. SUMMARY / CONCLUSION

This report concludes that the foul and surface water drainage strategy for 219-27 Sutton High Street development will be designed accordance with both national and local standards and best practice. The following key items have been summarised below:

- The foul and surface water drainage systems for the new development will be designed to accommodate the required flows for the lifetime of the development.
- Surface water will be removed from the existing foul network and discharge into a dedicated surface water sewer in accordance with the hierarchy of surface water disposal requirements.
- The post-development surface water flow rates have been restricted to 5 ltr/sec which is as close as feasibly practical to the equivalent Greenfield Run-off Rate and provides betterment on the existing pre-development Brownfield flows.
- All surface water run-off from storm events up to and including the 100 year plus 40% climate change will be retained within the development boundary.
- In the event that flows from rainfall exceed the 1 in 100-year rainfall event or system failure through lack of maintenance, surface water run-off will be directed via exceedance routes away buildings and/or critical infrastructure.
- Ownership and maintenance liabilities for the foul and surface water drainage system will be clearly defined so that in the event of failure the drainage system appropriate action can be taken to ensure that the drainage system continues to work efficiently.

Appendix A Existing Site Information

- Existing Site Location Plan
- Topographical / Utilities Survey
- Thames water Sewer Asset Map

Health & Safety Notes

1. Contractor must ensure that all work on site is carried out in a safe & satisfactory manner, in accordance with Health & Safety At Work Act 1974, COSHH Regulations 2002 & requirements of C.D.M

0 10 20 30 40 50 60 70m

1:1250 SCALE BAR - METRES

Cassidy+Ashton C+A
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Architecture + Building Surveying + Town Planning
7 East Cliff, Preston, Lancashire, PR1 3JE 01772 258 356
10 Hunters Walk, Canal Street,
Chester, CH1 4EB 01244 402 900

Client
Reid Capital

Project
Residential Development, Sutton

Drawing Title
Existing Site Plan

Drawn by	Checked by	Date
PD	DBT	12.03.20

Status	Scale @ A3
Pre-Application	As Indicated

Job no.	Dwg.no.	Rev.
10197	1001	

440mE

460mE

480mE

500mE

N

Asda

Elevation 2

Elevation 1

Elevation 3

219-223 & 225-227

Bench's

Substation

Brick Setts

Paving

Parapet Wall Line

High level Building Line

High level Building Lines

Barrier

Brk Wall

Metal Railing

NO ACCESS - STORED MATERIALS

Storage

Container

Ramp

Conc Ramp

Canopy O/Head
USL=53.62

Building O/Head
USL=52.13

Building O/Head
USL=55.23

Bike Rack's

TMac

Conc

PRIVATE LAND

Gate

KEY

- CCTV / CABLE TELEVISION
- COMBINED DRAINAGE
- COMMUNICATIONS CABLE
- COMPRESSED AIR
- DUCTING
- EARTH CABLE
- ELECTRIC CABLE
- END OF TRACE
- FOUL DRAINAGE
- FUEL PIPE
- GAS PIPE
- GAUGE LINE
- HEATING
- OFFSET FILL PIPE
- PUMPING MAIN
- RADAR AREA ANOMALY
- RADAR UTILITY TRACE
- SURFACE DRAINAGE
- SURVEY BOUNDARY
- TELECOM CABLE
- TRAFFIC LIGHTS
- UNIDENTIFIED
- VAPOUR RECOVERY
- VENT PIPE
- WATER PIPE
- OS BENCH MARK
- SURVEY CONTROL STATION

rev	description	by	date
REV:	DESCRIPTION:	BY:	DATE:

Durkan Geomatics Ltd
7 Knowles Walk
Burgess Hill, West Sussex
RH15 9AJ
Tel: 07792014509
E: kevin@durkangeomatics.com
W: www.durkangeomatics.com

CLIENT: Reid Capital Ltd
Moyser Rd
London
SW16 6SQ

SITE: 219-227 High Street
Sutton

TITLE: Underground Utility Services Layout

SCALE AT A1:	DATE:	SURVEYED:	DRAWN:	CHECKED:
1:100	08.04.20	KD	KD	KD

PROJECT NO:	DRAWING NO:	REVISION:
19042	19042_03	-

Asset Location Search Sewer Map - ALS/ALS Standard/2020_4233463

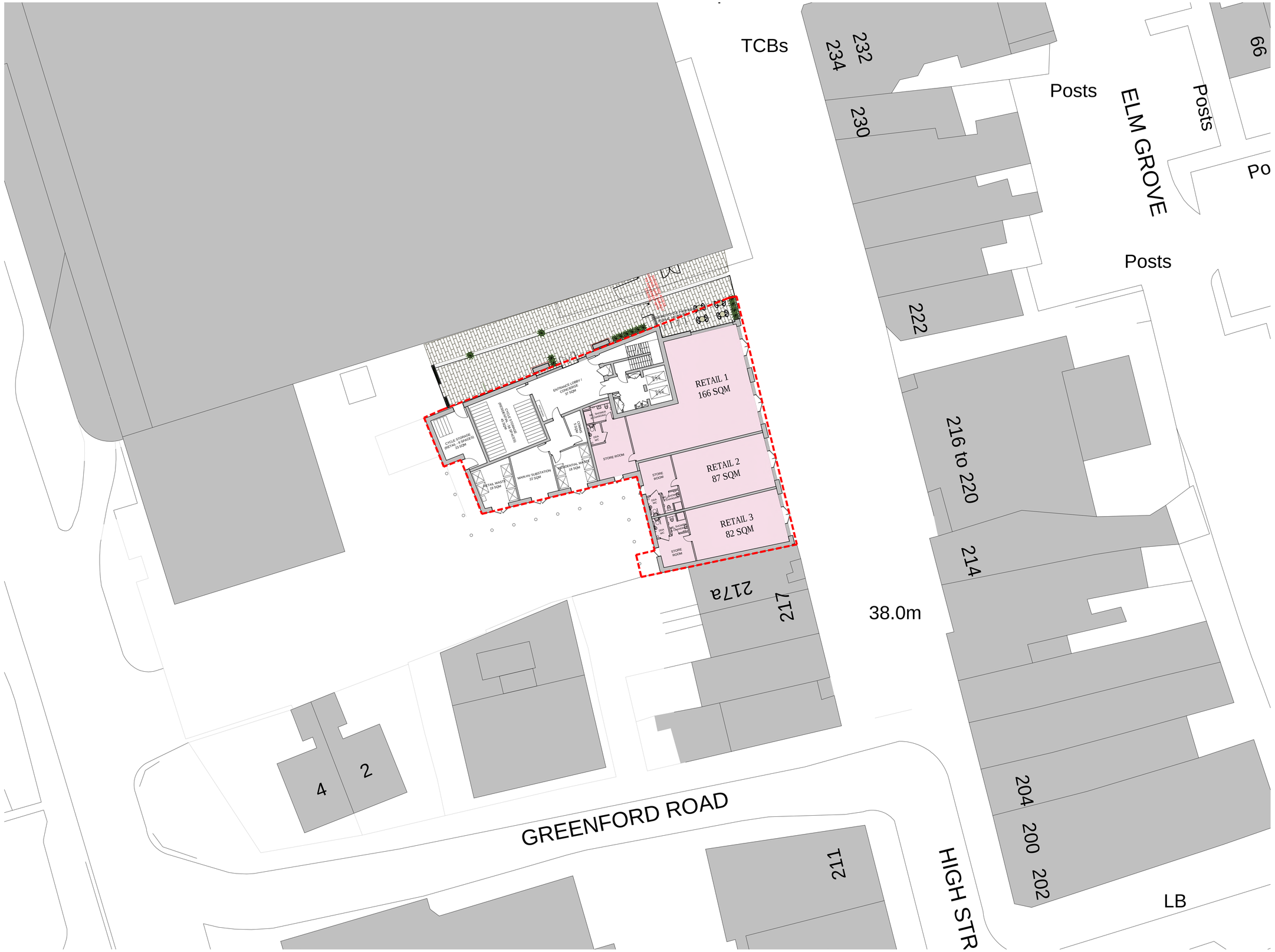
The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 525752,164575

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

Appendix B Development Proposals

- Proposed Site Plan
- Proposed Basement Plan



USE OF DRAWINGS

DO NOT SCALE FROM THIS DRAWING. USE WRITTEN DIMENSIONS AND CHECK ON SITE. THIS DRAWING IS BASED ON SITE INFORMATION SUPPLIED BY THIRD PARTIES AND ACCURACY OF EXISTING FEATURES IS NOT GUARANTEED.

ANY ERROR, OMISSION OR DISCREPANCY NOTED ON OR BETWEEN DRAWINGS AND OTHER DOCUMENTS MUST BE REPORTED IN WRITING IMMEDIATELY.

ALL MECHANICAL, ELECTRICAL AND STRUCTURAL LAYOUTS / COMPONENTS ARE INDICATIVE AND MUST BE DESIGNED AND CHECKED BY SPECIALISTS.

DO NOT START WORK ON SITE BEFORE CONFIRMING THAT ALL NECESSARY STATUTORY AND OTHER CONSENTS HAVE BEEN OBTAINED.

REVISIONS

REV	DATE	DESCRIPTION	CHECKED	DRAWN
-	29.01.2021	ISSUED FOR PLANNING	BG	SB

client
REID HOMES

project
219-227 SUTTON HIGH STREET

drawing title
PROPOSED SITE PLAN
GROUND FLOOR

sheet size
A1

scale
1:200@A1, 1:400@A3

status
PLANNING

drawing no.
1957-A-1000

revision
-

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USE OF DRAWINGS

DO NOT SCALE FROM THIS DRAWING. USE WRITTEN DIMENSIONS AND CHECK ON SITE. THIS DRAWING IS BASED ON SITE INFORMATION SUPPLIED BY THIRD PARTIES AND ACCURACY OF EXISTING FEATURES IS NOT GUARANTEED.

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ALL MECHANICAL, ELECTRICAL AND STRUCTURAL LAYOUTS / COMPONENTS ARE INDICATIVE AND MUST BE DESIGNED AND CHECKED BY SPECIALISTS.

DO NOT START WORK ON SITE BEFORE CONFIRMING THAT ALL NECESSARY STATUTORY AND OTHER CONSENTS HAVE BEEN OBTAINED.

REVISIONS

REV	DATE	DESCRIPTION	CHECKED	DRAWN
-	29.01.2021	ISSUED FOR PLANNING	BG	SB

0 2 5 10
Metres
Scale 1:100@A1, 1:200@A3

client
REID HOMES

project
219-227 SUTTON HIGH STREET

drawing title
PROPOSED GA PLAN
BASEMENT

sheet size
A1

scale
1:100@A1, 1:200@A3

status
PLANNING

drawing no.
1957-A-1090

revision
-

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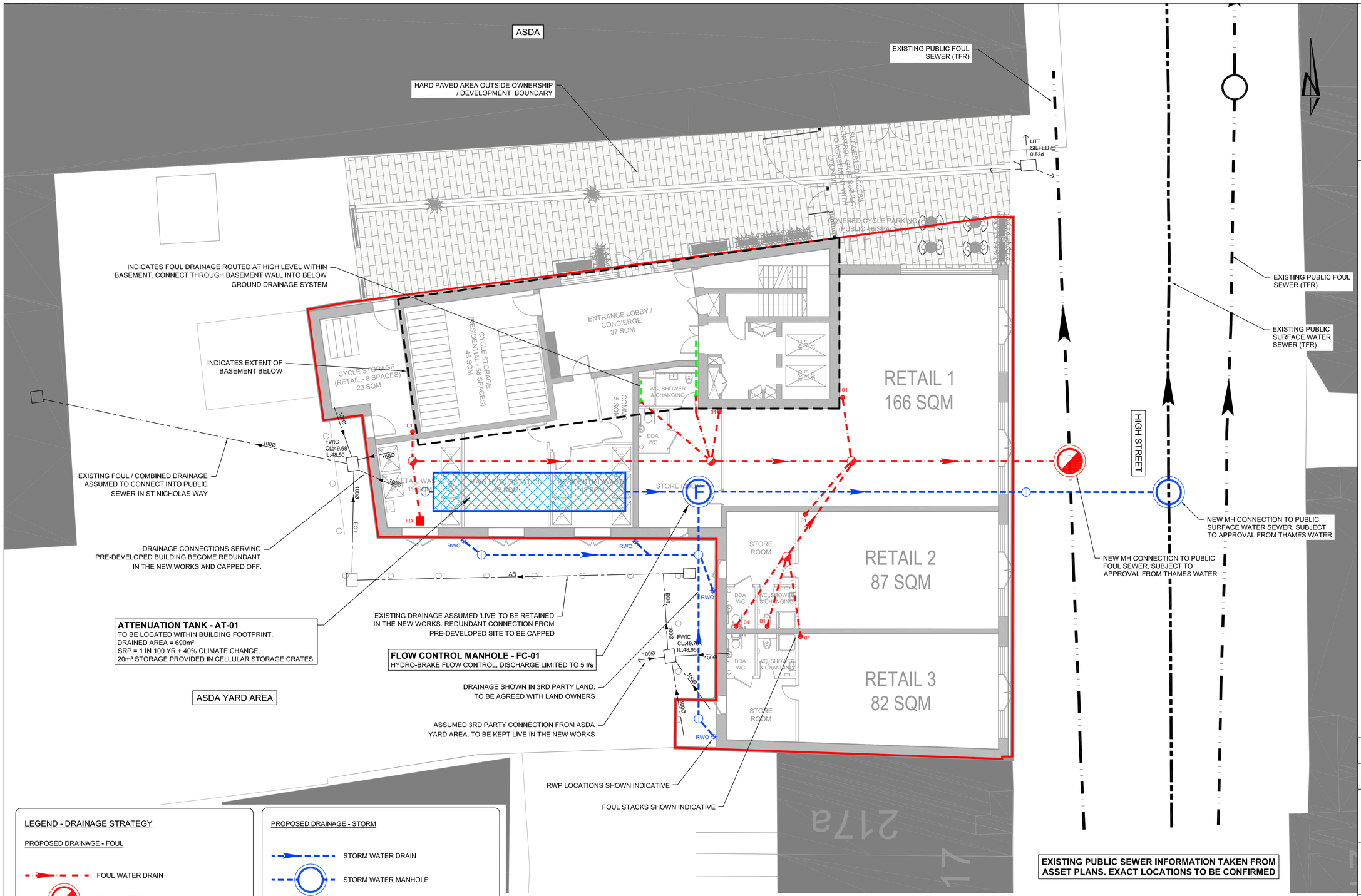
Appendix C Drainage Strategy

- Foul and Surface water Drainage Strategy



LEGEND - DRAINAGE STRATEGY

PROPOSED DRAINAGE - FOUL

- FOUL WATER DRAIN
- FOUL WATER MANHOLE
- FOUL WATER INSPECTION CHAMBER
- FOUL WATER SHALLOW ACCESS CHAMBER
- YG — FOUL YARD GULLY
- FD — FLOOR DRAIN
- 01 — FOUL OUTLET / STACK POSITION (Refer to Service Engineer / Architect for Details) (Shown indicative)

PROPOSED DRAINAGE - STORM

- STORM WATER DRAIN
- STORM WATER MANHOLE
- STORM WATER INSPECTION CHAMBER
- RG — ROAD GULLY
- PG — 'PAVED AREA' GULLY
- YG — YARD GULLY
- RWO — RAIN WATER DOWNPIPE
- DC — DRAINAGE CHANNEL

NOTE: DRAINAGE HAS ONLY BEEN SHOWN INDICATIVELY TO DEMONSTRATE THE PRINCIPLES OF THE DRAINAGE STRATEGY AND SHOULD NOT BE USED FOR PRICING

KEY PLAN

NOTES

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
2. The DWG file is issued for the purposes of coordination only and do not represent formal drawing issue and are not to be reprinted in any form. Formal issue of drawings is via DWF, Adobe PDF files and/or hard copies and their associated information issue sheets.
3. Note that all care has been taken with the export of DWG files and their content, but we recommend that you make due dimensional checks before using any DWG file information. Any errors found are to be reported to Hydrock immediately.
4. All levels are shown in metres above Ordnance Datum (m AOD).
5. All private drainage to comply with current Building Regulations, BS EN-752 Drain and Sewer systems outside Buildings and other relevant British Standards and Codes of Practices.
6. Drainage pipework routes under building footprint will require Co-ordination with foundations.
7. Final foul pipe connection routes and manholes are subject to confirmation of above ground drainage design discharge points at ground level by others to allow final pipe sizes, configuration and connections.
8. Door threshold drainage channel requirements to be advised by others.
9. Surface water drainage RWP locations to be confirmed by Architect.
10. External levels shown on this drawing relating to the civils, drainage works etc are to be confirmed on receipt of final external levels drawing (by others).
11. Foul drainage shown indicative subject to detailed design.

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	PLANNING					
	M. GRIFFIN	19.02.21	J.MAGEE	19.02.21	M. GRIFFIN	19.02.21

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CLIENT
REID HOMES

PROJECT
219-227 SUTTON HIGH STREET

TITLE
FOUL & SURFACE WATER DRAINAGE STRATEGY

HYDROCK PROJECT NO.	SCALE @ A1
C-16336-C	1:100
STATUS DESCRIPTION: PLANNING	STATUS: S2
DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER): 16336-HYD-00-ZZ-DR-C-7000	REVISION: P01

Appendix D Drainage Calculations

- Greenfield Run-off Rate
- Brownfield Run-off Rate
- Attenuation Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.069	Urban	0.000
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	0.1
QBAR Urban	0.1
Q100 years	0.3
Q1 year	0.1
Q30 years	0.2
Q100 years	0.3

Brownfield Run-off Rates

Project Name:	Sutton High St	Revision:
Contract no.	C-16336	Date: 18/02/2021

Description of Catchment:	Total Pre-Development Impermeable Area	Author: MG Checked: -

Peak run-off rate for Brownfields sites is estimated using the following equation:

Q = 2.78CiA

Where

Q = Peak run-off (l/s)

C = Non-dimensional run-off coefficient which is dependent on the catchment characteristics

I = Rainfall intensity for the design return period

A = Total catchment area being drained

And

C = CvCr

Cv = Volumetric run-off coefficient - usually set at 0.75 for brownfield sites

Cr = Dimensionless routing coefficient - usually set at 1.3

Therefore

*C= 0.75*1.3 = 0.975*

Hence

Q=2.710iA

CATCHMENT DETAILS :

Ai = Impervious Area	0.069	Ha
M5-2 Rainfall	50	mm/hr
M5-60 Rainfall	20	mm/hr
Ratio "r"	0.4	
Z_1 Factor	1	
D5-Dmin Rainfall	50.00	

Return Period	1Y	30Y	100Y
Z2	0.64	1.58	2.03
Rainfall mm/hr	32.0	79.0	101.5

Return Period	Brownfield Ql/s
1 Year	**6.0**
30 Year	**14.8**
100 Year	**19.0**

Hydrock

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 39 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	48.986	0.736	0.0	4.9	4.9	14.0	O K
30	min Summer	49.102	0.852	0.0	4.9	4.9	16.2	O K
60	min Summer	49.093	0.843	0.0	4.9	4.9	16.0	O K
120	min Summer	48.982	0.732	0.0	4.9	4.9	13.9	O K
180	min Summer	48.848	0.598	0.0	4.9	4.9	11.4	O K
240	min Summer	48.727	0.477	0.0	4.9	4.9	9.1	O K
360	min Summer	48.538	0.288	0.0	4.9	4.9	5.5	O K
480	min Summer	48.420	0.170	0.0	4.7	4.7	3.2	O K
600	min Summer	48.348	0.098	0.0	4.4	4.4	1.9	O K
720	min Summer	48.303	0.053	0.0	4.1	4.1	1.0	O K
960	min Summer	48.262	0.012	0.0	3.6	3.6	0.2	O K
1440	min Summer	48.250	0.000	0.0	2.6	2.6	0.0	O K
2160	min Summer	48.250	0.000	0.0	1.9	1.9	0.0	O K
2880	min Summer	48.250	0.000	0.0	1.5	1.5	0.0	O K
4320	min Summer	48.250	0.000	0.0	1.1	1.1	0.0	O K
5760	min Summer	48.250	0.000	0.0	0.8	0.8	0.0	O K
7200	min Summer	48.250	0.000	0.0	0.7	0.7	0.0	O K
8640	min Summer	48.250	0.000	0.0	0.6	0.6	0.0	O K
10080	min Summer	48.250	0.000	0.0	0.5	0.5	0.0	O K
15	min Winter	49.104	0.854	0.0	4.9	4.9	16.2	O K

	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15	min Summer	140.878	0.0	18.2	17
30	min Summer	91.614	0.0	23.7	30
60	min Summer	56.713	0.0	29.4	48
120	min Summer	33.931	0.0	35.2	82
180	min Summer	24.804	0.0	38.6	114
240	min Summer	19.752	0.0	41.0	144
360	min Summer	14.268	0.0	44.4	204
480	min Summer	11.332	0.0	46.9	260
600	min Summer	9.471	0.0	49.0	318
720	min Summer	8.176	0.0	50.7	376
960	min Summer	6.479	0.0	53.7	490
1440	min Summer	4.661	0.0	57.9	0
2160	min Summer	3.349	0.0	62.4	0
2880	min Summer	2.646	0.0	65.7	0
4320	min Summer	1.896	0.0	70.6	0
5760	min Summer	1.495	0.0	74.3	0
7200	min Summer	1.243	0.0	77.2	0
8640	min Summer	1.069	0.0	79.7	0
10080	min Summer	0.941	0.0	81.8	0
15	min Winter	140.878	0.0	20.5	17

Summary of Results for 100 year Return Period (+40%)

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
30 min Winter	49.248	0.998	0.0	4.9	4.9	19.0	O K
60 min Winter	49.241	0.991	0.0	4.9	4.9	18.8	O K
120 min Winter	49.092	0.842	0.0	4.9	4.9	16.0	O K
180 min Winter	48.872	0.622	0.0	4.9	4.9	11.8	O K
240 min Winter	48.685	0.435	0.0	4.9	4.9	8.3	O K
360 min Winter	48.439	0.189	0.0	4.7	4.7	3.6	O K
480 min Winter	48.322	0.072	0.0	4.3	4.3	1.4	O K
600 min Winter	48.270	0.020	0.0	3.8	3.8	0.4	O K
720 min Winter	48.253	0.003	0.0	3.3	3.3	0.1	O K
960 min Winter	48.250	0.000	0.0	2.6	2.6	0.0	O K
1440 min Winter	48.250	0.000	0.0	1.9	1.9	0.0	O K
2160 min Winter	48.250	0.000	0.0	1.4	1.4	0.0	O K
2880 min Winter	48.250	0.000	0.0	1.1	1.1	0.0	O K
4320 min Winter	48.250	0.000	0.0	0.8	0.8	0.0	O K
5760 min Winter	48.250	0.000	0.0	0.6	0.6	0.0	O K
7200 min Winter	48.250	0.000	0.0	0.5	0.5	0.0	O K
8640 min Winter	48.250	0.000	0.0	0.4	0.4	0.0	O K
10080 min Winter	48.250	0.000	0.0	0.4	0.4	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	91.614	0.0	26.5	30
60 min Winter	56.713	0.0	33.0	50
120 min Winter	33.931	0.0	39.2	90
180 min Winter	24.804	0.0	43.1	122
240 min Winter	19.752	0.0	45.7	154
360 min Winter	14.268	0.0	49.6	210
480 min Winter	11.332	0.0	52.5	262
600 min Winter	9.471	0.0	54.9	310
720 min Winter	8.176	0.0	56.9	368
960 min Winter	6.479	0.0	60.1	0
1440 min Winter	4.661	0.0	64.8	0
2160 min Winter	3.349	0.0	69.9	0
2880 min Winter	2.646	0.0	73.6	0
4320 min Winter	1.896	0.0	79.1	0
5760 min Winter	1.495	0.0	83.2	0
7200 min Winter	1.243	0.0	86.5	0
8640 min Winter	1.069	0.0	89.2	0
10080 min Winter	0.941	0.0	91.6	0

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.423	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.069

Time (mins) From:	To:	Area (ha)
0	4	0.069

Model Details

Storage is Online Cover Level (m) 49.850

Cellular Storage Structure

Invert Level (m) 48.250 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	20.0	0.0	1.001	0.0	0.0
1.000	20.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0098-5000-1500-5000
Design Head (m)	1.500
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	48.150
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
Mean Flow over Head Range	-	4.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Appendix E Sutton LLFA Pro-forma

- London Borough of Sutton SuDS / Drainage Pro-forma

The London Sustainable Drainage Proforma

Introduction

This proforma is intended to accompany a drainage strategy prepared for a planning application where required by national or local planning policy. It should be used to summarise the key outputs from the strategy to allow assessing officers at the Lead Local Flood Authority (LLFA) to quickly assess compliance with sustainable drainage (SuDS) planning

The proforma is divided into 4 sections, which are intended to be used as follows:

1. Site and project information - Provide summary details of the development, site and drainage
2. Proposed discharge arrangement – Summarise site ground conditions to determine potential for infiltration. Select a surface water discharge method (or mix of methods) following the hierarchical approach set out in the London Plan.
3. Drainage strategy – Prioritise SuDS measures that manage runoff as close to source as possible and contribute to the four main pillars of SuDS; amenity, biodiversity, water quality and water quantity.
4. Supporting information – Provide cross references to the page or section of the drainage strategy report where the detailed information to support each element can be found. This may be more than one reference for each

Policy

SuDS:

1. London Borough of Sutton Local Plan policy 32
2. London Plan policy 5.13 and draft New London Plan policy SI13
3. The National Planning Policy Framework (NPPF)

Technical Guidance

- Post-development surface water discharge rate should be limited to greenfield runoff rates. Proposals for higher discharge rates should be agreed with the LLFA ahead of submission of the Planning Application. Clear evidence should be provided with the Planning Application to show why greenfield rates cannot be achieved.
- Greenfield runoff rate is the runoff rate from a site in its natural state, prior to any development. This should be calculated using one of the runoff estimation methods set out in Table 24.1 of CIRIA C753 The SuDS Manual.
- Attenuation storage volumes required to reduce post-development discharge rates to greenfield rates should be calculated using one of the runoff estimation methods set out in Table 24.1 of CIRIA C753 The SuDS Manual.
- 'CC' refers to climate change allowance from the current Environment Agency guidance.
- An operation and maintenance strategy for proposed SuDS measures should be submitted with the Planning Application and include the details set out in section 32.2 of CIRIA C753 The SuDS Manual. The manual should be site-specific and not directly reproduce parts of The SuDS Manual.
- Other useful sources of guidance are:
  - The London Plan Sustainable Design and Construction SPG
  - DEFRA non-statutory technical standards for sustainable drainage
  - Environment Agency climate change guidance
  - CIRIA C753 The SuDS Manual

Sutton

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1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	219-227 Sutton High St.
Address & post code	219-227 High St. Sutton SM1 1LB
OS Grid ref. (Easting, Northing)	E 525780
	N 164581
LPA reference (if applicable)	
Brief description of proposed work	Demolition of existing Argos and redevelop site into 8 storey mixed use commercial and residential.
Total site Area	690 m^2
Total existing impervious area	690 m^2
Total proposed impervious area	690 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No
Existing drainage connection type and location	100mm dia combined out-falling to sewer in St Nicholas Way
Designer Name	M.Griffin
Designer Position	Infrastructure Eng
Designer Company	Hydrock

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Clay, Silt, Sand And Gravel
Bedrock geology classification	London Clay Formation
Site infiltration rate	n/a m/s
Depth to groundwater level	n/a m below ground level
Is infiltration feasible?	No - Ground conditions / site setting

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	Y	N
2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
3 attenuate rainwater in ponds or open water features for gradual release	N	N
4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
5 discharge rainwater direct to a watercourse	N	N
6 discharge rainwater to a surface water sewer/drain	Y	Y
7 discharge rainwater to the combined sewer.	Y	N

2c. Proposed Discharge Details

Proposed discharge location	Existing SW sewer in Sutton High St.
Has the owner/regulator of the discharge location been consulted?	TBA

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3. Drainage Strategy

3a. Discharge Rates & Required Storage

	Greenfield (GF) runoff rate (l/s)	*Existing discharge rate (l/s)*	*Required storage for GF rate (m^3)*	*Proposed discharge rate (l/s)*
Qbar				
1 in 1				
1 in 30				
1 in 100				
1 in 100 + CC				
Climate change allowance used		40%		
3b. Principal Method of Flow Control		HydroBrake		

3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	690		20
Total	690	0	20

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	n/a
Drainage hierarchy (2b)	Section 5.2.1 of Hydrock Report
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 5 & Appendix A
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 5 & Appendix D
Proposed SuDS measures & specifications (3b)	Section 5
4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Appendix C
Detailed drainage design drawings, including exceedance flow routes	n/a
Detailed landscaping plans	Appendix B
Maintenance strategy	Section 7
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	n/a
b) biodiversity?	n/a
c) amenity?	n/a