JOHN DAVIES ASSOCIATES
Consulting Engineers

LAND AT LONGFORD CLOSE
HAYES
UB4 0JP

DRAINAGE STRATEGY
(Rev A)

1st MARCH 2023

Issue Sheet.

Prepared	Date		Checked	Date
MJM	01-03-23		JD	01-03-23

Revisions	Comment	Date
A	Initial Issue	01-03-23

The report is based on the information that has been acquired and / or made available to John Davies Associates Limited via the various searches and consultations undertaken as part of the Drainage Strategy Report. In some cases, anecdotal information has been relied upon, where documented evidence has been lacking.

The conclusions drawn in the following report are considered correct although any subsequent additional information may allow refinement of the conclusions.

All work carried out in preparing this report has utilised and is based upon John Davies Associates current professional knowledge and understanding of current UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and cause any conclusions to become inappropriate or incorrect.

This report has been prepared using information contained in maps and documents prepared by others. John Davies Associates can accept no responsibility for the accuracy of such information.

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1 Introduction

1.1 This document is provided as a drainage strategy to support a planning application for a proposed development at a strip of land at Longford Close, Hayes, UB4 0JP.

1.2 The site is located off Longford Close and is a rough piece of scrub land, the site is approximately 0.021ha and is bounded by a private access road along the western boundary, a private driveway to the northern edge, and the rear gardens of 1-7 Longford Gardens run along the eastern boundary. The nearest postcode is UB4 0JP and the co-ordinates are 511531, 180778.

1.3 The proposal is for a new detached building consisting of 2 one bedroomed flats with off street parking and shared garden. (See Appendix A for the layout plans).

2 Existing Drainage

2.1 The site is a greenfield piece of land and therefore has no positive drainage, running along the northern boundary of the site is an existing foul public sewer, and running along the western boundary and down around the southern edge through Longford Close is an existing surface water public sewer. (See Appendix B for the Sewer records).

3 Proposed Surface Water Drainage

3.1 In accordance with the SUDS hierarchy when considering surface water drainage then consideration to each of the below discharge options should be considered in sequence:

SOURCE (INFILTRATION)

WATERCOURSE

SURFACE WATER SEWER

COMBINED SEWER

3.2 At the time of writing the report there wasn't a site investigation available, therefore we have referred to the BGS website (www.bgs.ac.uk) and the ground conditions are expected to be London Clays which is not a permeable material, (see Appendix C for BGS extract).

3.3 Also the site is a small strip, and it would be difficult to fit in a soakaway and manage a 5.0m offset from any dwelling.

3.3 The nearest watercourse is 'Yeading Brook' and is approximately 100m away and is not directly accessible, however it is believed the public SW sewer adjacent the site outfalls into the brook.

3.4 Therefore it is proposed to discharge the surface water to the public sewer in Longfold Close at a controlled rate with attenuation on site for the 1 in 100 year + 40CC rainfall event.

3.5 Wherever possible when discharging surface water, the discharge rate should be reverted back to greenfield rates and if required a flow control provided with attenuation, the site is 0.021ha in size and therefore the greenfield runoff would equate to (See Appendix D for calc):

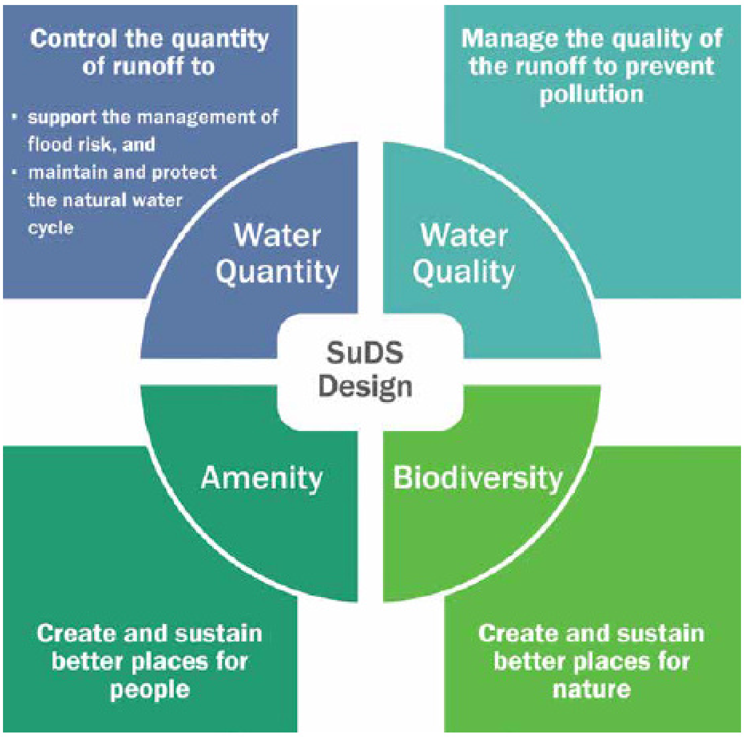
QBar = 0.42 l/s
1 in 1 Year = 0.35 l/s
1 in 30 Year = 0.96 l/s
1 in 100 Year = 1.33 l/s

3.6 All the above greenfield rates would require a very small orifice to be able to restrict flows so low which would increase the risk of blockages, it is therefore proposed to restrict the flow from site to 1.0 l/s (see appendix E for drainage layout).

3.7 We have also undertaken drainage calculations to support the drainage layout showing the 1 in 100 year + 40% climate change rainfall event has been modelled and is being maintained within the 150mm pipework. (See Appendix F for calcs)

4 SUDS

4.1 All new surface water should be designed in accordance with 'The SUDS Manual' which identifies 4 pillars of a sustainable drainage solution, these four elements are shown as:



4.2 WATER QUANTITY: The site is being restricted to a discharge rate of 1.0 l/s which is as close to greenfield rates as practically possible.

4.3 WATER QUALITY: The site has been designed as such that all the surface water runoff from the roof runs through the permeable paving before entering the public sewer.

4.4 AMENITY AND BIODIVERSITY: Amenity and Biodiversity is naturally provided in the garden area.

5 Proposed Foul Drainage

5.1 It is proposed to connect the new foul connections into the public foul sewer in Longfold Close (See Appendix E for drainage layout).

6 SUDS Operations and Maintenance Plan

6.1 The proposed drainage strategy consists of several SUDS elements which can have different responsibilities on the operation and maintenance and each one will require routine checks and repairs, these different SUDS elements and their require maintenance are as outlined in the table below.

ELEMENT	RESPONSIBILITY		
	PUBLIC	PRIVATE	MAINTENANCE COMPANY
FLOW CONTROL		✓	
PERMEABLE PAVING		✓	

6.2 FLOW CONTROL DEVICE MAINTENANCE

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

6.3 PERMEABLE PAVING

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

7 Flood Exceedance Event

6.1 Although the drainage has been designed to accommodate the 1 in 100 year + 40%cc rainfall event consideration has to be given to the exceedance event to the drainage, this is the event where the surface water system is pushed to such a point that it is forced to flood so that the resultant flow paths can be identified on a plan. (See Appendix G for plan)

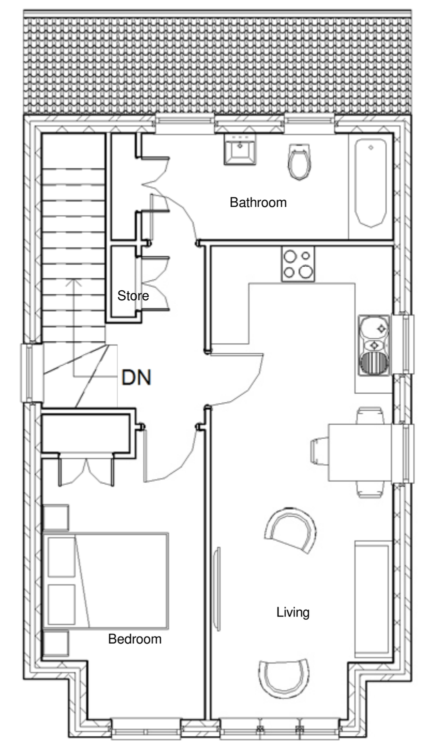
8 London Borough of Hillingdon Sustainable Drainage Proforma

6.1 The individual boroughs of London have their own Proforma forms provided that need to be completed as part of the application, please see Appendix H for the form.

Appendix A
Proposed Layouts

NOTES A1

DO NOT SCALE FROM THIS DRAWING.
ALL DIMENSION TO BE CHECKED ON SITE.



FIRST FLOOR
1:100

AREA:

GROUND FLOOR FLAT GROSS INTERNAL
50 M2

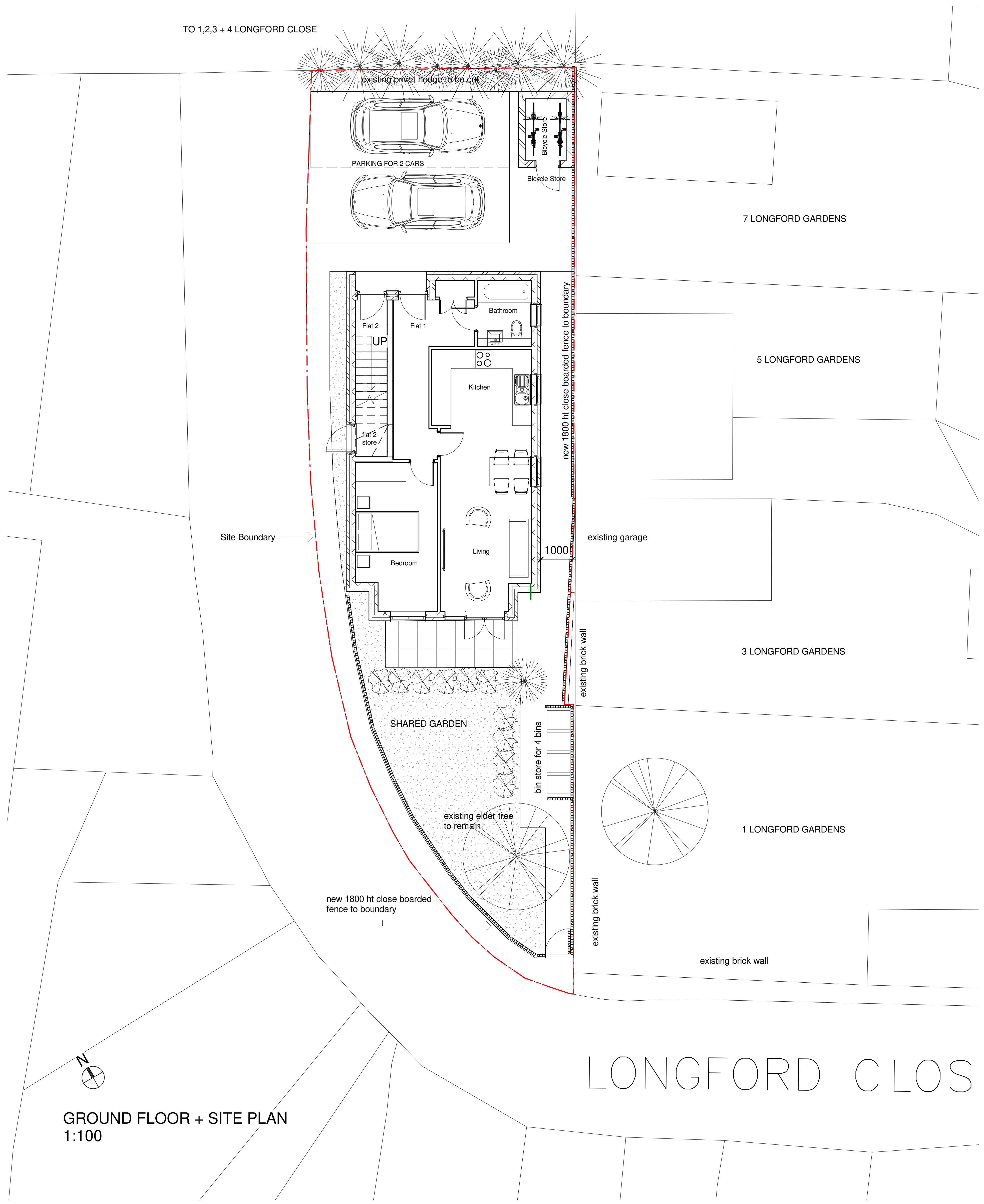
FIRST FLOOR FLAT GROSS INTERNAL
50 M2

MATERIAL KEY:

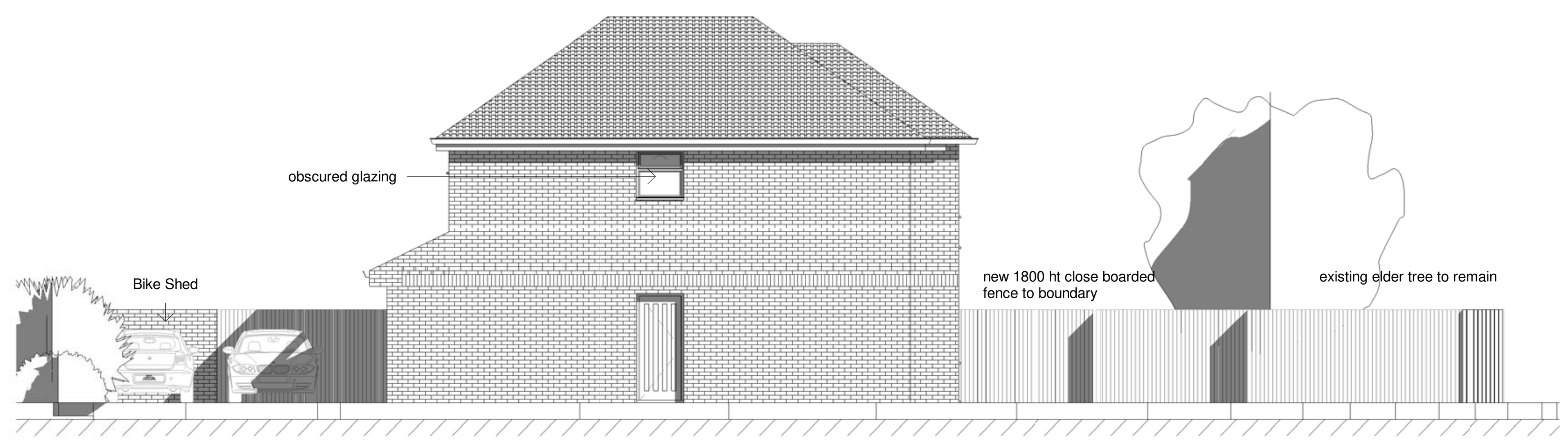
1 RED MULTIFACING BRICKWORK WITH CONTRASTING CORBELS AND SOLDIER COURSE

2 WHITE uPVC WINDOWS AND DOORS

3 REDLAND DUOPLAIN TILES IN FLAME RED

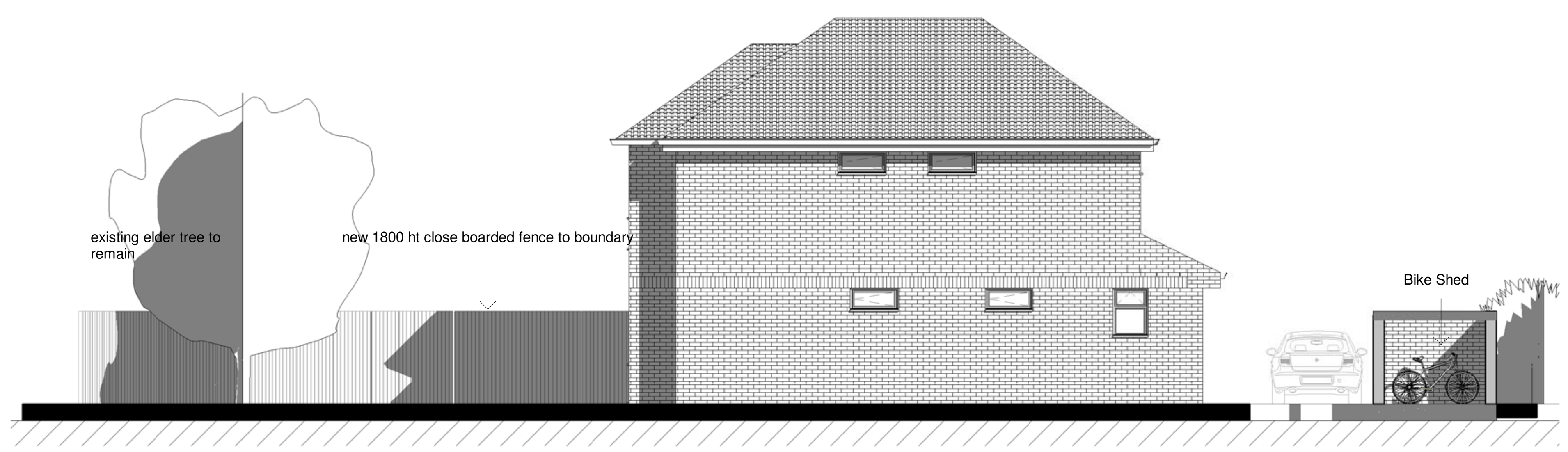


GROUND FLOOR + SITE PLAN
1:100



NORTH WEST ELEVATION (TO LONGFORD CLOSE)
1:100

NORTH EAST ELEVATION
(TO CAR PARKING)
1:100



SOUTH EAST ELEVATION (TO LONGFORD GARDENS)
1:100

SOUH WEST ELEVATION
(TO CAR PARKING)
1:100

N

LOCATION PLAN
1:1250

0 1 2 3 4 5 6 7 8 9 10 (m)

Rev/ Issue	NOTE	DRN	DATE
A	Revised to suit Planning areas	SR	MH

SCALE	DATE	DRN	CHK
1:100@A1	08.06.2018	SR	MH

PROJECT
Land at Longford Close,
Longford Gardens, Hayes

DRAWING
Proposed Plans,
Elevations and Location
Plan

bubble architects

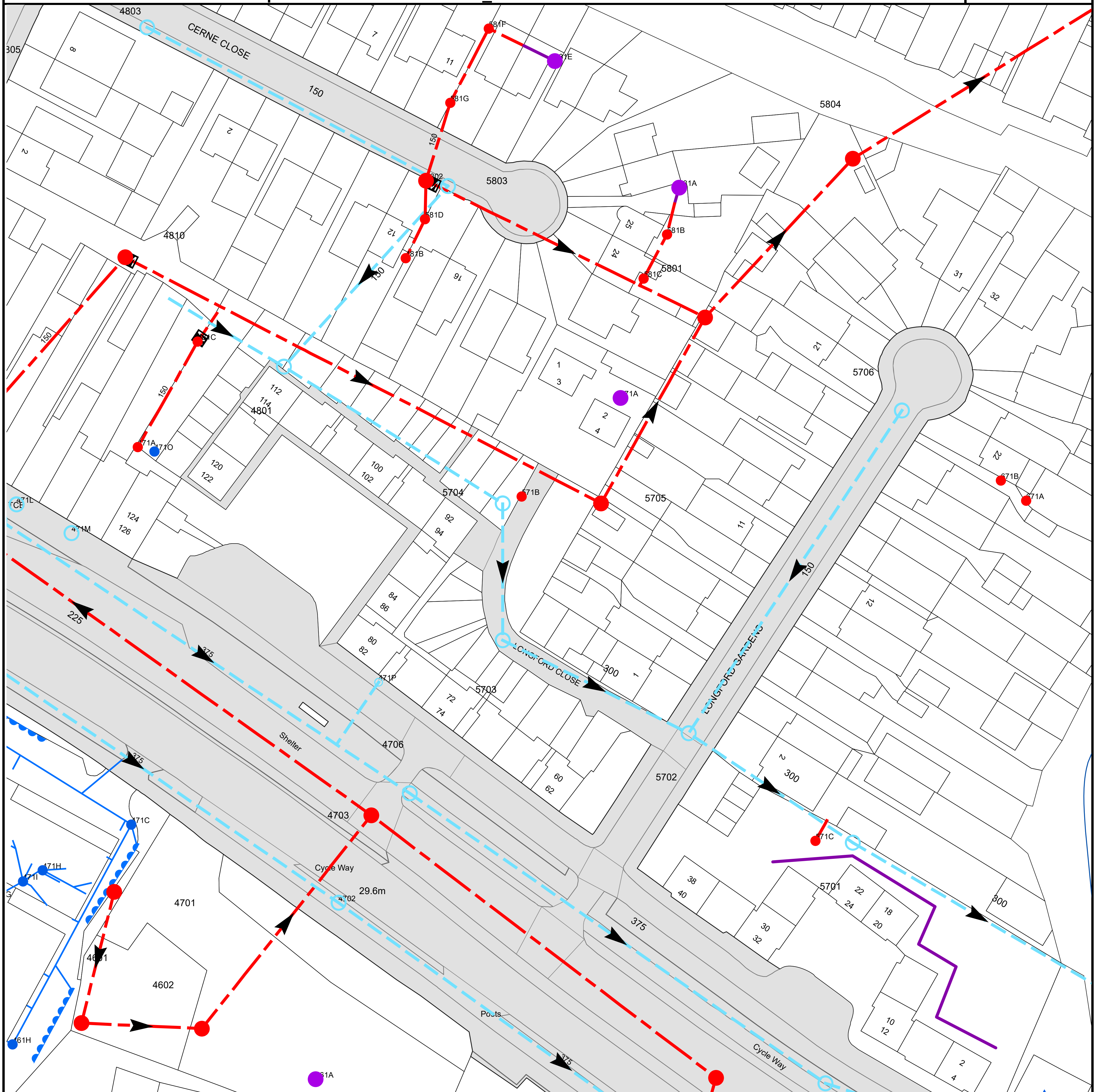
STUDIO 205 THE BUSWORKS
39-41 NORTH ROAD
LONDON N9 7DP

WWW.BUBBLEARCHITECTS.CO.UK

JOB NO	DRAWING NO	REV
018025	P-00-D-003	A

Appendix B
Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4792381



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 511524,180771

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.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
471P	n/a	n/a
4810	n/a	n/a
5802	30.36	28.71
571A	n/a	n/a
581C	n/a	n/a
581B	n/a	n/a
581A	n/a	n/a
5801	n/a	n/a
5804	n/a	n/a
5706	29.68	28.75
671B	n/a	n/a
671A	n/a	n/a
471L	n/a	n/a
471I	n/a	n/a
471H	n/a	n/a
471M	n/a	n/a
4701	n/a	n/a
471C	n/a	n/a
471A	n/a	n/a
4803	30.92	29.93
471O	n/a	n/a
481C	n/a	n/a
4801	n/a	n/a
4702	29.74	27.73
4703	29.72	25.42
481B	n/a	n/a
4706	29.97	27.73
581D	n/a	n/a
5803	30.31	29.34
581G	n/a	n/a
581F	n/a	n/a
5704	n/a	n/a
5703	29.47	28.25
571B	n/a	n/a
581E	n/a	n/a
5705	n/a	n/a
5702	29.37	27.97
5603	n/a	n/a
571C	n/a	n/a
5601	n/a	n/a
5701	n/a	n/a
461A	n/a	n/a
461H	n/a	n/a
4602	n/a	n/a
4601	n/a	n/a

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.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Storm Sewer

Sludge Sewer

Foul Trunk Sewer

Surface Trunk Sewer

Combined Trunk Sewer

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Vacuum

Thames Water Proposed

Vent Pipe

Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

Sewer

Culverted Watercourse

Proposed

Decommissioned Sewer

Content of this drainage network is currently unknown

Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Meter

Dam Chase

Vent

Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Ancillary

Drop Pipe

Control Valve

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Inlet

Outfall

Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

Change of Characteristic Indicator

Public / Private Pumping Station

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Chamber

Operational Site

Ducts or Crossings

Casement

Ducts may contain high voltage cables. Please check with Thames Water.

Conduit Bridge

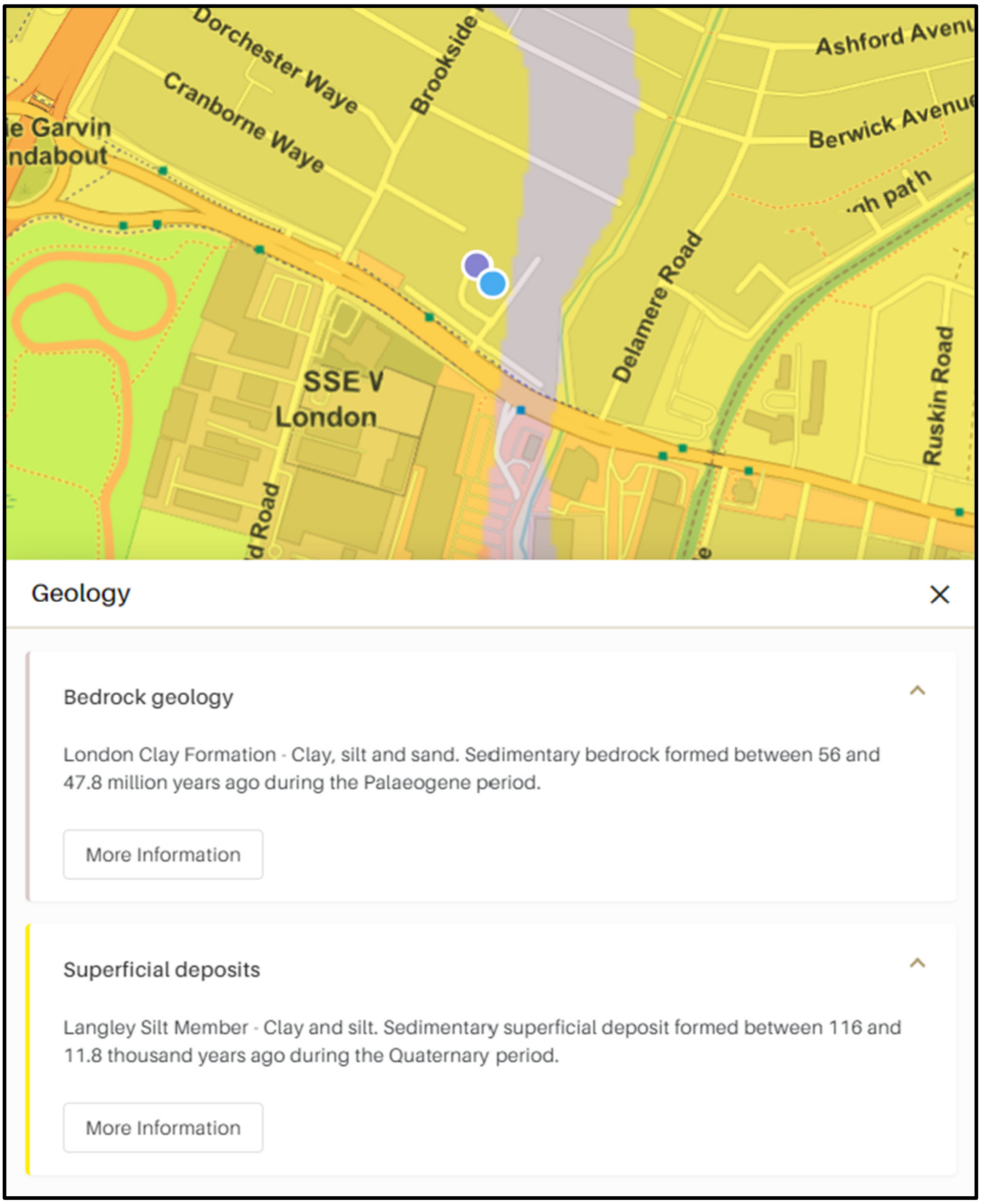
Subway

Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters.
Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.
If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Appendix C
BGS Website Extract


Dorchester Waye
Cranborne Waye
Brookside
Ashford Avenu
Berwick Avenue
Delamere Road
Ruskin Road
SSE V
London
Geology
Bedrock geology
London Clay Formation - Clay, silt and sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.
More Information
Superficial deposits
Langley Silt Member - Clay and silt. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.
More Information

Appendix D
Greenfield Calc

Print   Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Michael Micklethwaite
Site name:	Longford Close
Site location:	Hayes

This is an estimation of the greenfield runoff rates that are used 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). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.51488° N
Longitude:	0.39408° W
Reference:	2160804882
Date:	Mar 01 2023 07:53

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	617	617
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

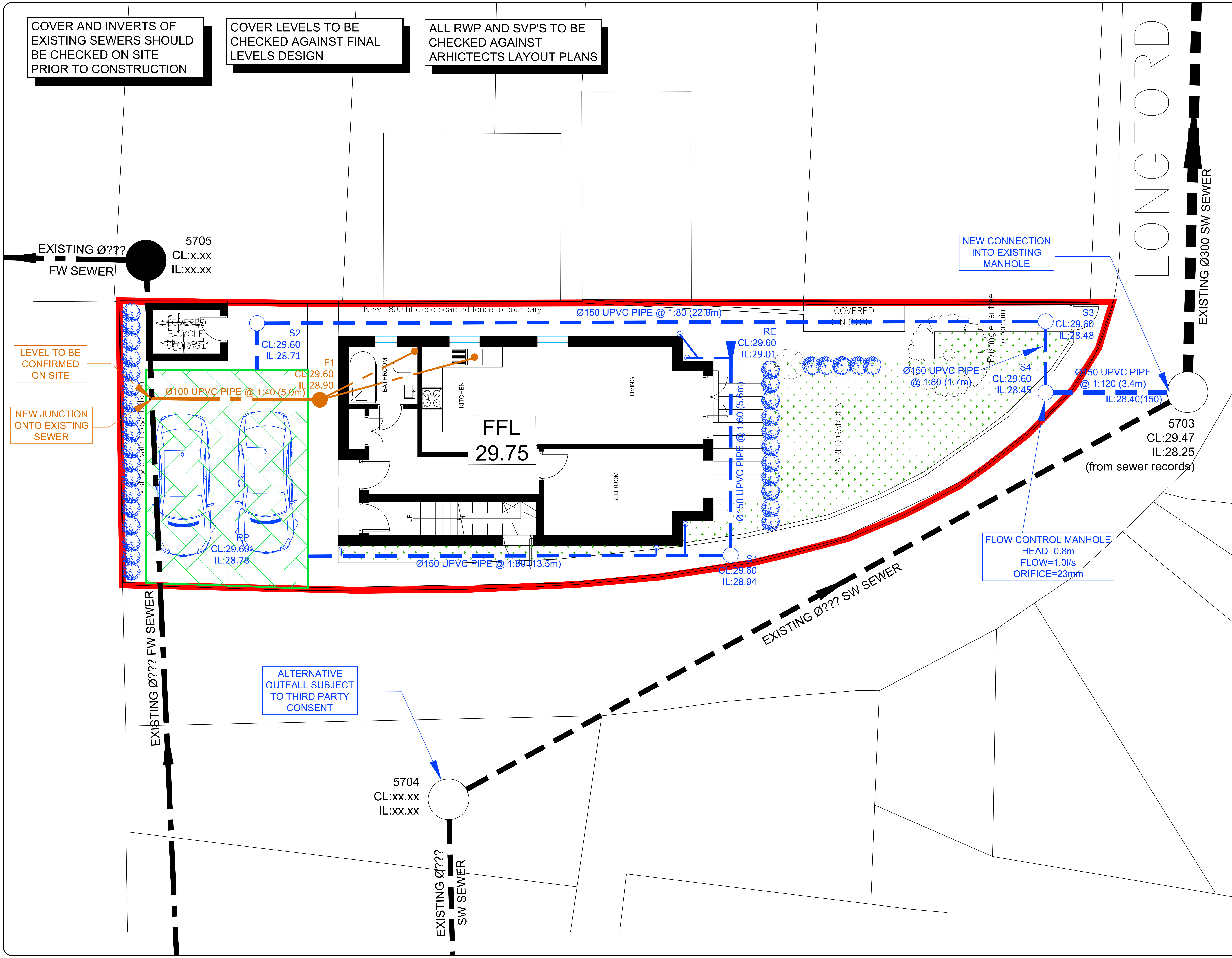
Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.42	0.42
1 in 1 year (l/s):	0.35	0.35
1 in 30 years (l/s):	0.96	0.96
1 in 100 year (l/s):	1.33	1.33
1 in 200 years (l/s):	1.56	1.56

Appendix E
Drainage Layout



Notes

1. This drawing is produced for use in this project only and may not be used for any other purpose. The consulting Engineers accept no liability for the use of this drawing other than the purpose for which it was intended in connection with this project as recorded on the title block fields 'Purpose for Issue' and 'File Status Code'.
2. This drawing may not be reproduced in any form without prior written agreement.
3. Do not scale from the drawing, use written dimensions only.
4. All dimensions are in metres unless otherwise specified.
5. Discrepancies must be reported back to the engineer prior to construction.

Key

- EXISTING FW SEWER
- EXISTING SW SEWER
- PROPOSED SW SEWER
- PROPOSED FW SEWER
- PERMEABLE PAVING

Drainage Strategy

SURFACE WATER

In accordance with the SuDS Hierarchy then infiltration should be considered in the first instance, witht he absence of a Site Investigation we have referred to the BGS website, and the ground is expected to be London Clays which are quite impermeable, also the site is such a small parcel we feel it woudl be difficult to fit in a soakaway and maintain 5.0m perimeter to the proposed dwelling.

The nearest watercourse is 'Yeading Brook' and is approx 100m away and is not directly accessible, however it is believed the public SW sewer adjacent the site outfalls into the Brook.

It is therefore proposed to connect the SW into the public sewer adjacent the site at a controlled rate with storage on site accommodating the 1 in 100 year + 40% climate rainfall event on site.

FOUL DRAINAGE

It is proposed to discharge to the existing foul public sewer located along the northern edge of the site.

REV.	DESCRIPTION	DWN	CHK	DATE
A	INITIAL ISSUE	MM	JD	01.03.23

CLIENT
WESTWAY CONSTRUCTION LTD

PROJECT
LONGFORD CLOSE
HAYES
UB4 0JP

TITLE
PROPOSED DRAINAGE LAYOUT PLAN

DWN	DATE	CHK	DATE	APP.	DATE	SCALE
MM	FEB 23					1:50

John Davies Associates
1 St John's Rd.
Queen's Park
Chester. CH4 7AL
Tel/Fax: 01244 677991

Drawing Number
JDA/445/2/1
A1
REV. A

Appendix F
Drainage Calc

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100	150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE	0.005	5.00	29.700	450	489486.029	135588.687	0.690
S1	0.005	5.00	29.700	450	489479.715	135588.696	0.760
PP	0.005	5.00	29.700	450	489479.681	135602.661	0.920
S2			29.700	450	489486.553	135602.651	0.990
S3			29.700	450	489486.609	135579.413	1.220
S4			29.700	600	489484.511	135579.416	1.250
5703			29.470	1200	489484.521	135575.233	1.070

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE	S1	6.314	0.600	29.010	28.940	0.070	90.2	150	5.10	50.0
1.001	S1	PP	13.965	0.600	28.940	28.780	0.160	87.3	150	5.32	50.0
1.002	PP	S2	6.872	0.600	28.780	28.710	0.070	98.2	150	5.43	50.0
1.003	S2	S3	23.238	0.600	28.710	28.480	0.230	101.0	150	5.82	50.0
1.004	S3	S4	2.098	0.600	28.480	28.450	0.030	69.9	150	5.85	50.0
1.005	S4	5703	4.183	0.600	28.450	28.400	0.050	83.7	150	5.91	50.0

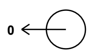
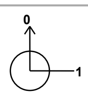
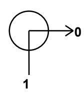
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.058	18.7	0.7	0.540	0.610	0.005	0.0	20	0.500
1.001	1.076	19.0	1.4	0.610	0.770	0.010	0.0	27	0.625
1.002	1.014	17.9	2.0	0.770	0.840	0.015	0.0	34	0.676
1.003	0.999	17.7	2.0	0.840	1.070	0.015	0.0	34	0.666
1.004	1.204	21.3	2.0	1.070	1.100	0.015	0.0	31	0.762
1.005	1.099	19.4	2.0	1.100	0.920	0.015	0.0	33	0.711

Pipeline Schedule

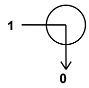
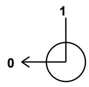
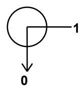
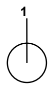
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	6.314	90.2	150	Circular	29.700	29.010	0.540	29.700	28.940	0.610
1.001	13.965	87.3	150	Circular	29.700	28.940	0.610	29.700	28.780	0.770
1.002	6.872	98.2	150	Circular	29.700	28.780	0.770	29.700	28.710	0.840
1.003	23.238	101.0	150	Circular	29.700	28.710	0.840	29.700	28.480	1.070
1.004	2.098	69.9	150	Circular	29.700	28.480	1.070	29.700	28.450	1.100
1.005	4.183	83.7	150	Circular	29.700	28.450	1.100	29.470	28.400	0.920

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE	450	Manhole	Adoptable	S1	450	Manhole	Adoptable
1.001	S1	450	Manhole	Adoptable	PP	450	Manhole	Adoptable
1.002	PP	450	Manhole	Adoptable	S2	450	Manhole	Adoptable
1.003	S2	450	Manhole	Adoptable	S3	450	Manhole	Adoptable
1.004	S3	450	Manhole	Adoptable	S4	600	Manhole	Adoptable
1.005	S4	600	Manhole	Adoptable	5703	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
RE	489486.029	135588.687	29.700	0.690	450		0	1.000	29.010	150
S1	489479.715	135588.696	29.700	0.760	450		1	1.000	28.940	150
							0	1.001	28.940	150
PP	489479.681	135602.661	29.700	0.920	450		1	1.001	28.780	150
							0	1.002	28.780	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S2	489486.553	135602.651	29.700	0.990	450		1	1.002	28.710	150
							0	1.003	28.710	150
S3	489486.609	135579.413	29.700	1.220	450		1	1.003	28.480	150
							0	1.004	28.480	150
S4	489484.511	135579.416	29.700	1.250	600		1	1.004	28.450	150
							0	1.005	28.450	150
5703	489484.521	135575.233	29.470	1.070	1200		1	1.005	28.400	150

Simulation Settings

Rainfall Methodology	FSR
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.400
Summer CV	0.750
Winter CV	0.840
Analysis Speed	Detailed
Skip Steady State	x

Drain Down Time (mins)	240
Additional Storage (m³/ha)	20.0
Check Discharge Rate(s)	✓
1 year (l/s)	0.1
30 year (l/s)	0.2
100 year (l/s)	0.3
Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	0.021
SAAR (mm)	617
Soil Index	4
SPR	0.47
Region	6
Growth Factor 1 year	0.85

Growth Factor 30 year	2.40
Growth Factor 100 year	3.19
Betterment (%)	0
QBar	0.1
Q 1 year (l/s)	0.1
Q 30 year (l/s)	0.2
Q 100 year (l/s)	0.3

Node S4 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.800	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	28.450	Diameter (m)	0.023		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year 600 minute winter	13.498	5.404
1 year 15 minute winter	76.857	30.991	30 year 720 minute summer	17.490	4.687
1 year 30 minute summer	71.439	20.215	30 year 720 minute winter	11.754	4.687
1 year 30 minute winter	50.133	20.215	30 year 960 minute summer	14.215	3.743
1 year 60 minute summer	48.435	12.800	30 year 960 minute winter	9.416	3.743
1 year 60 minute winter	32.179	12.800	30 year 1440 minute summer	10.161	2.723
1 year 120 minute summer	30.053	7.942	30 year 1440 minute winter	6.829	2.723
1 year 120 minute winter	19.966	7.942	100 year 15 minute summer	348.738	98.681
1 year 180 minute summer	23.233	5.979	100 year 15 minute winter	244.728	98.681
1 year 180 minute winter	15.102	5.979	100 year 30 minute summer	228.965	64.789
1 year 240 minute summer	18.475	4.882	100 year 30 minute winter	160.677	64.789
1 year 240 minute winter	12.274	4.882	100 year 60 minute summer	153.288	40.510
1 year 360 minute summer	14.169	3.646	100 year 60 minute winter	101.841	40.510
1 year 360 minute winter	9.210	3.646	100 year 120 minute summer	92.562	24.461
1 year 480 minute summer	11.185	2.956	100 year 120 minute winter	61.496	24.461
1 year 480 minute winter	7.431	2.956	100 year 180 minute summer	69.806	17.964
1 year 600 minute summer	9.182	2.511	100 year 180 minute winter	45.376	17.964
1 year 600 minute winter	6.274	2.511	100 year 240 minute summer	54.269	14.342
1 year 720 minute summer	8.203	2.199	100 year 240 minute winter	36.055	14.342
1 year 720 minute winter	5.513	2.199	100 year 360 minute summer	40.484	10.418
1 year 960 minute summer	6.768	1.782	100 year 360 minute winter	26.315	10.418
1 year 960 minute winter	4.483	1.782	100 year 480 minute summer	31.414	8.302
1 year 1440 minute summer	4.949	1.326	100 year 480 minute winter	20.871	8.302
1 year 1440 minute winter	3.326	1.326	100 year 600 minute summer	25.431	6.956
30 year 15 minute summer	268.706	76.035	100 year 600 minute winter	17.376	6.956
30 year 15 minute winter	188.566	76.035	100 year 720 minute summer	22.452	6.017
30 year 30 minute summer	174.929	49.499	100 year 720 minute winter	15.089	6.017
30 year 30 minute winter	122.757	49.499	100 year 960 minute summer	18.166	4.784
30 year 60 minute summer	116.589	30.811	100 year 960 minute winter	12.033	4.784
30 year 60 minute winter	77.459	30.811	100 year 1440 minute summer	12.896	3.456
30 year 120 minute summer	70.438	18.615	100 year 1440 minute winter	8.667	3.456
30 year 120 minute winter	46.797	18.615	100 year +40% CC 15 minute summer	488.233	138.153
30 year 180 minute summer	53.298	13.715	100 year +40% CC 15 minute winter	342.620	138.153
30 year 180 minute winter	34.645	13.715	100 year +40% CC 30 minute summer	320.551	90.705
30 year 240 minute summer	41.604	10.995	100 year +40% CC 30 minute winter	224.948	90.705
30 year 240 minute winter	27.641	10.995	100 year +40% CC 60 minute summer	214.603	56.713
30 year 360 minute summer	31.221	8.034	100 year +40% CC 60 minute winter	142.577	56.713
30 year 360 minute winter	20.295	8.034	100 year +40% CC 120 minute summer	129.587	34.246
30 year 480 minute summer	24.324	6.428	100 year +40% CC 120 minute winter	86.094	34.246
30 year 480 minute winter	16.160	6.428	100 year +40% CC 180 minute summer	97.729	25.149
30 year 600 minute summer	19.756	5.404	100 year +40% CC 180 minute winter	63.526	25.149

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 240 minute summer	75.977	20.078	100 year +40% CC 600 minute winter	24.327	9.738
100 year +40% CC 240 minute winter	50.477	20.078	100 year +40% CC 720 minute summer	31.433	8.424
100 year +40% CC 360 minute summer	56.677	14.585	100 year +40% CC 720 minute winter	21.125	8.424
100 year +40% CC 360 minute winter	36.841	14.585	100 year +40% CC 960 minute summer	25.432	6.697
100 year +40% CC 480 minute summer	43.979	11.622	100 year +40% CC 960 minute winter	16.847	6.697
100 year +40% CC 480 minute winter	29.219	11.622	100 year +40% CC 1440 minute summer	18.055	4.839
100 year +40% CC 600 minute summer	35.604	9.738	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE	11	29.030	0.020	0.7	0.0060	0.0000	OK
15 minute winter	S1	11	28.968	0.028	1.4	0.0080	0.0000	OK
15 minute winter	PP	11	28.816	0.036	2.1	0.0097	0.0000	OK
15 minute winter	S2	11	28.745	0.035	2.1	0.0055	0.0000	OK
30 minute winter	S3	27	28.679	0.199	2.1	0.0317	0.0000	SURCHARGED
30 minute winter	S4	27	28.679	0.229	2.0	0.0648	0.0000	SURCHARGED
15 minute summer	5703	1	28.400	0.000	0.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE	1.000	S1	0.7	0.394	0.037	0.0113	
15 minute winter	S1	1.001	PP	1.4	0.514	0.074	0.0382	
15 minute winter	PP	1.002	S2	2.1	0.664	0.117	0.0218	
15 minute winter	S2	1.003	S3	2.1	0.598	0.118	0.2311	
30 minute winter	S3	1.004	S4	2.0	0.437	0.096	0.0369	
30 minute winter	S4	Orifice	5703	0.5				1.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE	10	29.041	0.031	1.7	0.0094	0.0000	OK
15 minute winter	S1	10	28.982	0.042	3.4	0.0123	0.0000	OK
60 minute winter	PP	46	28.966	0.186	2.7	0.0497	0.0000	SURCHARGED
60 minute winter	S2	46	28.965	0.255	2.7	0.0406	0.0000	SURCHARGED
60 minute winter	S3	47	28.965	0.485	2.1	0.0771	0.0000	SURCHARGED
60 minute winter	S4	47	28.965	0.515	1.4	0.1457	0.0000	SURCHARGED
15 minute summer	5703	1	28.400	0.000	0.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE	1.000	S1	1.7	0.503	0.090	0.0212	
15 minute winter	S1	1.001	PP	3.3	0.649	0.175	0.1082	
60 minute winter	PP	1.002	S2	2.7	0.681	0.151	0.1210	
60 minute winter	S2	1.003	S3	2.1	0.489	0.122	0.4091	
60 minute winter	S3	1.004	S4	1.4	0.463	0.065	0.0369	
60 minute winter	S4	Orifice	5703	0.8				4.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	RE	49	29.084	0.074	1.2	0.0225	0.0000	OK
60 minute winter	S1	48	29.085	0.145	2.4	0.0421	0.0000	OK
60 minute winter	PP	49	29.084	0.304	3.6	0.0815	0.0000	SURCHARGED
60 minute winter	S2	49	29.084	0.374	3.1	0.0595	0.0000	SURCHARGED
60 minute winter	S3	49	29.083	0.603	2.4	0.0959	0.0000	SURCHARGED
60 minute winter	S4	49	29.083	0.633	1.5	0.1792	0.0000	SURCHARGED
15 minute summer	5703	1	28.400	0.000	0.8	0.0000	0.0000	OK

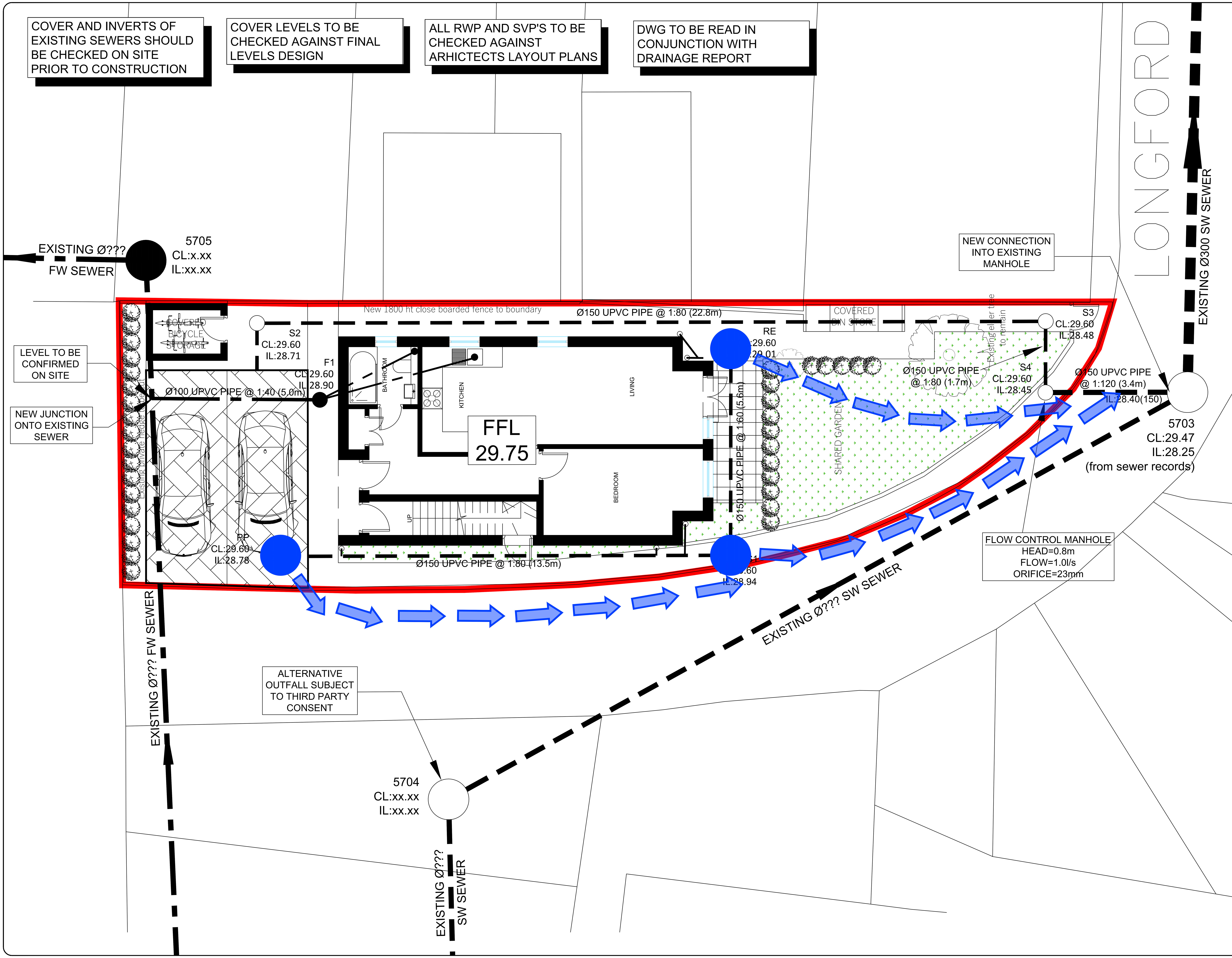
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	RE	1.000	S1	1.2	0.460	0.064	0.0823	
60 minute winter	S1	1.001	PP	2.4	0.602	0.126	0.2446	
60 minute winter	PP	1.002	S2	3.1	0.701	0.176	0.1210	
60 minute winter	S2	1.003	S3	2.4	0.492	0.136	0.4091	
60 minute winter	S3	1.004	S4	1.5	0.467	0.070	0.0369	
60 minute winter	S4	Orifice	5703	0.9				5.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	RE	49	29.351	0.341	1.6	0.1037	0.0000	SURCHARGED
60 minute winter	S1	49	29.351	0.411	3.2	0.1196	0.0000	SURCHARGED
60 minute winter	PP	49	29.351	0.571	4.5	0.1529	0.0000	SURCHARGED
60 minute winter	S2	50	29.350	0.640	3.7	0.1018	0.0000	SURCHARGED
60 minute winter	S3	50	29.350	0.870	2.4	0.1383	0.0000	SURCHARGED
60 minute winter	S4	50	29.350	0.900	1.7	0.2546	0.0000	SURCHARGED
15 minute summer	5703	1	28.400	0.000	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	RE	1.000	S1	1.6	0.488	0.086	0.1112	
60 minute winter	S1	1.001	PP	3.0	0.633	0.158	0.2459	
60 minute winter	PP	1.002	S2	3.7	0.701	0.208	0.1210	
60 minute winter	S2	1.003	S3	2.4	0.549	0.138	0.4091	
60 minute winter	S3	1.004	S4	1.7	0.530	0.082	0.0369	
60 minute winter	S4	Orifice	5703	1.0				7.2

Appendix G
Flood Exceedance Layout



Notes

1. This drawing is produced for use in this project only and may not be used for any other purpose. The consulting Engineers accept no liability for the use of this drawing other than the purpose for which it was intended in connection with this project as recorded on the title block fields 'Purpose for Issue' and 'File Status Code'.
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REV.	DESCRIPTION	DWN	CHK	DATE
A	INITIAL ISSUE	MM	JD	01.03.23

CLIENT
WESTWAY CONSTRUCTION LTD

PROJECT
LONGFORD CLOSE
HAYES
UB4 0JP

TITLE
FLOOD EXCEEDANCE LAYOUT PLAN

DWN	DATE	CHK	DATE	APP.	DATE	SCALE
MM	FEB 23					1:50

John Davies Associates
1 St John's Rd.
Queen's Park
Chester. CH4 7AL
Tel/Fax: 01244 677991

Drawing Number
JDA/445/3/1
A1
REV.
A

Appendix H
Hillingdon Borough of London Drainage Proforma

GREATER LONDON AUTHORITY

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	Land at Longfold Close
Address & post code	Longfold Close, Hayes, UB4 0JP
OS Grid ref. (Easting, Northing)	E 511531 N 180778
LPA reference (if applicable)	
Brief description of proposed work	New block of 2 one bedroomed apartments with parking and shared garden
Total site Area	210 m^2
Total existing impervious area	0 m^2
Total proposed impervious area	145 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	None
Designer Name	Michael Micklethwaite
Designer Position	Civil Engineer
Designer Company	John Davies Associates

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Langley Silt member	
Bedrock geology classification	London Clay	
Site infiltration rate	0	m/s
Depth to groundwater level	0	m below ground level
Is infiltration feasible?	No	

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	Y	Y
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.	N	N

2c. Proposed Discharge Details

Proposed discharge location	Public SW sewer
Has the owner/regulator of the discharge location been consulted?	Not Yet

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	0.42			
1 in 1	0.35	0		1
1 in 30	0.96	0		1
1 in 100	1.33	0		1
1 in 100 + CC				1
Climate change allowance used		40%		

3b. Principal Method of Flow Control

3b. Principal Method of Flow Control	Orifice manhole

3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^3)*	*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	145	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	0		0
Total	145	0	0

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Page 5 Paragraph 3.2
Drainage hierarchy (2b)	Page 5 Paragrpah 3.1
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	DWG: JDA/445/2/1
Proposed SuDS measures & specifications (3b)	

4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	
Detailed drainage design drawings, including exceedance flow routes	JDA/445/2/1 JDA/445/3/1
Detailed landscaping plans	
Maintenance strategy	Page 7
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	Permeable Paving
b) biodiversity?	
c) amenity?	