

APPENDIX A – DRAWINGS



N
NORTH
Indicative

Existing Red Boundary Total Area is
Approx. 1893m²

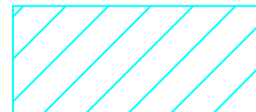


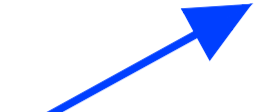
Existing Impermeable Total Area is
Approx. 882m²

Existing Permeable Total Area is
Approx. 1011m²

Existing Impermeable Area represent
Approx. 47% from Total Considered
Area.

DRAWING TO BE PRINTED IN COLOUR.

KEY:

-  Existing Roof Area
-  Existing Hardstanding Area
-  Proposed Site Boundary
-  Exceedance Route Arrow

NOT FOR CONSTRUCTION

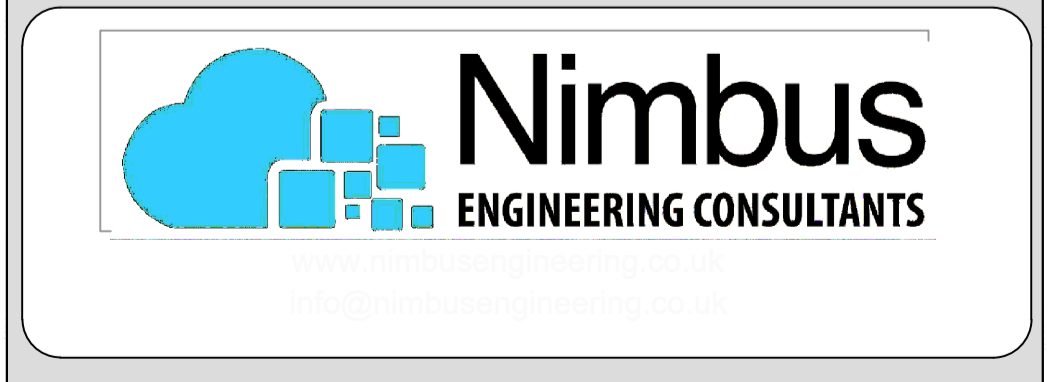
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A	09-04-26	M.HAM	For Information.	S.L	S.L

151 Station Road, West Drayton, UB7 7NG

Pre Development and Impermeable Area and Exceedance
Route Plan

Kearns Development Ltd



S.L	09-04-26	S.L	09-04-26
M.HAM	1:250	C3753-01	A
09-04-26	A1		



Proposed Red Boundary Total Area is
Approx. 1893m²


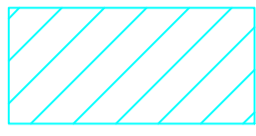


Proposed Impermeable Total Area is
Approx. 1052m²

Permeable Total Area is
Approx. 841m²

Proposed Impermeable Area
represent Approx. 56% from Total
Considered Area.

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KEY:

-  Proposed Hardstanding Areas
-  Proposed Roof Hatching
-  Proposed Site Boundary
-  Exceedance Route Arrow

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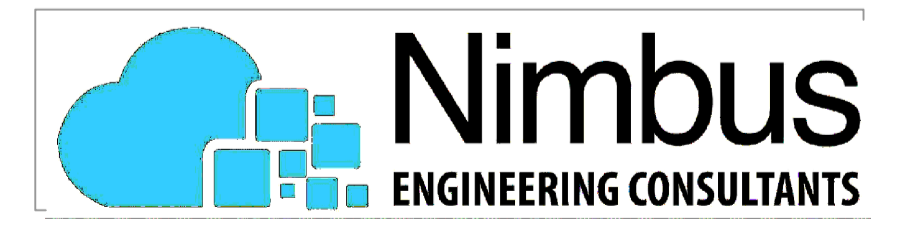
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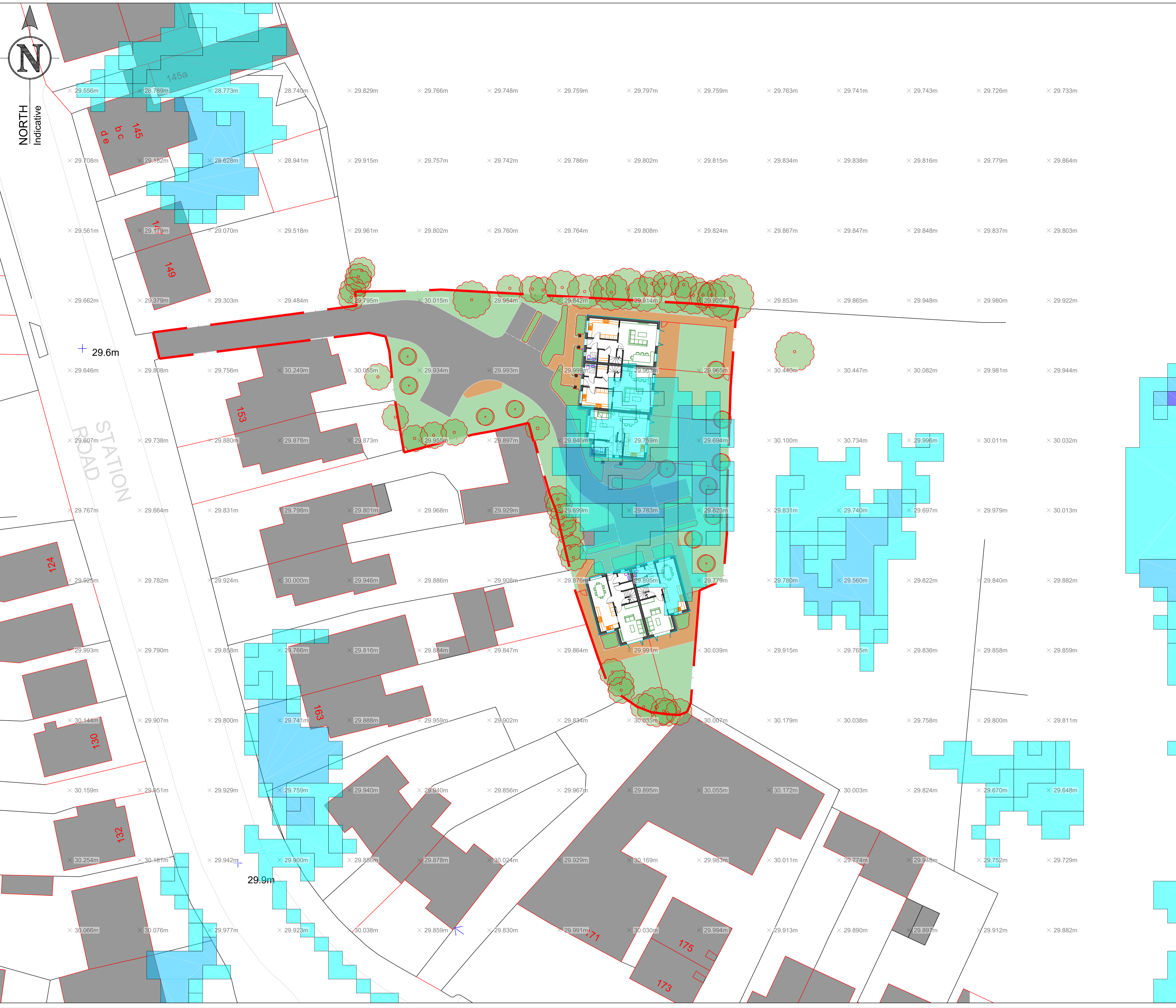
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Post Development and Impermeable Area and Exceedance
Route Plan

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S.L	02-04-26	S.L	02-04-26
L.B	1:250	C3753-02	A
02-04-26	A1		



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KEY:

RoFSW is a probabilistic product, meaning that it shows the overall risk, rather than the risk associated with a specific event or scenario. In externally published versions of this dataset, risk is displayed as the likelihood bandings:

- High - greater than or equal to 3.3% chance in any given year (1:30).
- Medium - less than 3.3% but greater than or equal to 1% (1:100) chance in any given year.
- Low - less than 1% (1:100) but greater than or equal to 0.1% (1:1000) chance in any given year.

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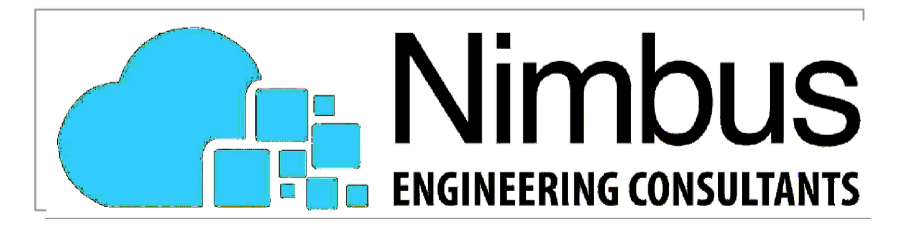
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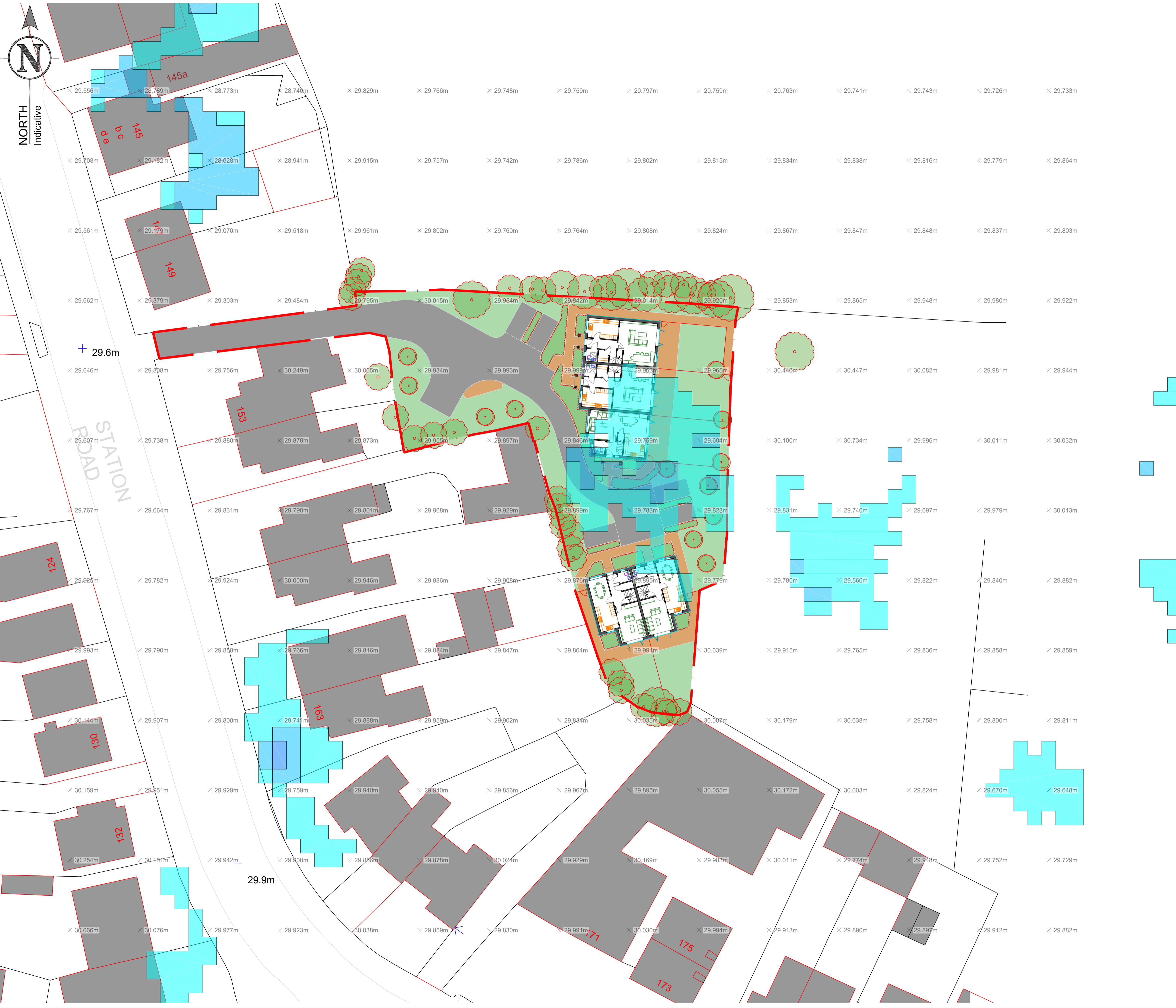
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DEFRA Risk of Flooding from Surface Water (RoFSW) Map for Proposed Development Site - Flood Extent Risk Bands

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09-04-26	A1		



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KEY:

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- High - greater than or equal to 3.3% chance in any given year (1:30).
- Medium - less than 3.3% but greater than or equal to 1% (1:100) chance in any given year.
- Low - less than 1% (1:100) but greater than or equal to 0.1% (1:1000) chance in any given year.
- Very Low - Less than 0.1% (1:1000) chance in any given year.

NOT FOR CONSTRUCTION

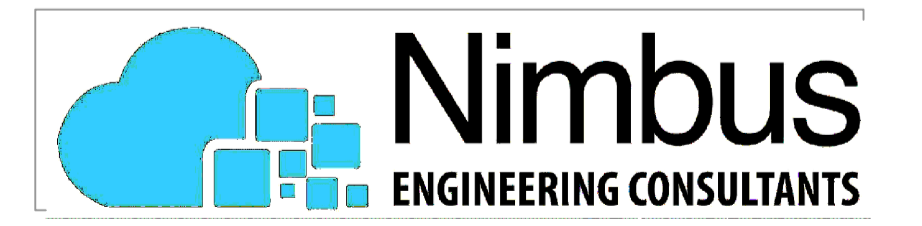
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DEFRA Risk of Flooding from Surface Water (RoFSW) Map for Proposed Development Site - Risk of up to 200mm





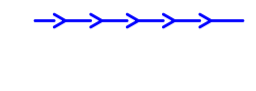
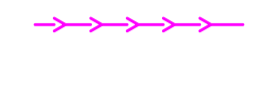

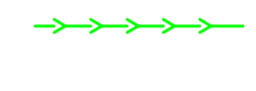
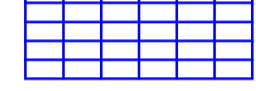
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M.HAM	1:250	C3753-04	A
09-04-26	A1		

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KEY:

-  Proposed Attenuating Permeable Paving
-  Permeable Paving not considered
-  Proposed Site Boundary
-  SW Inspection / Catchpit Chambers
-  Surface Water UPVC Pipes
-  Perforated Surface Water UPVC Pipes
-  Foul Water Pipe
-  Surface Water Pipe
-  Proposed Attenuation Tank



Surface Water Underground Attenuation Tank from Polystorm Deep or similar approved product to with 95% void ratio to provide minimum 64.03m³ of net storage to avoid any flooding for 1:100 storm event +45% Climate Change.
 CL: Approx. 29.993m AOD
 Top of tank: 29.493m AOD
 IL of tank: 29.093m AOD
 Supplier of tank to provide structural and floatation calculations and contractor to follow their recommendations regarding storing, handling and installation.
 Attenuation tank to be wrapped on sides and on bottom with welded impermeable membrane and on top to have geotextile to allow infiltration from the permeable pavement. Buildup on top of attenuation tank to be made from suitable granular material to allow infiltration.

SWC-06
 Proposed Orifice Flow Control Chamber to have a Ø21mm orifice to restrict the flow to a maximum of 1l/s for 1:100 +45% climate change. Flow rate as per previous approved drainage strategy approved by the council.

Proposed connection to Existing Thames Water Surface Water Chamber 2603
 IL: 28.89m AOD
 Location & IL as per TW Asset Plans

Minimum 89.5m² of Proposed Permeable Pavement Type C to have at least 500mm suitable subbase with minimum 30% void ratio shown to be allowed to provide minimum 13.50m³ of net storage to avoid any flooding for 1:100 storm event +45% Climate Change. 100mm pavement buildup was considered.
 CL: Approx. 29.783m AOD
 IL of tank: 29.183m AOD

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PROJECT:
 151 Station Road, West Drayton, UB7 7NG

TITLE:
 Outline SuDS Layout & Location Plan

CLIENT:
 Kearns Development Ltd



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CHECKED BY: S.L	DATE: 09-04-26	APPROVED BY: S.L	DATE: 09-04-26
DRN BY: M.HAM	SCALE: 1:250	DRAWING NUMBER: C3573-05	REV: A
DATE: 09-04-26	SIZE: A1		

APPENDIX B – SURFACE WATER RUNOFF CALCULATIONS



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Job No.	C3753	
Sheet no.	1	
Date	09/04/26	
By	Checked	Reviewed
M.HAM		

MasterDrain
HY 10.01

Project **151 Station Road, West Drayton, UB7 7NG**
 Title **Pre & Post Development SW Runoff Calcs Prior to SuDS**

Data:-

Hydrology (FSR):-

Location = WEST DRAYTON
 Long reference = 506179
 M5-60 (mm) = 20
 r = 0.42
 Hyd. area = 6
 Hydrograph = Winter

WRAP = 2
 Grid reference = TQ0679
 SAAR (mm/yr) = 650
 Soil = 0.30
 Hyd. zone = 8
 Area = England & Wales

Site values used in design:-

Total site area = 0.1893 ha
 Pre-dev area drained = 0.0882 ha
 Imperm runoff factor = 100%
 Climate change factor = 45%
 Post-dev area drained = 0.1052 ha
 Perm runoff factor = 20%

Pre-development

Area to soakaways = 0.0000 ha
 Perv. area to SUDS = 0.0000 ha
 Area to other SUDS = 0.0000 ha
 Pre-dev flow to drain = 0.00 l/s

Post-development

Area to soakaways = 0.0000 ha
 Perv. area to SUDS = 0.0000 ha
 Area to other SUDS = 0.0000 ha
 Post-dev flow to drain = 0.00 l/s

Calculations:-

Revised Post-dev Imperm. area = 0.105 ha
 Equiv. Post-dev Imperm. area = 0.105 ha
 Equiv. Post-dev Perm. area = 0.017 ha
 Total Pre-dev equiv. area ha = 0.108 ha
 Total Post-dev equiv. area ha = 0.122 ha
 100 yr 6 hour mean intensity = 10.22mm/hr

Results:-

Pre-dev peakflow runoff (l/s) (m³/s)

R.P.	15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
1	23.9	15.7	9.6	6.0	3.6	2.7	2.2	1.9	23.9	N/A	23.9	1
30	58.2	37.6	23.2	13.9	8.2	5.9	4.7	4.0	58.2	N/A	58.2	30
100	75.6	49.2	30.5	18.3	10.6	7.7	6.1	5.1	75.6	N/A	75.6	100

Post-dev peakflow runoff (l/s)

R.P.	15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
1	26.9	17.7	10.8	6.7	4.1	3.1	2.5	2.1	26.9	45	39.0	1
30	65.5	42.3	26.1	15.6	9.2	6.7	5.3	4.5	65.5	45	95.0	30
100	85.1	55.4	34.3	20.6	12.0	8.7	6.9	5.8	85.1	45	123.3	100

100 year 6 hour (x Climate Change Factor) storm gives:-

Pre-dev runoff volume m³ = 66.5m³
 Post-dev rainfall volume = 108.5m³
 Post-dev volume m³ (excess above SUDS) = 108.5m³
 100 yr 6 hour mean intensity = 10.22mm/hr
 Pre-dev volume to drain at 0 l/s = 0.0 m³
 Post-dev volume to drain at 0 l/s = 0.0 m³
 Post-dev storage volume = 108.5m³
 Post-dev 5mm imperm volume = 5.3 m³
 Post-dev 5mm perm volume = 4.2 m³

$$Q_{\text{BAR(rural)}} = 0.316 \text{ l/s or } 1.671 \text{ l/s/ha or } 0.000 \text{ cumecs - from IoH 124.}$$

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.



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Project **151 Station Road, West Drayton, UB7 7NG**

Title **Pre & Post Development SW Runoff Calcs Prior to SuDS**

Data summary.

Use the data below for the SUR1 form

Site areas:-

Total site area	=	0.1893 ha	;1893.0 m ²	[3A]
Pre-development impermeable area	=	0.0882 ha		[3B]
Pre-development permeable area	=	0.1011 ha		
Post-development impermeable area	=	0.1052 ha		[3C]
Post-development permeable area	=	0.0841 ha		

Peak runoff:-

Pre-development 1 year storm (15min)	=	23.9 l/s	[6A]
Pre-development 100 year storm (15min)	=	75.6 l/s	[6C]
Post-development 1 year storm (15min)	=	26.9 l/s	[6B]
Post-development 100 year storm (15min)	=	85.06 l/s	[6D]

Greenfield runoff:-

$Q_{BAR(rural)} = 0.316 \text{ l/s}$ or 1.671 l/s/ha or 0.000 cumecs - from IoH 124.

Climate change factor:-

CCF = 45%

Volumes:-

Pre-development 100 yr/6hr storm	[12A]=	96.4m ³
Post-development 100 yr/6hr storm (add. volume with no SUDS)	[12B]=	108.5m ³
Post-development 100 yr/6hr storm (add. volume with SUDS)	=	108.5m ³
Post-development add. predicted volume (No SUDS)	[12C]	= 12.1m ³

You may also require

- Data relating to the infiltration test calculations (if applicable)
- Evidence to show runoff reduction (if applicable)
- Information on calculation methods (if applicable see next sheet)

Note

Numbers in square brackets relate to the
Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1



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By M.HAM	Checked	Reviewed

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Project **151 Station Road, West Drayton, UB7 7NG**

Title **Pre & Post Development SW Runoff Calcs Prior to SuDS**

Definitions and methods

Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

Site values and factors

Areas of the site should be entered in hectares (10000 m²). If the Pre-development site is a green field, this box is blank.

Climate Change Factor is initially set at 20% - this may be changed as required.

Greenfield runoff is calculated using the method described in loH 124.

Runoff factors

The impermeable runoff factor is initially set at 98%

The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development

The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.

All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff.

These are then summated.

This gives a total pre-development equivalent area, and a similar figure for the post-development area.

The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.

The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.

The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as l/s. Figures in red indicate m³/s

The peak value is measured, multiplied by the CCF and the total maximum rate is shown.

The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.

Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS.

Qbar(rural) is calculated in accordance with the procedure laid down in loH 124



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By	Checked	Reviewed
M.HAM		

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Project **151 Station Road, West Drayton, UB7 7NG**

Title **IoH 124 (Qbar(urban))Runoff Calcs**

Hydrological Data:-

FSR Hydrology:-

Location	= WEST DRAYTON	Grid reference	= TQ0679
M5-60 (mm)	= 20	r	= 0.42
Soil runoff	= 0.30	SAAR (mm/yr)	= 650
WRAP	= 2	Area	= England & Wales
Hydrological area	= 6	Hydrological zone	= 8

Soil classification for WRAP type 2

- i) Very permeable soils with shallow ground water;
- ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils; (fragipan - a natural subsurface horizon having a higher bulk density than the solum above. Seemingly cemented when dry but showing moderate to weak brittleness when moist. The layer is low in organic matter, mottled and slowly or very slowly permeable to water. It is found in profiles of either cultivated or virgin soils but not in calcareous material).
- iii) Moderately permeable soils, some with slowly permeable subsoils.

Design data:-

Area = 0.001893 Km² - 0.189 Ha - 1893 m² % Urbanisation = 47.00%

Calculation method:-

Runoff is calculated from:-

$$Q_{BAR(urban)} = Q_{BAR(rural)} (1 + URBAN)^{2NC} [1 + URBAN \{ (21/CIND) - 0.3 \}]$$

where:-

NC varies with the value of SAAR:-

for 500<SAAR<1100 mm then NC = 0.92 - 0.00024SAAR

for 1100<SAAR<3000 mm then NC = 0.74 - 0.000082SAAR

CIND = 102.4SOIL + 0.28(CWI - 125) CWI = Catchment Wetness Index

so

CIND =14.757

CWI =67.989

NC =0.764

For areas less than 50Ha, a modified calculation which multiplies the 50Ha runoff value by the ratio of the site area to 50Ha is used
Reducing factor used for these calculations is 0.004

$$Q_{BAR(rural)} = 0.316 \text{ (1/s)}$$

$$Q_{BAR(urban)} = 0.871 \text{ (1/s)}$$

$Q_{BAR(urban)}$ is then multiplied by a growth factor - GC(T) - for different storm return periods derived from EA publication W5-074/A.



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Project **151 Station Road, West Drayton, UB7 7NG**

Title **IoH 124 (Qbar(urban))Runoff Calcs**

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Calculated data:-

Mean Annual Peak Flow $Q_{BAR(urban)} = 0.87 \text{ l/s}$

Values for $Q_{BAR(urban)}$

Ret. per.	m ³ /hr	l/s	l/s/ha	Ret. per.	m ³ /hr	l/s	l/s/ha
1yr	0.001	0.740	3.910	100yr	0.003	2.743	14.489
2yr	0.001	0.766	4.048	100yr+20%	0.003	3.291	17.387
5yr	0.001	1.115	5.888	100yr+30%	0.004	3.566	18.836
10yr	0.001	1.411	7.452	200yr	0.003	3.222	17.019
30yr	0.002	1.942	10.258	200yr + 30%	0.004	4.188	22.125
50yr	0.002	2.281	12.051	500yr	0.004	3.910	20.653
				1000yr	0.004	4.493	23.735

Growth factors -

1yr	2yr	5yr	10yr	30yr	50yr	100yr	200yr	500yr	1000yr
0.85	0.88	1.28	1.62	2.23	2.62	3.15	3.70	4.49	5.16

The above is based on the Institute of Hydrology Report 124 to which you are referred for further details (see Sect 7). Note that the 200 year growth curve was taken from W5-074/A.

For WRAP type 1 soils, CIND can become negative for lower values of SAAR. In this case the CIND value is multiplied by -1 to return a positive value (CIND is very small at this point).



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Job No.	C3753		
Sheet no.	1		
Date	09/04/26		
By	M.HAM	Checked	Reviewed

Project	151 Station Road, West Drayton, UB7 7NG		
Title	Hydrograph Storage Calcs @ Qbar(Urban) Discharge Rate		

Data:-

Location = WEST DRAYTON Grid reference = TQ0679
M5-60 (mm) = 20 r = 0.42
Soil index = 0.30 SAAR (mm/yr) = 650
Return period = 100 WRAP = 2
UCWI = 0.0 Climate change = 45%

- i) Very permeable soils with shallow ground water;
- ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils; The layer is low in organic matter, mottled and (fragipan - a natural subsurface horizon having a higher bulk density than the solum above. Seemingly cemented when dry but showing moderate to weak brittleness when moist. Slowly or very slowly permeable to water. It is found in profiles of either cultivated or virgin soils but not in calcareous material).
- iii) Moderately permeable soils, some with slowly permeable subsoils.

Pipeline storage = 0.0 m³ Available MH storage = 0.0 m³
Offline storage = 0.0 m³

Percentage runoff = 100.0% (manual setting)

Imperv. area = 1052 m² Pervious area = 0 m²
Total area = 1052 m² Equiv area = 1052 m² (Tot. area x % runoff).
Total runoff = 96.5 m³ Discharge rate = 0.871 l/s
Storage (m³) = 77.1 m³ (Sum of all balance quantities)
Total rainfall depth = 91.7 mm

Calculations :-

Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)	Cumulative (m3)
0.070	20.0	2.6	0.193	0.219	0.000	0.000
0.140	20.0	2.6	0.193	0.219	0.000	0.000
0.210	21.0	2.8	0.203	0.219	0.000	0.000
0.280	21.0	2.8	0.203	0.219	0.000	0.000
0.350	22.0	2.9	0.212	0.219	0.000	0.000
0.420	23.0	3.0	0.222	0.219	0.002	0.002
0.490	24.0	3.1	0.232	0.219	0.012	0.015
0.560	26.0	3.4	0.251	0.219	0.031	0.046
0.630	27.0	3.5	0.261	0.219	0.041	0.087
0.700	29.0	3.8	0.280	0.219	0.060	0.147
0.770	31.0	4.1	0.299	0.219	0.080	0.227
0.840	32.0	4.2	0.309	0.219	0.089	0.316
0.910	33.0	4.3	0.318	0.219	0.099	0.415
0.980	34.0	4.5	0.328	0.219	0.109	0.524
1.050	36.0	4.7	0.347	0.219	0.128	0.652
1.120	38.0	5.0	0.367	0.219	0.147	0.799
1.190	39.0	5.1	0.376	0.219	0.157	0.955
1.260	40.0	5.2	0.386	0.219	0.166	1.122
1.330	42.0	5.5	0.405	0.219	0.186	1.308
1.400	45.0	5.9	0.434	0.219	0.215	1.522
1.470	49.0	6.4	0.473	0.219	0.253	1.776
1.540	53.0	6.9	0.511	0.219	0.292	2.068
1.610	57.0	7.5	0.550	0.219	0.330	2.398
1.680	62.0	8.1	0.598	0.219	0.379	2.777
1.750	66.0	8.6	0.637	0.219	0.417	3.194
1.820	71.0	9.3	0.685	0.219	0.466	3.660
1.890	77.0	10.1	0.743	0.219	0.523	4.183
1.960	84.0	11.0	0.811	0.219	0.591	4.774
2.030	91.0	11.9	0.878	0.219	0.659	5.433
2.100	98.0	12.8	0.946	0.219	0.726	6.159
2.170	105.0	13.8	1.013	0.219	0.794	6.953
2.240	114.0	14.9	1.100	0.219	0.880	7.833
2.310	125.0	16.4	1.206	0.219	0.987	8.820



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Job No.	C3753		
Sheet no.	2		
Date	09/04/26		
By	M.HAM	Checked	Reviewed

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Project **151 Station Road, West Drayton, UB7 7NG**

Title **Hydrograph Storage Calcs @ Qbar(Urban) Discharge Rate**

Calculations (cont.) :-

Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)	Cumulative (m3)
2.870	204.0	26.7	1.968	0.219	1.749	20.090
2.940	212.0	27.8	2.046	0.219	1.826	21.916
3.010	219.0	28.7	2.113	0.219	1.894	23.809
3.080	226.0	29.6	2.181	0.219	1.961	25.771
3.150	233.0	30.5	2.248	0.219	2.029	27.799
3.220	239.0	31.3	2.306	0.219	2.087	29.886
3.290	244.0	32.0	2.354	0.219	2.135	32.021
3.360	248.0	32.5	2.393	0.219	2.173	34.194
3.430	249.0	32.6	2.403	0.219	2.183	36.377
3.500	250.0	32.8	2.412	0.219	2.193	38.570
3.570	250.0	32.8	2.412	0.219	2.193	40.763
3.640	249.0	32.6	2.403	0.219	2.183	42.946
3.710	248.0	32.5	2.393	0.219	2.173	45.119
3.780	244.0	32.0	2.354	0.219	2.135	47.254
3.850	239.0	31.3	2.306	0.219	2.087	49.341
3.920	233.0	30.5	2.248	0.219	2.029	51.369
3.990	226.0	29.6	2.181	0.219	1.961	53.330
4.060	219.0	28.7	2.113	0.219	1.894	55.224
4.130	212.0	27.8	2.046	0.219	1.826	57.050
4.200	204.0	26.7	1.968	0.219	1.749	58.799
4.270	194.0	25.4	1.872	0.219	1.652	60.451
4.340	183.0	24.0	1.766	0.219	1.546	61.998
4.410	173.0	22.7	1.669	0.219	1.450	63.447
4.480	164.0	21.5	1.582	0.219	1.363	64.810
4.550	154.0	20.2	1.486	0.219	1.266	66.077
4.620	143.0	18.7	1.380	0.219	1.160	67.237
4.690	135.0	17.7	1.303	0.219	1.083	68.320
4.760	125.0	16.4	1.206	0.219	0.987	69.307
4.830	114.0	14.9	1.100	0.219	0.880	70.187
4.900	105.0	13.8	1.013	0.219	0.794	70.981
4.970	98.0	12.8	0.946	0.219	0.726	71.707
5.040	91.0	11.9	0.878	0.219	0.659	72.366
5.110	84.0	11.0	0.811	0.219	0.591	72.957
5.180	77.0	10.1	0.743	0.219	0.523	73.480
5.250	71.0	9.3	0.685	0.219	0.466	73.946
5.320	66.0	8.6	0.637	0.219	0.417	74.363
5.390	62.0	8.1	0.598	0.219	0.379	74.742
5.460	57.0	7.5	0.550	0.219	0.330	75.072
5.530	53.0	6.9	0.511	0.219	0.292	75.364
5.600	49.0	6.4	0.473	0.219	0.253	75.617
5.670	45.0	5.9	0.434	0.219	0.215	75.832
5.740	42.0	5.5	0.405	0.219	0.186	76.018
5.810	40.0	5.2	0.386	0.219	0.166	76.184
5.880	39.0	5.1	0.376	0.219	0.157	76.341
5.950	38.0	5.0	0.367	0.219	0.147	76.488
6.020	36.0	4.7	0.347	0.219	0.128	76.616
6.090	34.0	4.5	0.328	0.219	0.109	76.725
6.160	33.0	4.3	0.318	0.219	0.099	76.824
6.230	32.0	4.2	0.309	0.219	0.089	76.913
6.300	31.0	4.1	0.299	0.219	0.080	76.993
6.370	29.0	3.8	0.280	0.219	0.060	77.053
6.440	27.0	3.5	0.261	0.219	0.041	77.094
6.510	26.0	3.4	0.251	0.219	0.031	77.125
6.580	24.0	3.1	0.232	0.219	0.012	77.137
6.650	23.0	3.0	0.222	0.219	0.002	77.140
6.720	22.0	2.9	0.212	0.219	0.000	77.133
6.790	21.0	2.8	0.203	0.219	0.000	77.116
6.860	21.0	2.8	0.203	0.219	0.000	77.099
6.930	20.0	2.6	0.193	0.219	0.000	77.072
7.000	20.0	2.6	0.193	0.219	0.000	77.046

Storage volume (m³) = 77.1 m³ (Sum of all balance quantities)



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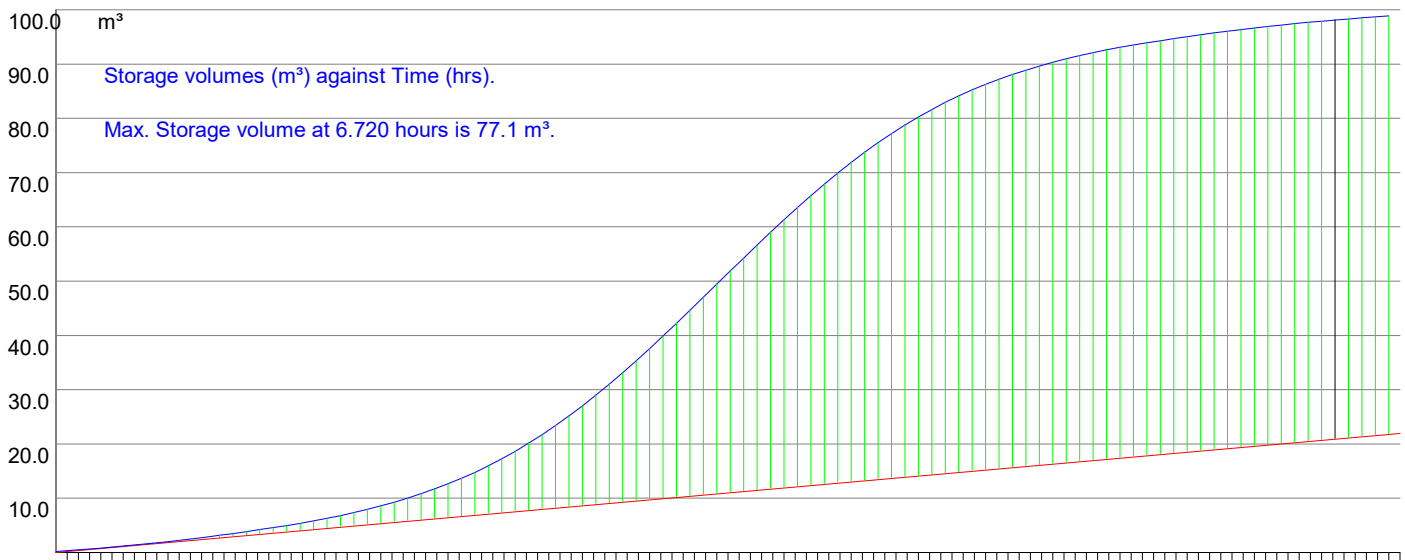
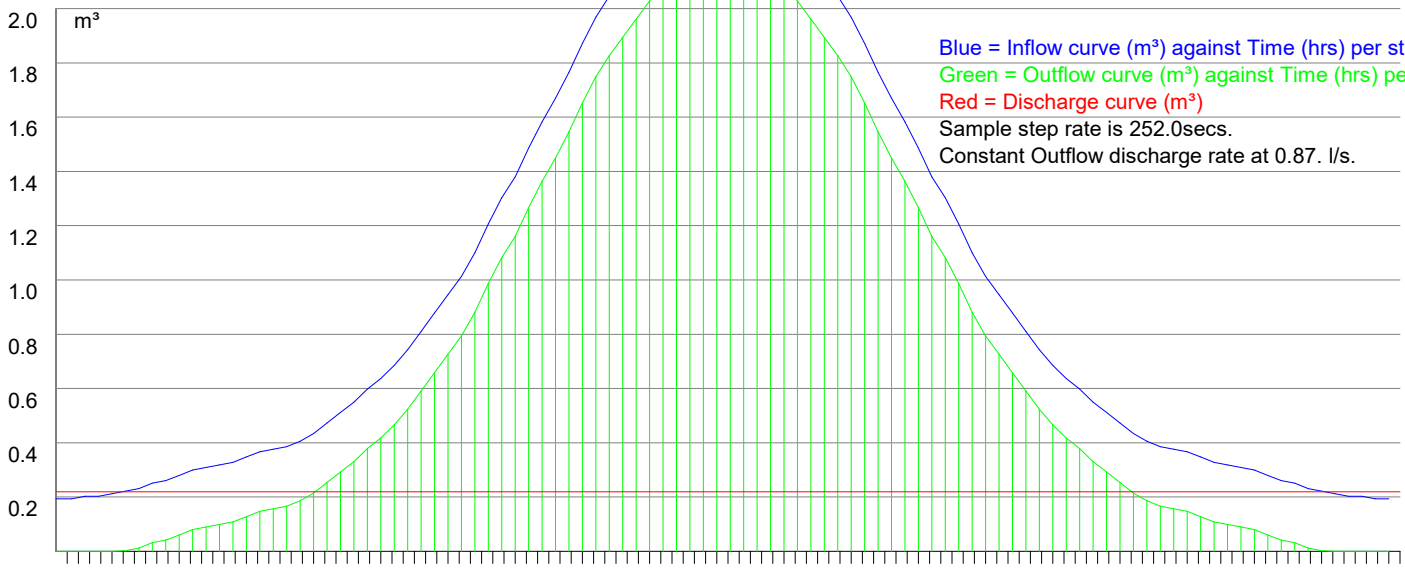
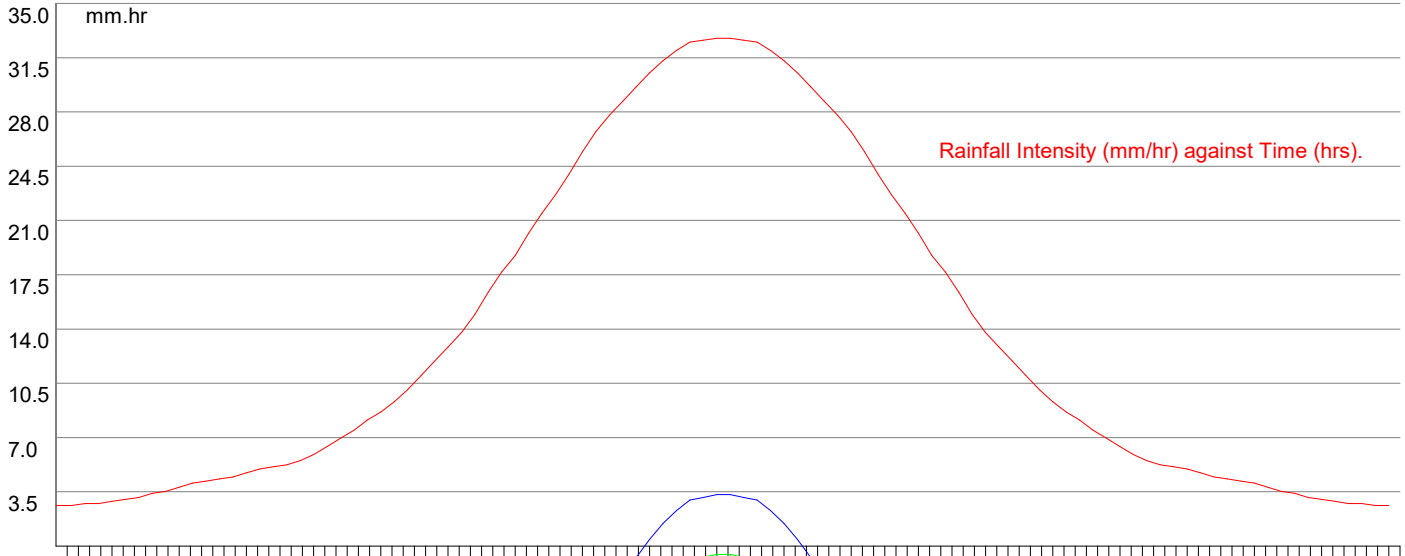
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Job No. C3753		
Sheet no.		3
Date 09/04/26		
By	Checked	Reviewed
M.HAM		

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Project **151 Station Road, West Drayton, UB7 7NG**

Title **Hydrograph Storage Calcs @ Qbar(Urban) Discharge Rate**





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Job No. C3753		
Sheet no. 4		
Date 09/04/26		
By M.HAM	Checked	Reviewed

Project **151 Station Road, West Drayton, UB7 7NG**

Title **Hydrograph Storage Calcs @ Qbar(Urban) Discharge Rate**

Maximum storage volumes for varying duration storms.

Storm length (hrs)	Max. Vol (m ³)	Max. Vol time	Mean intens (mm/hr)	Step time. (mins)	Peak found
0.25	38.45	0.25	145.55	0.2	
0.5	49.53	0.50	94.77	0.3	
1	60.20	1.00	58.74	0.6	
2	69.61	2.00	35.18	1.2	
3	73.85	3.00	25.74	1.8	
4	75.88	4.00	20.50	2.4	
5	76.67	5.00	17.13	3.0	
6	77.07	6.00	14.82	3.6	
7	77.14	7.00	13.10	4.2	Peak found
8	77.01	---	11.77	4.8	
9	76.69	---	10.71	5.4	
10	76.24	---	9.84	6.0	
12	75.11	---	8.50	7.2	
15	73.17	---	7.10	9.0	
18	71.05	---	6.13	10.8	
20	69.50	---	5.62	12.0	
24	66.24	---	4.85	14.4	
30	61.18	---	4.05	18.0	
36	56.05	---	3.49	21.6	
42	50.96	---	3.07	25.2	
48	46.03	---	2.76	28.8	
54	41.25	---	2.50	32.4	
60	36.57	---	2.30	36.0	
66	32.06	---	2.12	39.6	
72	27.81	---	1.98	43.2	
84	19.92	---	1.74	50.4	
96	13.06	---	1.56	57.6	
120	2.74	---	1.30	72.0	
150	0.00	---	1.08	90.0	
175	0.00	---	0.95	105.0	
200	0.00	---	0.85	120.0	
250	0.00	---	0.71	150.0	
300	0.00	---	0.61	180.0	
375	0.00	---	0.50	225.0	
500	0.00	---	0.40	300.0	
750	0.00	---	0.28	450.0	
1000	0.00	---	0.22	600.0	
1250	0.00	---	0.19	750.0	
1500	0.00	---	0.16	900.0	
1570	0.00	---	0.15	942.0	
2000	0.00	---	0.13	1200.0	
2500	0.00	---	0.11	1500.0	
3000	0.00	---	0.09	1800.0	
3500	0.00	---	0.08	2100.0	
4000	0.00	---	0.07	2400.0	



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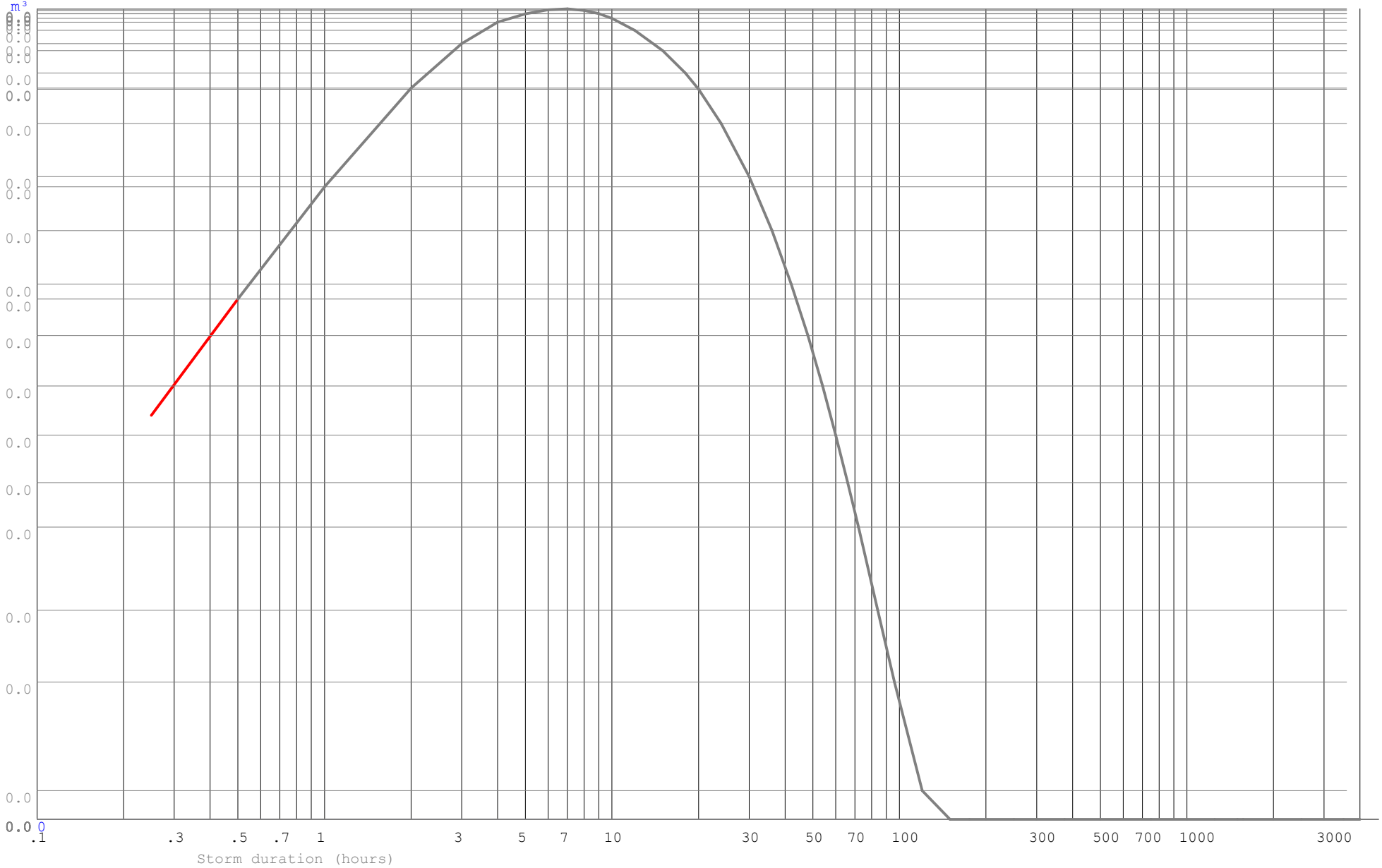
Job No. C3753		
Sheet no. 5		
Date 09/04/26		
By M.HAM	Checked	Reviewed

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Project **151 Station Road, West Drayton, UB7 7NG**

Title **Hydrograph Storage Calcs @ Qbar(Urban) Discharge Rate**

Sequential storage volume at specific storm durations.





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			Sheet no. 6
			Date 09/04/26
Project 151 Station Road, West Drayton, UB7 7NG	M.HAM		Checked
Title Hydrograph Storage Calcs @ Qbar(Urban) Discharge Rate			Reviewed

Explanatory notes for Peak Flow Storage

- 1) This system uses the rainfall intensity/ duration curve calculated using either the Wallingford or FEH method as selected.
- 2) The balance is calculated from the inflow minus the outflow.
- 3) The storage volume is the maximum value of the balance curve.
- 4) This method was described by Davis (1963) - see Butler & Davies, 2nd edition, p294
- 5) References to 'storm duration' relate only to the hydrograph method (qv).
- 6) There are always 600 steps in the calculation process, thus a 'run' time of 10 hours will be sampled every minute,

Explanatory notes for Hydrograph Storage

- 1) The user has the choice of Summer or Winter curves
- 2) The mean intensity varies with the duration of the storm curve
- 3) There are always 120 steps in the calculation process, irrespective of storm duration.
- 4) The balance is calculated from the inflow minus the outflow.
- 5) The storage volume is the sum of the balance values for each step.
- 6) Varying durations should be tried to find the maximum storage value - this can be narrowed down very closely.

*Modelling using the flow characteristics of the restrictor is available using Vortex Control modelling function. Please be aware that this function needs the full design data file to function.

Why do the two methods give different results?

The rainfall characteristics for each method are very different.

The Peak flow (using the Intensity/Duration/Frequency curve) does not model the actual rainfall. This curve is joined points which represent the mean intensity of a storm at a given duration i.e. a value of 19.5 mm/hr for a 60 minute storm indicates that over the sixty minute period, the mean intensity was 19.5 mm/hr. The calculation method samples the IDF curve for a given location and frequency (Return Period) and calculates the storage for that rate and duration less the outflow volume. The maximum value is displayed as the 'worst case' storage.

The hydrograph method uses a standard curve for either Winter or Summer storms. Traditionally these are symmetrical about the central peak. UK rainfall does not fit into this convenient curve, so the calculations are dealing with a stylised set of data. The mean intensity for the storm is calculated from the IDF curve and applied to the curve data, calculating the storage for that step less the outflow volume. The final storage volume is the sum of the storage for all the steps.

It can be seen that these two methods are very different, and the user may have the choice of which result to use. This is not an exact science, though is often treated as such by those that do not understand the principles of the calculations.

151 Station Road, West Drayton, UB7 7NG
Nimbus Engineering Consultants Ltd
Flood Risk Assessment and SuDS Report
April 2026

APPENDIX C – LOCAL WATER AUTHORITY ASSET PLANS



Nimbus Engineering Consultants Limited
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Search address supplied 151
Station Road
West Drayton
UB7 7NG

Your reference C3753

Our reference ALS/ALS Standard/2026_5313101

Search date 9 April 2026

Keeping you up-to-date

Notification of price changes

We're changing our report prices from 4th June 2025. The price will increase by 3.5% based on Retail Price Index (RPI).

Find our new prices on our website thameswater.co.uk/property-searches

Any Questions? We're happy to talk through the changes with you – give our Property Searches team a call on 0800 009 4540 .



Thames Water Utilities Ltd
Property Searches,
Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

Search address supplied: 151, Station Road, West Drayton, UB7 7NG

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position and size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the contact details below:

Thames Water Utilities Ltd
Property Searches
Clearwater Court
Vastern Road
Reading
RG1 8DB

Email: property.searches@thameswater.co.uk

Web: thameswater.co.uk/propertysearches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority. Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners. The public sewer map relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus. The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

Affinity Water Ltd
Tamblin Way

Asset Location Search



Property Searches

Hatfield
AL10 9EZ
Tel: 0845 7823333

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.



Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. You can do this by emailing customer.feedback@thameswater.co.uk with the email subject header 'Enquiry – TWOSA', along with details of the request.

If you have any questions regarding sewer connections, budget estimates, diversions or building over issues please direct them to our service desk which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

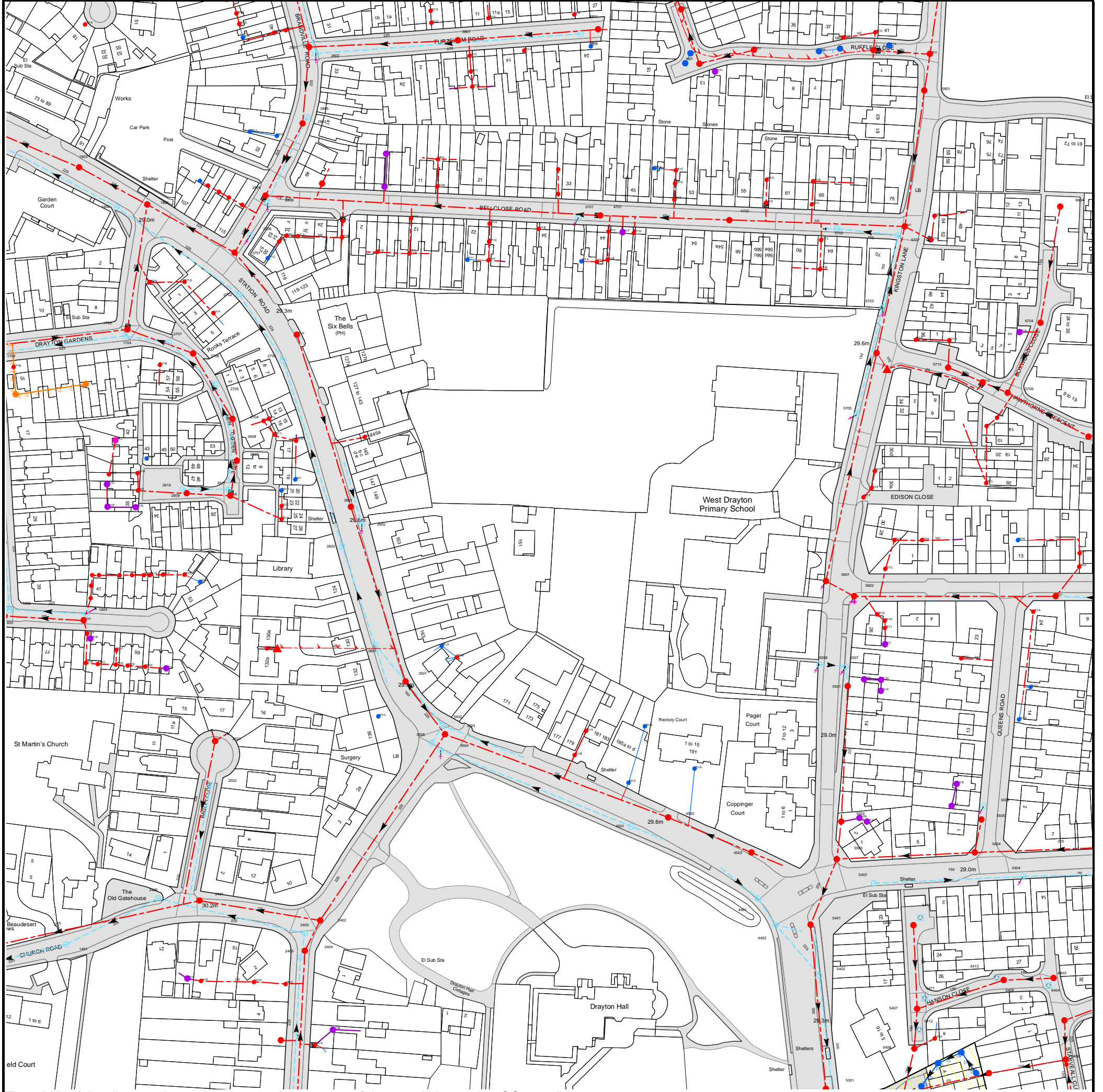
Clean Water queries

Should you require any advice concerning clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2026 5313101



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 506384,179647

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 (2024) with the Sanction of the controller of H.M. Stationery Office, License no. AC000849556 Crown Copyright Reserved.

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
581E	n/a	n/a
581H	29	28.29
6406	29.53	26.63
5406	29.61	27.75
5408	29.65	26.54
5407	29.69	26.71
5412	n/a	n/a
5410	n/a	n/a
5411	n/a	n/a
541A	n/a	n/a
n/a	4.15	2.802
5413	n/a	n/a
5409	29.68	27.12
5404	29.18	28.1
6404	n/a	n/a
6403	29.74	27.35
6408	29.79	26.71
561B	n/a	n/a
571F	n/a	n/a
561A	n/a	n/a
5710	n/a	n/a
571G	n/a	n/a
571E	n/a	n/a
561L	n/a	n/a
571H	n/a	n/a
571I	n/a	n/a
5709	n/a	n/a
561K	n/a	n/a
661L	n/a	n/a
6605	n/a	n/a
581A	n/a	n/a
5707	n/a	n/a
5701	30.01	27.22
5801	30.6	27.27
5803	30.82	27.27
571D	n/a	n/a
581F	n/a	n/a
571A	n/a	n/a
6704	n/a	n/a
6804	n/a	n/a
5504	29.02	26.2
5505	28.38	26.25
5508	n/a	n/a
551F	n/a	n/a
551E	n/a	n/a
551D	n/a	n/a
651C	n/a	n/a
551C	n/a	n/a
561I	n/a	n/a
561J	n/a	n/a
561H	n/a	n/a
661A	n/a	n/a
6601	28.2	26.84
561C	n/a	n/a
6602	n/a	n/a
n/a	4.15	2.802
n/a	4.15	2.802
5420	28.8	26.46
n/a	4.15	2.802
471A	n/a	n/a
4701	28.82	26.67
471B	n/a	n/a
471C	n/a	n/a
471F	n/a	n/a
471D	n/a	n/a
481A	n/a	n/a
481B	n/a	n/a
481G	n/a	n/a
481C	n/a	n/a
4806	n/a	n/a
4805	n/a	n/a
4803	28.47	26.5
481H	n/a	n/a
4702	n/a	n/a
4802	28.54	26.68
481E	n/a	n/a
481D	n/a	n/a
581C	n/a	n/a
581B	n/a	n/a
5805	n/a	n/a
571B	n/a	n/a
571C	n/a	n/a
5702	29.37	27.57
5804	n/a	n/a
581D	n/a	n/a
5802	29.13	27.58
5301	29.18	25.6
371A	n/a	n/a
371F	n/a	n/a
371I	n/a	n/a
371D	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
371G	n/a	n/a
371B	n/a	n/a
371H	n/a	n/a
371C	n/a	n/a
3701	28.75	27.25
3804	n/a	n/a
381E	n/a	n/a
381M	n/a	n/a
3803	n/a	n/a
381L	n/a	n/a
381D	n/a	n/a
381B	n/a	n/a
381J	n/a	n/a
381C	n/a	n/a
381A	n/a	n/a
481F	n/a	n/a
3801	28.97	27.9
2407	n/a	n/a
241C	n/a	n/a
2405	30.39	28.15
2403	30.74	28
241A	n/a	n/a
2402	30.77	25.79
241B	n/a	n/a
3506	29.98	28.68
3504	30.01	28.28
3503	29.91	26.09
351B	n/a	n/a
351A	n/a	n/a
451C	n/a	n/a
4501	29.72	28.44
451B	n/a	n/a
4502	29.46	27.03
451A	n/a	n/a
4503	29.68	27.41
4401	29.18	28.26
4402	29.21	28.16
5401	29.8	25.81
5402	29.58	28.23
5503	29.18	25.9
5502	n/a	n/a
551B	n/a	n/a
551A	n/a	n/a
5403	29.12	28.17
2608	n/a	n/a
2607	n/a	n/a
2702	29.28	27.73
261C	n/a	n/a
261D	n/a	n/a
261A	n/a	n/a
2703	29.4	27.83
2603	30.74	29.21
2602	29.65	28.89
3601	29.88	28.36
351C	n/a	n/a
3501	29.85	26.47
361A	n/a	n/a
3502	29.77	28.27
351D	n/a	n/a
5506	29.24	27.26
5601	29.41	27.54
5507	28.24	26.36
5501	28.36	26.24
5602	28.81	26.37
5705	29.77	27.79
561F	n/a	n/a
551I	n/a	n/a
561E	n/a	n/a
561D	n/a	n/a
5714	29.81	27.25
561G	n/a	n/a
551G	n/a	n/a
551H	n/a	n/a
5703	29.84	27.65
181A	n/a	n/a
381H	n/a	n/a
381G	n/a	n/a
381F	n/a	n/a
381K	n/a	n/a
381I	n/a	n/a
3802	n/a	n/a
4801	n/a	n/a
4804	28.62	26.32
281F	n/a	n/a
281B	n/a	n/a
281C	n/a	n/a
281G	n/a	n/a
281H	n/a	n/a
281E	n/a	n/a
271C	n/a	n/a
2701	29.33	25.47
371E	n/a	n/a
271D	n/a	n/a
















Manhole Reference	Manhole Cover Level	Manhole Invert Level
271K	n/a	n/a
271E	n/a	n/a
271I	n/a	n/a
2708	29.16	27.93
271J	n/a	n/a
2812	n/a	n/a
2806	29.76	26.79
2811	n/a	n/a
2804	n/a	n/a
2807	n/a	n/a
281K	n/a	n/a
281J	n/a	n/a
2803	28.89	26.79
2805	n/a	n/a
2802	29.01	27.51
2801	29.03	27.71
161O	n/a	n/a
161K	n/a	n/a
161J	n/a	n/a
1704	29.4	27.75
161H	n/a	n/a
161E	n/a	n/a
271B	n/a	n/a
2707	n/a	n/a
2706	n/a	n/a
2705	n/a	n/a
2704	n/a	n/a
271M	n/a	n/a
271L	n/a	n/a
261J	n/a	n/a
261I	n/a	n/a
261K	n/a	n/a
271N	n/a	n/a
261B	n/a	n/a
1606	n/a	n/a
1607	n/a	n/a
161P	n/a	n/a
2613	n/a	n/a
2612	n/a	n/a
161N	n/a	n/a
161I	n/a	n/a
161Q	n/a	n/a
261G	n/a	n/a
261F	n/a	n/a
2610	n/a	n/a
261E	n/a	n/a
2609	n/a	n/a
261H	n/a	n/a
2611	n/a	n/a
2606	n/a	n/a
2601	29.54	27.08
241D	n/a	n/a
241F	n/a	n/a
241E	n/a	n/a
2404	32.51	27.82
2401	30.34	25.23
2406	30.41	26.96
2502	29.9	29
2501	30	27.87
251A	n/a	n/a
151D	n/a	n/a
151E	n/a	n/a
151A	n/a	n/a
151C	n/a	n/a
151F	n/a	n/a
251C	30.08	29.37
161R	n/a	n/a
161A	n/a	n/a
1401	n/a	n/a
151B	n/a	n/a
1605	28.59	26.44
1603	28.03	25.26
1604	28.61	26.45
1602	28.1	25.32
1609	n/a	n/a
1608	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
171B	n/a	n/a
1803	29.13	25.12
1804	29.14	27.5
1703	30.46	25.62
1805	29.18	25.26
271H	n/a	n/a
271G	n/a	n/a
2808	n/a	n/a
2809	n/a	n/a
271F	n/a	n/a
2810	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
<p>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.</p>		









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

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.

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
 -  Conduit Bridge
 -  Subway
 -  Tunnel
- Ducts may contain high voltage cables. Please check with Thames Water.

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.