APPENDIX H

P24-3285 Sevenoaks, 101A High St, Hampton
Brownfield Run-off Calculations - Impermeable Area Only

M5-60 : 20 mm
r : 0.45

Wallingford Method - maps

For different durations,

From Table 1

Duration, D	Z1			
15 min	0.65	**M5-15:**	Z1 x M5-60	13.00 mm
30 min	0.82	**M5-30:**	Z1 x M5-60	16.40 mm
60 min	1	**M5-60:**	Z1 x M5-60	20.00 mm
6hr	1.51	**M5-360:**	Z1 x M5-60	30.20 mm

For different return intervals,

From Table 2*

		Z2	
Duration, D	M1	M30	M100
15 min	0.62	1.52	1.96
30 min	0.62	1.53	2.00
60 min	0.64	1.54	2.03
6 hr	0.68	1.51	1.97

Average point intensity, API = I/(D/60)

	D (min)	Calculation	I (mm)	API (mm/hr)
M 1-15	15	M5-15*Z2(M1)	8.06	32.24
M 1-30	30	M5-30*Z2(M1)	10.17	20.34
M 1-60	30	M5-360*Z2(M1)	12.80	25.60
M1-360	360	M5-360*Z2(M1)	20.54	3.42
M 30-15	15	M5-15*Z2(M30)	19.76	79.04
M 30-30	30	M5-30*Z2(M30)	25.09	50.18
M 30-60	60	M5-60*Z2(M30)	30.80	30.80
M30-360	360	M5-360*Z2(M30)	45.60	7.60
M 100-15	15	M5-15*Z2(M100)	25.48	101.92
M 100-30	30	M5-30*Z2(M100)	32.80	65.60
M100-60	60	M5-60*Z2(M100)	40.60	40.60
M100-360	360	M5-360*Z2(M100)	59.49	9.92

Peak Runoff

Q=2.78CiA Rational Method, SUDS Manual Section 4.3.3

where:
(1) C = Cv Cr
(2) i = API, defined above
(3) A = areas measured for subcatchments

Cv = 1
Cr = 1.3 **
therefore , C = 1.3 constant value for design purposes

Q=2.78CiA 2.78*C= **3.614**

Table 1

Rainfall Duration D

Minutes					Hours					
r	5	10	15	30	1	2	4	6	10	24
0.12	0.22	0.34	0.45	0.67	1.00	1.48	2.17	2.75	3.70	6.00
0.15	0.25	0.38	0.48	0.69	1.00	1.42	2.02	2.46	3.32	4.90
0.18	0.27	0.41	0.51	0.71	1.00	1.36	1.86	2.25	2.86	4.30
0.21	0.29	0.43	0.54	0.73	1.00	1.33	1.77	2.12	2.62	3.60
0.24	0.31	0.46	0.56	0.75	1.00	1.30	1.71	2.00	2.40	3.35
0.27	0.33	0.48	0.58	0.76	1.00	1.27	1.64	1.88	2.24	3.10
0.30	0.34	0.49	0.59	0.77	1.00	1.25	1.57	1.78	2.12	2.84
0.33	0.35	0.50	0.61	0.78	1.00	1.23	1.53	1.73	2.04	2.60
0.36	0.36	0.51	0.62	0.79	1.00	1.22	1.48	1.67	1.90	2.42
0.39	0.37	0.52	0.63	0.80	1.00	1.21	1.46	1.62	1.82	2.28
0.42	0.38	0.53	0.64	0.81	1.00	1.20	1.42	1.57	1.74	2.16
0.45	0.39	0.54	0.65	0.82	1.00	1.19	1.38	1.51	1.68	2.03

Table 2 - England and Wales

Growth Factor Z2

M5 rainfall	M1	M2	M3	M4	M5	M10	M20	M50	M100	M30 interpolated
5.00	0.62	0.79	0.89	0.97	1.02	1.19	1.36	1.56	1.79	1.25
10.00	0.61	0.79	0.90	0.97	1.03	1.22	1.41	1.65	1.91	1.49
15.00	0.62	0.80	0.90	0.97	1.03	1.24	1.44	1.70	1.99	1.53
20.00	0.64	0.81	0.90	0.97	1.03	1.24	1.45	1.73	2.03	1.54
25.00	0.66	0.82	0.91	0.97	1.03	1.24	1.44	1.72	2.01	1.53
30.00	0.68	0.83	0.91	0.97	1.03	1.22	1.42	1.70	1.97	1.51
40.00	0.70	0.84	0.92	0.97	1.02	1.19	1.38	1.64	1.89	1.47
50.00	0.72	0.85	0.93	0.98	1.02	1.17	1.34	1.58	1.81	1.42
75.00	0.76	0.87	0.93	0.98	1.02	1.14	1.28	1.47	1.64	1.34
100.00	0.78	0.88	0.94	0.98	1.02	1.13	1.25	1.40	1.54	1.30
150.00	0.78	0.88	0.94	0.98	1.01	1.12	1.21	1.33	1.45	1.25
200.00	0.78	0.88	0.94	0.98	1.01	1.11	1.19	1.30	1.40	1.23

		Contributing Impermeable Area (ha)	
	i	Site	Per hectare
	mm/hr	0.02	1
M 1-15	32.24	2.33	116.52
M 1-30	20.34	1.47	73.49
M 1-60	25.60	1.85	73.49
M1-360	3.42	0.25	12.37
M 30-15	79.04	**5.71**	285.65
M 30-30	50.18	3.63	181.36

		Contributing Impermeable Area (ha)	
	i	Site	Per hectare
	mm/hr	0.02	1
M 30-60	30.80	2.23	181.36
M30-360	7.60	0.55	27.47
M 100-15	101.92	**7.37**	368.34
M 100-30	65.60	4.74	237.08
M 100-60	40.60	2.93	237.08
M100-360	9.92	0.72	35.84

* The rainfall depths from cells E8-E11 are compared with the depths given in cells J29-J40 and Z2 interpolated accordingly for each return period

** Cv varies between 0.6 (rapidly draining soils) and 0.9 (heavy clay) with an average of 0.75 taken if ground conditions not known.

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Tracey Tooke
Site name:	Sevenoaks
Site location:	101A High St, Hampton

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:	51.41753° N
Longitude:	0.35942° W
Reference:	1917748043
Date:	Aug 29 2024 15:38

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 0.27

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Calculate from dominant HOST
HOST class:	7
BFI / BFIHOST:	0.682
Q_{MED} (l/s):	0.26
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	598	598
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):	0.29	0.29
1 in 1 year (l/s):	0.25	0.25
1 in 30 years (l/s):	0.68	0.68
1 in 100 year (l/s):	0.94	0.94
1 in 200 years (l/s):	1.1	1.1

hr wallingford

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Tracey Tooke
Site name:	
Site location:	

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:	51.41753° N
Longitude:	0.35941° W
Reference:	1170465672
Date:	Aug 29 2024 15:45

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):	0.1

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Calculate from dominant HOST
HOST class:	7
BFI / BFIHOST:	0.682
Q_{MED} (l/s):	0.1
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	598	598
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):	0.11	0.11
1 in 1 year (l/s):	0.09	0.09
1 in 30 years (l/s):	0.25	0.25
1 in 100 year (l/s):	0.35	0.35
1 in 200 years (l/s):	0.41	0.41

APPENDIX I

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
MH1	0.030	5.00	12.640	1200	1.340
MH2			12.640	1200	1.514
TANK 1	0.030	5.00	12.640	1200	1.414

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	1.000	13.5	100	Circular	12.640	11.300	1.240	12.640	11.226	1.314
1.001	1.000	10.0	100	Circular	12.640	11.226	1.314	12.640	11.126	1.414

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	MH1	1200	Manhole	Adoptable	TANK 1	1200	Manhole	Adoptable
1.001	TANK 1	1200	Manhole	Adoptable	MH2	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m^3/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0
100	40	0	0

Node MH2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	11.126	Product Number	CTL-SHE-0045-1000-1143-1000
Design Depth (m)	1.143	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node TANK 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	11.226
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.97	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	48.2	0.0	0.914	48.2	0.0	0.915	1.1	0.0	1.414	1.1	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	103.926	29.407
2 year 15 minute winter	72.930	29.407
2 year 30 minute summer	66.192	18.730
2 year 30 minute winter	46.451	18.730
2 year 60 minute summer	43.005	11.365
2 year 60 minute winter	28.572	11.365
2 year 120 minute summer	32.476	8.583
2 year 120 minute winter	21.576	8.583
2 year 180 minute summer	26.683	6.866
2 year 180 minute winter	17.345	6.866
2 year 240 minute summer	21.706	5.736
2 year 240 minute winter	14.421	5.736
2 year 360 minute summer	16.818	4.328
2 year 360 minute winter	10.932	4.328
2 year 480 minute summer	13.198	3.488
2 year 480 minute winter	8.769	3.488
2 year 600 minute summer	10.724	2.933
2 year 600 minute winter	7.328	2.933
2 year 720 minute summer	9.473	2.539
2 year 720 minute winter	6.367	2.539
2 year 960 minute summer	7.649	2.014
2 year 960 minute winter	5.067	2.014
2 year 1440 minute summer	5.402	1.448
2 year 1440 minute winter	3.631	1.448
2 year 2160 minute summer	3.787	1.047
2 year 2160 minute winter	2.609	1.047
2 year 2880 minute summer	3.126	0.838
2 year 2880 minute winter	2.101	0.838
2 year 4320 minute summer	2.389	0.625
2 year 4320 minute winter	1.573	0.625
2 year 5760 minute summer	2.012	0.515
2 year 5760 minute winter	1.302	0.515
2 year 7200 minute summer	1.761	0.449
2 year 7200 minute winter	1.136	0.449
2 year 8640 minute summer	1.588	0.405
2 year 8640 minute winter	1.025	0.405
2 year 10080 minute summer	1.464	0.373
2 year 10080 minute winter	0.945	0.373
30 year +35% CC 15 minute summer	411.357	116.400
30 year +35% CC 15 minute winter	288.672	116.400
30 year +35% CC 30 minute summer	264.453	74.831
30 year +35% CC 30 minute winter	185.581	74.831
30 year +35% CC 60 minute summer	174.350	46.076

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 60 minute winter	115.834	46.076
30 year +35% CC 120 minute summer	111.590	29.490
30 year +35% CC 120 minute winter	74.138	29.490
30 year +35% CC 180 minute summer	86.147	22.169
30 year +35% CC 180 minute winter	55.998	22.169
30 year +35% CC 240 minute summer	67.693	17.889
30 year +35% CC 240 minute winter	44.974	17.889
30 year +35% CC 360 minute summer	50.454	12.983
30 year +35% CC 360 minute winter	32.796	12.983
30 year +35% CC 480 minute summer	38.735	10.237
30 year +35% CC 480 minute winter	25.735	10.237
30 year +35% CC 600 minute summer	30.998	8.479
30 year +35% CC 600 minute winter	21.180	8.479
30 year +35% CC 720 minute summer	27.065	7.254
30 year +35% CC 720 minute winter	18.190	7.254
30 year +35% CC 960 minute summer	21.475	5.655
30 year +35% CC 960 minute winter	14.225	5.655
30 year +35% CC 1440 minute summer	14.783	3.962
30 year +35% CC 1440 minute winter	9.935	3.962
30 year +35% CC 2160 minute summer	10.081	2.786
30 year +35% CC 2160 minute winter	6.946	2.786
30 year +35% CC 2880 minute summer	8.142	2.182
30 year +35% CC 2880 minute winter	5.472	2.182
30 year +35% CC 4320 minute summer	5.993	1.567
30 year +35% CC 4320 minute winter	3.947	1.567
30 year +35% CC 5760 minute summer	4.895	1.253
30 year +35% CC 5760 minute winter	3.169	1.253
30 year +35% CC 7200 minute summer	4.172	1.064
30 year +35% CC 7200 minute winter	2.693	1.064
30 year +35% CC 8640 minute summer	3.675	0.937
30 year +35% CC 8640 minute winter	2.372	0.937
30 year +35% CC 10080 minute summer	3.318	0.846
30 year +35% CC 10080 minute winter	2.141	0.846
100 year +40% CC 15 minute summer	549.859	155.591
100 year +40% CC 15 minute winter	385.866	155.591
100 year +40% CC 30 minute summer	356.117	100.769
100 year +40% CC 30 minute winter	249.907	100.769
100 year +40% CC 60 minute summer	235.754	62.303
100 year +40% CC 60 minute winter	156.629	62.303
100 year +40% CC 120 minute summer	148.810	39.326
100 year +40% CC 120 minute winter	98.866	39.326
100 year +40% CC 180 minute summer	114.526	29.471
100 year +40% CC 180 minute winter	74.445	29.471
100 year +40% CC 240 minute summer	90.019	23.789
100 year +40% CC 240 minute winter	59.806	23.789
100 year +40% CC 360 minute summer	67.352	17.332
100 year +40% CC 360 minute winter	43.781	17.332
100 year +40% CC 480 minute summer	51.835	13.699
100 year +40% CC 480 minute winter	34.438	13.699
100 year +40% CC 600 minute summer	41.524	11.358
100 year +40% CC 600 minute winter	28.372	11.358
100 year +40% CC 720 minute summer	36.263	9.719

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 720 minute winter	24.371	9.719
100 year +40% CC 960 minute summer	28.736	7.567
100 year +40% CC 960 minute winter	19.035	7.567
100 year +40% CC 1440 minute summer	19.695	5.278
100 year +40% CC 1440 minute winter	13.236	5.278
100 year +40% CC 2160 minute summer	13.287	3.672
100 year +40% CC 2160 minute winter	9.155	3.672
100 year +40% CC 2880 minute summer	10.616	2.845
100 year +40% CC 2880 minute winter	7.134	2.845
100 year +40% CC 4320 minute summer	7.660	2.003
100 year +40% CC 4320 minute winter	5.044	2.003
100 year +40% CC 5760 minute summer	6.150	1.574
100 year +40% CC 5760 minute winter	3.980	1.574
100 year +40% CC 7200 minute summer	5.169	1.319
100 year +40% CC 7200 minute winter	3.336	1.319
100 year +40% CC 8640 minute summer	4.500	1.148
100 year +40% CC 8640 minute winter	2.905	1.148
100 year +40% CC 10080 minute summer	4.023	1.026
100 year +40% CC 10080 minute winter	2.597	1.026

Results for 2 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
240 minute summer	MH1	164	11.361	0.061	1.9	0.0688	0.0000	OK
240 minute summer	MH2	168	11.359	0.233	3.2	0.2638	0.0000	OK
240 minute summer	TANK 1	168	11.360	0.134	4.4	6.3959	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	MH1	1.000	TANK 1	3.3	0.983	0.198	0.0064	
240 minute summer	MH2	Hydro-Brake®		0.8				14.0
240 minute summer	TANK 1	1.001	MH2	3.2	0.504	0.163	0.0078	

Results for 30 year +35% 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
240 minute winter	MH1	236	11.883	0.583	3.7	0.6599	0.0000	SURCHARGED
240 minute winter	MH2	236	11.883	0.757	2.5	0.8560	0.0000	OK
240 minute winter	TANK 1	236	11.883	0.657	7.2	31.4760	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	MH1	1.000	TANK 1	3.5	1.156	0.214	0.0078	
240 minute winter	MH2	Hydro-Brake®		0.8				21.4
240 minute winter	TANK 1	1.001	MH2	2.5	0.599	0.131	0.0078	

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
240 minute winter	MH1	236	12.172	0.872	5.0	0.9861	0.0000	SURCHARGED
240 minute winter	MH2	236	12.171	1.045	1.6	1.1820	0.0000	OK
240 minute winter	TANK 1	236	12.172	0.946	9.8	43.8595	0.0000	SURCHARGED

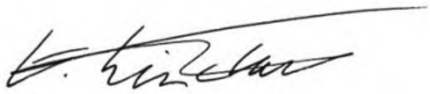
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	MH1	1.000	TANK 1	4.8	1.190	0.289	0.0078	
240 minute winter	MH2	Hydro-Brake®		1.0				23.9
240 minute winter	TANK 1	1.001	MH2	1.6	0.577	0.081	0.0078	

APPENDIX J

LBR BIA Assessment Verification Form

Site Details	Applicant Information
Site Name	Sevenoaks
Planning Application Reference (If applicable)	N/A
Address and Postcode	Sevenoaks, 101 A High Street, Hampton, TW12 2SX
Brief description of the proposed works	Demolition of current dwelling and construction of replacement dwelling with basement
Geology type	Kempton Park Gravels and London Clay Formation
Presence of aquifer?	Yes – Kempton Park Gravels
Total Site Area	0.27 ha
Is the site currently know to be at risk of flooding from any sources?	Long Term Flood Risk Maps show surface water flooding at the site.

Professional Details	Application Information
Name	Graham Sinclair
Profession/Areas of Expertise	Flood Risk and Drainage Engineer
Chartered Institution and Membership Level	Charted Water and Environment Manager (C.WEM) with the Chartered Institute of Water and Environmental Management (CIWEM)
Brief description of the assessment involved	Replacement dwelling with basement
Brief Summary of the assessment results	Site is at risk of surface water flooding in isolated areas, but the location of the replacement house is outside the area of surface water risk. Perched groundwater is present in the Kempton Park Gravels Member. London Clay commences at 5 m bgl. The true groundwater position will below the London Clay which is goes past 10 m bgl. The basement will interact with the perched groundwater, and the basement need to be suitable tanked to prevent groundwater ingress or seepage. The SuDS network proposed reduces flow rates from the site, and therefore increase capacity with the sewer network. Attenuation is required on the Site to achieve this via below ground crated storage with a controlled discharge rate to the adopted surface water sewer. Other options to discharge surface water was investigated but was not achievable, as outlined in this report.

Signature	
Professional Details	**Application Information**
Name	Colin Buchanan
Profession/Areas of Expertise	Geotechnical Engineering
Chartered Institution and Membership Level	Geologist, Fellow of Geological Society
Brief description of the assessment involved	Replacement dwelling with basement
Brief Summary of the assessment results	The ground movement assessment concluded proximal properties would be subject to negligible damage from the proposed basement construction. With a low flow rate across the Site, the high permeability of the Kempton Park gravel and the relatively low obstruction presented by the basement within the groundwater table, the proposed basement will not increase throughflow or groundwater risk by means of flow diversion to the proximal properties. It is recommended the method of basement construction takes into account the groundwater at the Site, with some form of temporary works employed to restrict groundwater flow into the basement excavation. Without the temporary, an expensive groundwater pumping regime will be required to facilitate basement construction.
Signature	

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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

Drainage strategies for developments in the London Borough of Richmond upon Thames need to comply with the following policies on SuDS:

1. London Borough of Richmond upon Thames Local Plan policy LP21
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:
  - Richmond upon Thames Sustainable Drainage guidance
  - 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

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1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	Sevenoaks Maidenhead & Sunbury Management Catchment outline planning
Address & post code	Sevenoaks, 101A High Street , Hampton, TW12 2SX
OS Grid ref. (Easting, Northing)	E 514164 N 170010
LPA reference (if applicable)	
Brief description of proposed work	Replacement single occupancy dwelling
Total site Area	2700 m^2
Total existing impervious area	193.7 m^2
Total proposed impervious area	600 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No but small areas of surface water flood risk on site
Existing drainage connection type and location	Assumend foul connection to tw sewer in High Street
Designer Name	Tracey Tooke
Designer Position	Senior Consultant Water & Flood Risk
Designer Company	Create Consulting Engineers Ltd

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Kempton Park Gravel Member	
Bedrock geology classification	London Clay	
Site infiltration rate	unknown	m/s
Depth to groundwater level	2.0 (perched)	m below ground level
Is infiltration feasible?	no concentrated features due to high perched groundwater	

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	Thames Water surface sewer in High Street
Has the owner/regulator of the discharge location been consulted?	no

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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	0.11			
1 in 1	0.09	unknown	1.0	1.0
1 in 30	0.25		1.0	1.0
1 in 100	0.35		1.0	1.0
1 in 100 + CC			1.0	1.0
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	207.5 0	207.5 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	51.5 0	51.5 0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	600 0		43.86 0
Total	0	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	Appendix B - perched groundwater between 2 - 4 m bgl, infiltration unfesable except for shallow features draining themselves such as pathways etc.
Drainage hierarchy (2b)	To surface sewer section 10 of report
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	See drainage drawing and section 10 of the report
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 10 of the report and Appendix D
Proposed SuDS measures & specifications (3b)	Section 10 of the report and Appendix D

4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Appended Plans
Detailed drainage design drawings, including exceedance flow routes	Drainage drawing appended
Detailed landscaping plans	
Maintenance strategy	Section 10 of the report
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	section 10 and Appendix D
b) biodiversity?	Section 10
c) amenity?	Section 10