APPENDIX H

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



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	l (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

therefore,

Peak Runoff

Q=2.78CiA Rational Method, SUDS Manual Section 4.3.3

(3) A = areas measured for subcatchments

where:

(1) C = Cv Cr (2) i = API, defined above



Cv = 1 Cr = 1.3 C = 1.3

2.78*C= **3.614**

**

constant value for design purposes

		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	

Rainfall Duration D							
Minutes					Hours		
r	5	10	15	30	1	2	4
0.12	0.22	0.34	0.45	0.67	1.00	1.48	2.17
0.15	0.25	0.38	0.48	0.69	1.00	1.42	2.02
0.18	0.27	0.41	0.51	0.71	1.00	1.36	1.86
0.21	0.29	0.43	0.54	0.73	1.00	1.33	1.77
0.24	0.31	0.46	0.56	0.75	1.00	1.30	1.71
0.27	0.33	0.48	0.58	0.76	1.00	1.27	1.64
0.30	0.34	0.49	0.59	0.77	1.00	1.25	1.57
0.33	0.35	0.50	0.61	0.78	1.00	1.23	1.53
0.36	0.36	0.51	0.62	0.79	1.00	1.22	1.48
0.39	0.37	0.52	0.63	0.80	1.00	1.21	1.46
0.42	0.38	0.53	0.64	0.81	1.00	1.20	1.42
0.45	0.39	0.54	0.65	0.82	1.00	1.19	1.38

Table 2 - England and Wales

Table 1

Growth Factor Z2									
	M5 rainfall	M1	M2	M3	M4	M5	M10	M20	
	5.00	0.62	0.79	0.89	0.97	1.02	1.19	1.36	
	10.00	0.61	0.79	0.90	0.97	1.03	1.22	1.41	
	15.00	0.62	0.80	0.90	0.97	1.03	1.24	1.44	
	20.00	0.64	0.81	0.90	0.97	1.03	1.24	1.45	
	25.00	0.66	0.82	0.91	0.97	1.03	1.24	1.44	
	30.00	0.68	0.83	0.91	0.97	1.03	1.22	1.42	
	40.00	0.70	0.84	0.92	0.97	1.02	1.19	1.38	
	50.00	0.72	0.85	0.93	0.98	1.02	1.17	1.34	
	75.00	0.76	0.87	0.93	0.98	1.02	1.14	1.28	
	100.00	0.78	0.88	0.94	0.98	1.02	1.13	1.25	
	150.00	0.78	0.88	0.94	0.98	1.01	1.12	1.21	
	200.00	0.78	0.88	0.94	0.98	1.01	1.11	1.19	

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



6	10	24
2.75	3.70	6.00
2.46	3.32	4.90
2.25	2.86	4.30
2.12	2.62	3.60
2.00	2.40	3.35
1.88	2.24	3.10
1.78	2.12	2.84
1.73	2.04	2.60
1.67	1.90	2.42
1.62	1.82	2.28
1.57	1.74	2.16
1.51	1.68	2.03

M50	M100	M30 interpolated
1.56	1.79	1.25
1.65	1.91	1.49
1.70	1.99	1.53
1.73	2.03	1.54
1.72	2.01	1.53
1.70	1.97	1.51
1.64	1.89	1.47
1.58	1.81	1.42
1.47	1.64	1.34
1.40	1.54	1.30
1.33	1.45	1.25
1.30	1.40	1.23



Tracey Tooke

Calculated by:

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Aug 29 2024 15:38

Site Details

Site name:	Sevenoaks	Latitude:	51.41753° N
Site location:	101A High St, Hampton	Longitude:	0.35942° W
This is an estimatio	on of the greenfield runoff rates that	are used to meet normal best practice p oforonoo	1917748043

leterence: 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

Date: for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

FEH Statistical

Site characteristics

0.27 Total site area (ha):

Notes

Methodology	
Q_{MFD} estimation method:	Calculate from BFI and SAAR

Salealate nom bir and shan
Calculate from dominant HOST
7
0.682
0.26
1.14

Hydrological characteristics

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

(1) Is Q_{BAB} < 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 \leq 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

Q _{BAR} (I/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	

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

hrwallingford

Tracey Tooke

Calculated by:

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Site Details

Site name:		Latitude:	51.41753° N
Site location:		Longitude:	0.35941° W
criteria in line with E	invironment Agency guidance "Rainfa	0	1170465672
	30219 (2013) , the SuDS Manual C753 ((Defra, 2015). This information on gre	Ciria, 2015) and the non-statutory enfield runoff rates may be the basis Date :	Aug 29 2024 15:45

Date: for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

FEH Statistical

Site characteristics

0.1 Total site area (ha):

Notes

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

rates are set at 2.0 l/s/ha.

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} (I/s):	0.1
Q _{BAR} / Q _{MED} factor.	1.14

Hydrological characteristics

	Doradit	Earroa
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

Default

(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.

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge

(3) Is SPR/SPRHOST \leq 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

Edited

Q _{BAR} (I/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	

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APPENDIX I

	Sevenc	oaks, 10	1A High St		File	e: Attenu	ation Tan	k 1 in :	100 yr	40% Pag	e 1		
ata	Hampt	on			Ne	twork: St	orm Net	work					
eate	Attenu	ation Cr	ates			acey Took							
	1 in 10	0 year +	40% CC		06	/09/2024	•						
						Design	Settings						
			Rain	fall Meth	odology	FEH-22		N	∕linimu	m Velocity	(m/s) 1	1.00	
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	Maxii		me of Con			30.00	Enfo	rce be	est prac	tice design	rules	/	
		I	Maximum	Rainfall	(mm/nr)	50.0							
						<u>N</u>	odes						
				Name	Area (ha)	T of E (mins)	Cover Level	Diam (m	neter m)	Depth (m)			
				MH1	0.030	5.00	(m) 12.640		1200	1.340			
				MH2	0.050	5.00	12.640		1200	1.540			
						5.00							
				TANK 1	0.030	5.00	12.640		1200	1.414			
						<u>Pipeline</u>	<u>Schedul</u>	<u>e</u>					
	Link	Lengt	-	Dia	Link	US CL		US	Depth		DS IL	DS Dep	
		(m)		(mm)	Туре	(m)	(m)	_	(m)	(m)	(m)	(m)	
	1.000	1.00		100	Circular				1.240		11.226		814
	1.001	1.00	0 10.0	100	Circular	12.640) 11.22	6	1.314	12.640	11.126	1.4	14
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			Node	(mm)	Туре	Тур	e N	ode	(mm)	Туре	Ту	ре	
		1.000	MH1	1200	Manhole			NK 1	1200				
		1.001	TANK 1	1200	Manhole	Adopt	able M	H2	1200	Manhol	e Adop	table	
						<u>Simulati</u>	<u>on Settin</u>	<u>gs</u>					
	Rainfall	Method	lology Fl	EH-22		Analysi	s Speed	Norn	nal	Additiona	l Storage	e (m³⁄ha)	0.0
		Summ		000		Skip Stead		х			Discharge		х
		Wint	ter CV 1.	000	Drain D	own Time	e (mins)	240		Check E	ischarge	Volume	х
						Storm I	Duration	5					
		15					960	2160				10080	
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				<u>1</u>	Node MH2	2 Online I	Hydro-Br	ake® C	Control				

Flap Valve	х	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	\checkmark	Sump Available	\checkmark
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 (I/s)	1.0	Min Node Diameter (mm)	1200

Network Network Tacey Tools Jacob Volume Base Inf Coefficient (m/hr) 0.00000 Safety Factor 1.0 Tacey Tools Depth Area Inf Area Inf Area (m) (m) (m) (m) (m) (m) 0.000 48.2 0.0 Depth Area Inf Area Inf Area Inf Area (m) (m		Seven	oaks,	101A High S	St		File: Attenua	tion Tank :	1 in 100 v	/r 40%	Page 2			
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30 year +35% CC 60 minute summer 174.350 46.076					30 year +3	5% CC	60 minute su	Immer	1/4.350	46.0	1/6			
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	Sevenoaks, 101A High St	File: Attenuation Tank 1 in 100 yr 40%	Page 3
araata	Hampton	Network: Storm Network	
create	Hampton Attenuation Crates	Tracey Tooke	
	1 in 100 year + 40% CC	06/09/2024	

ainfall

<u>Rainfall</u>			
Event	Peak	Average	
	Intensity	Intensity	
	(mm/hr)	(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 21.475	7.254	
30 year +35% CC 960 minute summer 30 year +35% CC 960 minute winter	21.475 14.225	5.655 5.655	
30 year +35% CC 1440 minute summer	14.223	3.962	
30 year +35% CC 1440 minute summer	9.935	3.962	
30 year +35% CC 2160 minute summer	10.081	2.786	
30 year +35% CC 2160 minute summer	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 11.358	
100 year +40% CC 600 minute summer 100 year +40% CC 600 minute winter	41.524 28.372	11.358 11.358	
100 year +40% CC 800 minute winter 100 year +40% CC 720 minute summer	36.263	9.719	
	50.205	5.715	

	Sevenoaks, 101A High St	File: Attenuation Tank 1 in 100 yr 40%	Page 4
create	Hampton	Network: Storm Network	
	Hampton Attenuation Crates	Tracey Tooke	
	1 in 100 year + 40% CC	06/09/2024	

<u>Rainfall</u>

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

	Sevenoaks, 101A High St	File: Attenuation Tank 1 in 100 yr 40%	Page 5
create	Hampton	Network: Storm Network	
create	Attenuation Crates	Tracey Tooke	
	1 in 100 year + 40% CC	06/09/2024	

<u>Re</u>	esults for	2 year C	ritical S	Storm Dur	ation. L	owest	mass ba	lance	: 100.00	<u>%</u>	
Node Event			Peak nins)	Level (m)	Depth (m)	Inflov (I/s)	v No Vol (Flood (m³)	Stat	us
240 minute sum	mer Ml	11	164	11.361	0.061	1.	9 0.0	688	0.0000	OK	
240 minute sum	mer MI	12	168	11.359	0.233	3.	2 0.2	638	0.0000	ОК	
240 minute sum	mer TA	NK 1	168	11.360	0.134	4.	4 6.3	959	0.0000	SURCHA	RGED
Link Event (Upstream Depth) 240 minute summer	US Node MH1	Li 1.000	nk	DS Node TANK 1	Outfl (I/s	-	'elocity (m/s) 0.983		v/Cap 0.198	Link Vol (m³) 0.0064	Discharge Vol (m ³)
240 minute summer	MH2	Hvdro-	Brake®			0.8	0.905		0.198	0.0004	14.0
240 minute summer	TANK 1	1.001	2.0.00	MH2		3.2	0.504		0.163	0.0078	1 110

	Sevenoaks, 101A High St	File: Attenuation Tank 1 in 100 yr 40%	Page 6
create	Hampton	Network: Storm Network	
create	Attenuation Crates	Tracey Tooke	
	1 in 100 year + 40% CC	06/09/2024	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event		US lode	Peak (mins)	Level (m)	Depth (m)	Inflow (I/s)	Node Vol (m³	Flood) (m³)	Stat	us
240 minute win	ter M	H1	236	11.883	0.583	3.7	0.659	0.0000	SURCH/	ARGED
240 minute win	ter M	H2	236	11.883	0.757	2.5	0.856	0.0000	ОК	
240 minute win	ter TA	NK 1	236	11.883	0.657	7.2	31.476	0.0000	SURCH/	ARGED
Link Event (Upstream Depth)	US Node		Link	DS Node	Outflo (I/s)	-	ocity F n/s)	low/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	MH1	1.00	00	TANK 1	L 3	3. 5 :	1.156	0.214	0.0078	

0.8

21.4

240 minute winter	TANK 1	1.001	MH2	2.5	0.599	0.131	0.0078

Hydro-Brake®

240 minute winter MH2

	Sevenoaks, 101A High St	File: Attenuation Tank 1 in 100 yr 40%	Page 7
create	Hampton	Network: Storm Network	
credie	Attenuation Crates	Tracey Tooke	
	1 in 100 year + 40% CC	06/09/2024	

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 (I/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	ОК
240 minute winter	TANK 1	236	12.172	0.946	9.8	43.8595	0.0000	SURCHARGED

Link Event	US	Link	DS	Outflow	Velocity	Flow/Cap	Link	Discharge
(Upstream Depth)	Node		Node	(I/s)	(m/s)		Vol (m³)	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	Long Term Flood Risk Maps show surface water
from any sources?	flooding at the site.

Professional Details	Application Information
Name	Graham Sinclair
Profession/Areas of Expertise	Flood Risk and Drainage Engineer
Chartered Institution and	Charted Water and Environment Manager (C.WEM) with the
Membership Level	Chartered Institute of Water and Environmental Management
	(CIWEM)
Brief description of the assessment	Replacement dwelling with basement
involved	
Brief Summary of the assessment	Site is at risk of surface water flooding in isolated areas, but the
results	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	6. hindur
Professional Details	Application Information
Name	Colin Buchanan
Profession/Areas of Expertise	Geotechnical Engineering
Chartered Institution and	Geologist, Fellow of Geological Society
Membership Level	
Brief description of the assessment	Replacement dwelling with basement
involved	
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	ashed





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 <u>New London Plan policy SI13</u>
- 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:
- o Richmond upon Thames Sustainable Drainage guidance
- o The London Plan Sustainable Design and Construction SPG
- o DEFRA non-statutory technical standards for sustainable drainage
- o Environment Agency climate change guidance
- o CIRIA C753 The SuDS Manual



GREATER LONDON AUTHORITY



	Sevenoaks
Project / Site Name (including sub- catchment / stage / phase where	Maidenhead & Sunbury Management Catchment
appropriate)	outline planning
Address & post code	Sevenoaks, 101A High Street , Hampton, TW12 2SX
OC Cuid act (Easting Neuthing)	E 514164
US Grid ref. (Easting, Northing)	N170010
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
	catchment / stage / phase where appropriate) Address & post code OS Grid ref. (Easting, Northing) LPA reference (if applicable) Brief description of proposed work Total site Area Total site Area Total existing impervious area Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)? Existing drainage connection type and location Designer Name Designer Position

	2a. Infiltration Feasibility				
2. Proposed Discharge Arrangements	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		у	у	
	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		у	у	
	5 discharge rainwater direct to a watercourse		n	n	
	6 discharge rainwater to a surface water sewer/drain		У	у	
	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			



GREATER LONDON AUTHORITY



Greenfield (GF) runoff rate (I/s) discharge rate (I/s) storage for GF rate (m³) di Qbar 0.11 0.09 unknown 1.0 1.0 1 in 1 0.09 unknown 1.0 1.0 1.1 1 in 30 0.25 1.0 1.1 1 in 100 0.35 1.0 1.1 1 in 100 + CC 1.0 1.0 1.0 Climate change allowance used 40% 40%	Proposed discharge rate (I/s) 1.0 1.0 1.0 1.0			
1 in 1 0.09 unknown 1.0 1. 1 in 30 0.25 1.0 1. 1 in 100 0.35 1.0 1. 1 in 100 + CC 1.0 1. 1.0 Climate change allowance used 40% 40%	1.0 1.0			
1 in 30 0.25 1.0 1. 1 in 100 0.35 1.0 1. 1 in 100 + CC 1.0 1. 1.0 Climate change allowance used 40% 40%	1.0 1.0			
1 in 100 0.35 1.0 1. 1 in 100 + CC 1.0 1. Climate change allowance used 40%	1.0			
1 in 100 + CC 1.0 1. Climate change allowance used 40%	-			
Climate change allowance used 40%	1.0			
3b. Principal Method of Flow				
Control hydrobrake	hydrobrake			
3c. Proposed SuDS Measures				
	Storage			
	vol. (m ³)			
m Rainwater harvesting 0	0			
Infiltration systems 0 Green roofs 207.5 0 207.5 0	0			
	0			
Blue roofs 0 0	0			
Filter strips 0 0	0			
Filter drains 0 0	0			
Bioretention / tree pits 0 0 Description servicements 54.5 0 51.5	0			
Pervious pavements51.5051.50Swales00	0			
Basins/ponds 0 0	0			
	0			
Attenuation tanks 600 0 4	43.86 ⁰			

	4a. Discharge & Drainage Strategy	Page/section of drainage report
4. Supporting Information	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
	measures improve: a) water quality of the runoff? b) biodiversity?	Section 10