Taylor Tuxford Associates
10 Flash Lane, Bramley
Rotherham, S66 1TY
T: 01709 730780 E:info@taylortuxford.co.uk

Project				Job Ref.	
High Croft Bungalow, Hoyland				17-2393	
Section				Sheet no./rev.	
Soakaway design				1	
Calc. by	Date	Chk'd by	Date	App'd by	Date
MT	11/12/2017	RT	11/12/2017		

SOAKAWAY DESIGN (BRE DIGEST 365/SUDS)

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.03

Design rainfall intensity

Location of catchment area	Sheffield
Impermeable area drained to the system	A = **75.0** m^2
Return period	Period = **10** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.360**
5-year return period rainfall of 60 minutes duration	M5_60min = **18.9** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **0** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1200** mm
Width of pit	w = **1000** mm
Length of pit	l = **2500** mm
Percentage free volume	V_{free} = **30** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **300** mm
Width of trial pit	b_{trial} = **300** mm
Depth of trial pit (below invert)	d_{trial} = **300** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	$d_{75} = (d_{trial} \times 0.75)$ = **225.00** mm
50% depth of pit	$d_{50} = (d_{trial} \times 0.50)$ = **150.00** mm
25% depth of pit	$d_{25} = (d_{trial} \times 0.25)$ = **75.00** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **11** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **11** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **12** min
Longest time to fall from 75% depth to 25% depth	t_{lg} = max(T1, T2, T3) = **12** min
Storage volume from 75% to 25% depth	$V_{p75_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial}$ = **0.01** m^3
Internal surface area to 50% depth	$a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50})$ = **0.27** m^2
Surface area of soakaway to 50% storage depth	$A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2$ = **0.180** m^2
Soil infiltration rate	$f = V_{p75_25} / (a_{p50} \times t_{lg})$ = **69.4×10^{-6}** m/s
Wetted area of pit 50% full	$a_{s50} = l \times d + w \times d$ = **4200000** mm^2

Table equations

Inflow (cl.3.3.1)	$I = M10 \times A$
Outflow (cl.3.3.2)	$O = a_{s50} \times f \times D$
Storage (cl.3.3.3)	$S = I - O$

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Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	10 year rainfall, M10 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.36	6.8	1.20	8.2	0.61	0.09	0.53
10	0.51	9.6	1.22	11.7	0.88	0.18	0.71
15	0.62	11.7	1.23	14.4	1.08	0.26	0.82
30	0.79	14.9	1.24	18.5	1.39	0.53	0.86
60	1.00	18.9	1.24	23.4	1.76	1.05	0.71
120	1.22	23.1	1.24	28.6	2.14	2.10	0.04
240	1.48	28.0	1.23	34.4	2.58	4.20	0.00
360	1.67	31.6	1.22	38.4	2.88	6.30	0.00
600	1.90	35.9	1.20	43.2	3.24	10.50	0.00
1440	2.42	45.7	1.18	53.9	4.04	25.20	0.00

Required storage volume S_{req} = **0.86** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **0.90** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 24min 35s

PASS - Soakaway discharge time less than or equal to 24 hours