

	Project Land Adjacent to Red Cottage				Job no. 536	
	Calcs for Soakaway				Start page no./Revision 1	
	Calcs by BH	Calcs date 18/01/2018	Checked by	Checked date	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with CIRIA C697 SUDS

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area Brighton
Impermeable area drained to the system $A = 250.0 \text{ m}^2$
Return period Period = **100 yr**
Ratio 60 min to 2 day rainfall of 5 yr return period $r = 0.350$
5-year return period rainfall of 60 minutes duration $M5_{60\text{min}} = 19.0 \text{ mm}$
Increase of rainfall intensity due to global warming $p_{\text{climate}} = 30 \%$

Soakaway / infiltration trench details

Soakaway type Rectangular
Width of pit $w = 1000 \text{ mm}$
Length of pit $l = 5000 \text{ mm}$
Percentage free volume $V_{\text{free}} = 95 \%$

Soil infiltration rate (BRE digest 365)

Length of trial pit $l_{\text{trial}} = 3000 \text{ mm}$
Width of trial pit $b_{\text{trial}} = 450 \text{ mm}$
Depth of trial pit (below invert) $d_{\text{trial}} = 1500 \text{ mm}$
Free volume (if fill used) $V_{\text{trial}} = 100 \%$
75% depth of pit $d_{75} = (d_{\text{trial}} \times 0.75) = 1125.00 \text{ mm}$
50% depth of pit $d_{50} = (d_{\text{trial}} \times 0.50) = 750.00 \text{ mm}$
25% depth of pit $d_{25} = (d_{\text{trial}} \times 0.25) = 375.00 \text{ mm}$
Test 1 - time to fall from 75% depth to 25% depth $T1 = 10 \text{ min}$
Test 2 - time to fall from 75% depth to 25% depth $T2 = 12 \text{ min}$
Test 3 - time to fall from 75% depth to 25% depth $T3 = 13 \text{ min}$
Longest time to fall from 75% depth to 25% depth $t_{\text{lg}} = \max(T1, T2, T3) = 13 \text{ min}$
Storage volume from 75% to 25% depth $V_{p75_{25}} = (l_{\text{trial}} \times b_{\text{trial}} \times (d_{75} - d_{25})) \times V_{\text{trial}} = 1.01 \text{ m}^3$
Internal surface area to 50% depth $a_{p50} = ((l_{\text{trial}} \times b_{\text{trial}}) + (l_{\text{trial}} + b_{\text{trial}}) \times 2 \times d_{50}) = 6.53 \text{ m}^2$
Surface area of soakaway to 50% storage depth $A_{s50} = 2 \times (l_{\text{trial}} + b_{\text{trial}}) \times d_{\text{trial}} / 2 = 5.175 \text{ m}^2$
Soil infiltration rate $f = V_{p75_{25}} / (a_{p50} \times t_{\text{lg}}) = 199. \times 10^{-6} \text{ m/s}$
Base area $A_b = w \times l = 5000000 \text{ mm}^2$
Perimeter $P = 2 \times (w + l) = 12000 \text{ mm}$
Coefficient b $b = P \times f / (A_b \times V_{\text{free}}) = 1.81 \text{ hr}^{-1}$

Table equations

Rainfall intensity $i = M100 / D$
Coefficient a $a = A_b / P - (A \times i / (P \times f))$
Minimum depth required $H = a \times (e^{(-bD)} - 1)$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
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Project Land Adjacent to Red Cottage				Job no. 536	
Calcs for Soakaway				Start page no./Revision 2	
Calcs by BH	Calcs date 18/01/2018	Checked by	Checked date	Approved by	Approved date

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5	0.36	8.8	1.88	16.6	198.90	-5369	751
10	0.51	12.5	1.95	24.4	146.44	-3843	1000
15	0.62	15.2	1.99	30.3	121.36	-3114	1133
30	0.79	19.4	2.03	39.4	78.71	-1873	1115
60	1.00	24.7	2.01	49.7	49.68	-1028	860
120	1.22	30.2	1.97	59.5	29.74	-448	436
240	1.50	37.0	1.91	70.8	17.69	-98	98
360	1.69	41.7	1.88	78.3	13.05	37	0
600	1.95	48.1	1.83	87.8	8.78	161	0
1440	2.48	61.3	1.73	106.2	4.42	288	0

Minimum depth of soakaway

$H_{max} = 1133$ mm

Time for emptying soakaway to half volume

$t_{s50} = V_{free} \times A_b / (f \times P) \times \ln((H_{max} + A_b / P) / (H_{max} / 2 + A_b / P)) =$
15min 5s

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