

Project 23 - OP - 1301 - 38 & 40 Silverfox Crescent, RG5 3JA				Job Ref. 23 - OP - 1301	
Section Soakaway 1 - 1 in 100 year + 40% CC				Sheet no./rev. 1	
Calc. by RJS	Date 22/09/2023	Chk'd by	Date	App'd by	Date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = 170.0 m ²
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.400
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 40 %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = 1000 mm
Width of pit	w = 3000 mm
Length of pit	l = 3819 mm
Percentage free volume	V _{free} = 95 %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l _{trial} = 1000 mm
Width of trial pit	b _{trial} = 300 mm
Depth of trial pit (below invert)	d _{trial} = 1000 mm
Free volume (if fill used)	V _{trial} = 100 %
75% depth of pit	d ₇₅ = (d _{trial} × 0.75) = 750.00 mm
50% depth of pit	d ₅₀ = (d _{trial} × 0.50) = 500.00 mm
25% depth of pit	d ₂₅ = (d _{trial} × 0.25) = 250.00 mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = 37 min
Test 2 - time to fall from 75% depth to 25% depth	T2 = 49 min
Test 3 - time to fall from 75% depth to 25% depth	T3 = 71 min
Longest time to fall from 75% depth to 25% depth	t _{lg} = max(T1, T2, T3) = 71 min
Storage volume from 75% to 25% depth	V _{p75_25} = (l _{trial} × b _{trial} × (d ₇₅ - d ₂₅)) × V _{trial} = 0.15 m ³
Internal surface area to 50% depth	a _{p50} = ((l _{trial} × b _{trial}) + (l _{trial} + b _{trial}) × 2 × d ₅₀) = 1.60 m ²
Surface area of soakaway to 50% storage depth	A _{s50} = 2 × (l _{trial} + b _{trial}) × d _{trial} / 2 = 1.300 m ²
Soil infiltration rate	f = V _{p75_25} / (a _{p50} × t _{lg}) = 22.0 × 10⁻⁶ m/s
Wetted area of pit 50% full	a _{s50} = l × d + w × d = 6818967 mm ²

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a _{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m ³)	Outflow (m ³)	Storage required (m ³)
5	0.37;	10.5;	1.92;	20.0;	3.41;	0.05;	3.36



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Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
10	0.52;	14.7;	1.98;	29.1;	4.94;	0.09;	4.85
15	0.63;	17.7;	2.01;	35.7;	6.07;	0.14;	5.93
30	0.80;	22.5;	2.02;	45.4;	7.72;	0.27;	7.45
60	1.00;	28.0;	1.99;	55.6;	9.45;	0.54;	8.91
120	1.21;	33.8;	1.94;	65.5;	11.14;	1.08;	10.06
240	1.45;	40.5;	1.89;	76.4;	12.99;	2.16;	10.83
360	1.60;	44.9;	1.85;	83.1;	14.13;	3.24;	10.88
600	1.79;	50.2;	1.81;	90.8;	15.44;	5.40;	10.04
1440	2.24;	62.7;	1.72;	108.1;	18.38;	12.97;	5.41

Required storage volume $S_{req} = 10.88 \text{ m}^3$

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free} = 10.88 \text{ m}^3$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f) = 10\text{hr } 4\text{min } 11\text{s}$

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