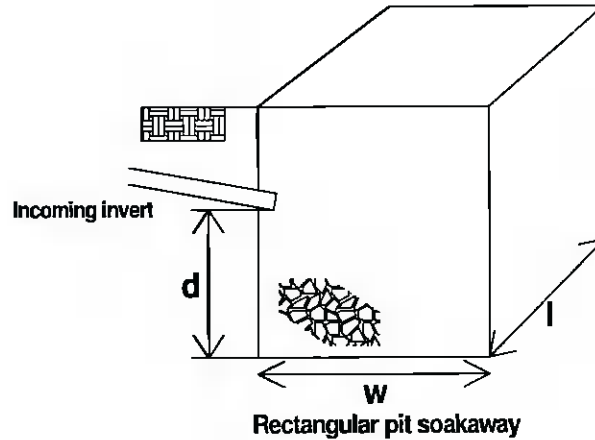


Soakaway Design Calculations

Project Jamie Goldrick: Site @ Blackthron Hill, Coolmine, Saggart				Job Ref.	
Section Dwelling Extension -3No. Soakaways				Sheet no./rev. 1	
Calc. by WD	Date 4/26/2022	Chk'd by WD	Date	App'd by	Date

SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



Soil infiltration rate (BRE digest 365)

Length of trial pit	$l_{\text{trial}} = 2500 \text{ mm}$	Width of trial pit	$b_{\text{trial}} = 1000 \text{ mm}$
Depth of trial pit (below invert)	$d_{\text{trial}} = 1200 \text{ mm}$	Free volume (if fill used)	$V_{\text{trial}} = 100 \%$
75% depth of pit	$d_{75} = (d_{\text{trial}} \times 0.75) = 900.00 \text{ mm}$		
50% depth of pit	$d_{50} = (d_{\text{trial}} \times 0.50) = 600.00 \text{ mm}$		
25% depth of pit	$d_{25} = (d_{\text{trial}} \times 0.25) = 300.00 \text{ mm}$		
Test 1 - time to fall from 75% depth to 25% depth		T1 = 710 min	
Test 2 - time to fall from 75% depth to 25% depth		T2 = 740 min	
Test 3 - time to fall from 75% depth to 25% depth		T3 = 770 min	
Longest time to fall from 75% depth to 25% depth		$t_{ig} = \max(T1, T2, T3) = 770 \text{ min}$	
Storage volume from 75% to 25% depth		$V_{p75_25} = (l_{\text{trial}} \times b_{\text{trial}} \times (d_{75} - d_{25})) \times V_{\text{trial}} = 1.50 \text{ m}^3$	
Internal surface area to 50% depth		$a_{p50} = ((l_{\text{trial}} \times b_{\text{trial}}) + (l_{\text{trial}} + b_{\text{trial}}) \times 2 \times d_{50}) = 6.70 \text{ m}^2$	
Surface area of soakaway to 50% storage depth		$A_{s50} = 2 \times (l_{\text{trial}} + b_{\text{trial}}) \times d_{\text{trial}} / 2 = 4.200 \text{ m}^2$	
Soil infiltration rate		$f = V_{p75_25} / (a_{p50} \times t_{ig}) = 4.85 \times 10^{-6} \text{ m/s}$	

Rectangular Pit Design

Pit length	$l = 2500 \text{ mm}$	Pit width	$w = 2500 \text{ mm}$
Pit depth below invert	$d = 1200 \text{ mm}$	Free volume	$V_{\text{free}} = 30.0 \%$
Location of soakaway	England and Wales	Return period	100 years
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)		$r = 0.30$	
Impermeable area	$A = 40.0 \text{ m}^2$	Soil infiltration rate	$f = 0.0000048 \text{ m/s}$
Surface area of soakaway to 50% storage depth	$A_{s50} = 2 \times (l + w) \times d / 2 = 6.000 \text{ m}^2$		
Outflow factor	$AF = A_{s50} \times f = 29.1 \times 10^{-6} \text{ m}^3/\text{s}$		

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	6.8 mm	1.83	12.5 mm	0.5 m ³	0.0 m ³	0.5 m ³
10 mins	9.8 mm	1.91	18.7 mm	0.7 m ³	0.0 m ³	0.7 m ³

15 mins	11.8 mm	1.94	22.9 mm	0.9 m ³	0.0 m ³	0.9 m ³
30 mins	15.4 mm	1.99	30.7 mm	1.2 m ³	0.1 m ³	1.2 m ³
1 hour	20.0 mm	2.03	40.6 mm	1.6 m ³	0.1 m ³	1.5 m ³
2 hours	25.0 mm	2.01	50.2 mm	2.0 m ³	0.2 m ³	1.8 m ³
4 hours	31.4 mm	1.96	61.5 mm	2.5 m ³	0.4 m ³	2.0 m ³
6 hours	35.6 mm	1.93	68.5 mm	2.7 m ³	0.6 m ³	2.1 m ³
10 hours	42.4 mm	1.87	79.3 mm	3.2 m ³	1.0 m ³	2.1 m ³
24 hours	56.8 mm	1.76	100.2 mm	4.0 m ³	2.5 m ³	1.5 m ³

Required storage volume $S_{reqd} = 2.1 \text{ m}^3$

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free} = 2.3 \text{ m}^3$

Soakaway storage volume- OK

Time for emptying soakaway to half volume

$$T_{s50} = S_{reqd} \times 0.5 / (A_{s50} \times f) = 10 \text{ hr } 9 \text{ min } 23 \text{ s}$$

Soakaway discharge time - OK