



Barnaby Associates
The Corner House
Station Road
Cheddar

Project **Land Adjacent 2 Waterside Way**

Calcs for **Dave Fishlock Properties Ltd - soakage test**

Job no.

Start page no./Revision
1

Calcs by
U

Calcs date
16/04/2012

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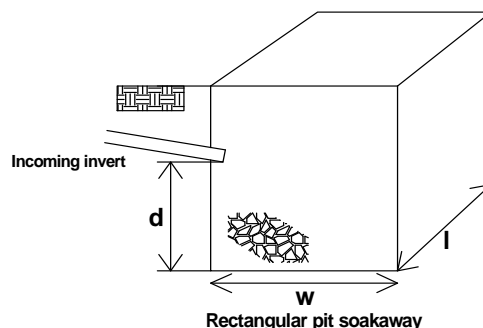
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SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



Soil infiltration rate (BRE digest 365)

Length of trial pit	$l_{\text{trial}} = 450 \text{ mm}$	Width of trial pit	$b_{\text{trial}} = 450 \text{ mm}$
Depth of trial pit (below invert)	$d_{\text{trial}} = 800 \text{ mm}$	Free volume (if fill used) $V_{\text{trial}} = 100 \%$	
75% depth of pit	$d_{75} = (d_{\text{trial}} \times 0.75) = 600.00 \text{ mm}$		
50% depth of pit	$d_{50} = (d_{\text{trial}} \times 0.50) = 400.00 \text{ mm}$		
25% depth of pit	$d_{25} = (d_{\text{trial}} \times 0.25) = 200.00 \text{ mm}$		
Test 1 - time to fall from 75% depth to 25% depth		$T1 = 8 \text{ min}$	
Test 2 - time to fall from 75% depth to 25% depth		$T2 = 8 \text{ min}$	
Test 3 - time to fall from 75% depth to 25% depth		$T3 = 8 \text{ min}$	
Longest time to fall from 75% depth to 25% depth		$t_{\text{lg}} = \max(T1, T2, T3) = 8 \text{ min}$	
Storage volume from 75% to 25% depth		$V_{p75_25} = (l_{\text{trial}} \times b_{\text{trial}} \times (d_{75} - d_{25})) \times V_{\text{trial}} = 0.08 \text{ m}^3$	
Internal surface area to 50% depth		$a_{p50} = ((l_{\text{trial}} \times b_{\text{trial}}) + (l_{\text{trial}} + b_{\text{trial}}) \times 2 \times d_{50}) = 0.92 \text{ m}^2$	
Surface area of soakaway to 50% storage depth		$A_{s50} = 2 \times (l_{\text{trial}} + b_{\text{trial}}) \times d_{\text{trial}} / 2 = 0.720 \text{ m}^2$	
Soil infiltration rate		$f = V_{p75_25} / (a_{p50} \times t_{\text{lg}}) = 183. \times 10^{-6} \text{ m/s}$	

Rectangular Pit Design

Pit length	$l = 750 \text{ mm}$	Pit width	$w = 750 \text{ mm}$
Pit depth below invert	$d = 1000 \text{ mm}$	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)		$r = 0.40$	
Impermeable area	$A = 12.0 \text{ m}^2$	Soil infiltration rate	$f = 0.0001829 \text{ m/s}$
Surface area of soakaway to 50% storage depth			

$$A_{s50} = 2 \times (l + w) \times d / 2 = 1.500 \text{ m}^2$$

Outflow factor $AF = A_{s50} \times f = 274. \times 10^{-6} \text{ m}^3/\text{s}$

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	7.5 mm	1.85	13.8 mm	0.2 m ³	0.1 m ³	0.1 m ³
10 mins	10.5 mm	1.92	20.1 mm	0.2 m ³	0.2 m ³	0.1 m ³
15 mins	12.7 mm	1.95	24.7 mm	0.3 m ³	0.2 m ³	0.0 m ³
30 mins	16.1 mm	2.00	32.1 mm	0.4 m ³	0.5 m ³	-0.1 m ³
1 hour	20.0 mm	2.03	40.6 mm	0.5 m ³	1.0 m ³	-0.5 m ³



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2 hours	24.1 mm	2.01	48.6 mm	0.6 m³	2.0 m³	-1.4 m³
4 hours	28.9 mm	1.98	57.2 mm	0.7 m³	4.0 m³	-3.3 m³
6 hours	32.1 mm	1.95	62.6 mm	0.8 m³	5.9 m³	-5.2 m³
10 hours	35.9 mm	1.92	69.0 mm	0.8 m³	9.9 m³	-9.1 m³
24 hours	44.8 mm	1.85	83.0 mm	1.0 m³	23.7 m³	-22.7 m³

Required storage volume $S_{reqd} = 0.1 \text{ m}^3$

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free} = 0.2 \text{ m}^3$

Soakaway storage volume- OK

Time for emptying soakaway to half volume

$$T_{s50} = S_{reqd} \times 0.5 / (A_{s50} \times f) = 0 \text{ hr } 2 \text{ min } 32 \text{ s}$$

Soakaway discharge time - OK