

 Jrbdesigns Ltd 1 Saville Street Cudworth Barnsley	Project Laxton Road				Job no.	
	Calcs for Soakaway				Start page no./Revision 1	
	Calcs by JB	Calcs date 13/06/2018	Checked by	Checked date	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.02

Design rainfall intensity

Location of catchment area **Sheffield**
 Impermeable area drained to the system **A = 115.0 m²**
 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 = 2031 mm**
 Width of pit **w = 1000 mm**
 Length of pit **l = 2000 mm**
 Percentage free volume **V_{free} = 80 %**

Soil infiltration rate (BRE digest 365)

Length of trial pit **l_{trial} = 300 mm**
 Width of trial pit **b_{trial} = 240 mm**
 Depth of trial pit (below invert) **d_{trial} = 1000 mm**
 Free volume (if fill used) **V_{trial} = 100 %**
 75% depth of pit **d₇₅ = (d_{trial} × 0.75) = 750.00 mm**
 50% depth of pit **d₅₀ = (d_{trial} × 0.50) = 500.00 mm**
 25% depth of pit **d₂₅ = (d_{trial} × 0.25) = 250.00 mm**
 Test 1 - time to fall from 75% depth to 25% depth **T1 = 111 min**
 Test 2 - time to fall from 75% depth to 25% depth **T2 = 111 min**
 Test 3 - time to fall from 75% depth to 25% depth **T3 = 111 min**
 Longest time to fall from 75% depth to 25% depth **t_{lg} = max(T1, T2, T3) = 111 min**
 Storage volume from 75% to 25% depth **V_{p75_25} = (l_{trial} × b_{trial} × (d₇₅ - d₂₅)) × V_{trial} = 0.04 m³**
 Internal surface area to 50% depth **a_{p50} = ((l_{trial} × b_{trial}) + (l_{trial} + b_{trial}) × 2 × d₅₀) = 0.61 m²**
 Surface area of soakaway to 50% storage depth **A_{s50} = 2 × (l_{trial} + b_{trial}) × d_{trial} / 2 = 0.540 m²**
 Soil infiltration rate **f = V_{p75_25} / (a_{p50} × t_{lg}) = 8.83×10⁻⁶ m/s**
 Wetted area of pit 50% full **a_{s50} = l × d + w × d = 6091968 mm²**

Table equations

Inflow **I = M10 × A**
 Outflow **O = a_{s50} × f × D**
 Storage **S = I - O**

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	0.94	0.02	0.92
10	0.51	9.6	1.22	11.7	1.35	0.03	1.32
15	0.62	11.7	1.23	14.4	1.65	0.05	1.60

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Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	10 year rainfall, M10 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
30	0.79	14.9	1.24	18.5	2.13	0.10	2.03
60	1.00	18.9	1.24	23.4	2.70	0.19	2.50
120	1.22	23.1	1.24	28.6	3.29	0.39	2.90
240	1.48	28.0	1.23	34.4	3.95	0.77	3.18
360	1.67	31.6	1.22	38.4	4.41	1.16	3.25
600	1.90	35.9	1.20	43.2	4.96	1.94	3.03
1440	2.42	45.7	1.18	53.9	6.20	4.65	1.55

Required storage volume

$$S_{\text{req}} = 3.25 \text{ m}^3$$

Soakaway storage volume

$$S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 3.25 \text{ m}^3$$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume

$$t_{s50} = S_{\text{req}} \times 0.5 / (a_{s50} \times f) = 8\text{hr } 23\text{min } 21\text{s}$$

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