	Project		Job no.	
Tekla Tedds Jrbdesigns Ltd 1 Saville Street Cudworth Barnsley		Cross Lane		
	Calcs for		Start page no./Revision	
	Soakaway		1	
	Calcs by JB	Calcs date 16/06/2017	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 — $A = \textbf{100.0} \text{ m}^2$

Return period — Period = **10** yr

Ratio 60 min to 2 day rainfall of 5 yr return period — $r = \textbf{0.360}$

5-year return period rainfall of 60 minutes duration — $M5\_60min = \textbf{18.9}$ mm

Increase of rainfall intensity due to global warming — $p_{climate} = \textbf{0}$ %

Soakaway / infiltration trench details

Soakaway type — Rectangular

Minimum depth of pit (below incoming invert) — $d = \textbf{1766}$ mm

Width of pit — $w = \textbf{1000}$ mm

Length of pit — $l = \textbf{2000}$ mm

Percentage free volume — $V_{free} = \textbf{80}$ %

Soil infiltration rate (BRE digest 365)

Length of trial pit — $l_{trial} = \textbf{300}$ mm

Width of trial pit — $b_{trial} = \textbf{240}$ mm

Depth of trial pit (below invert) — $d_{trial} = \textbf{1000}$ mm

Free volume (if fill used) — $V_{trial} = \textbf{100}$ %

75% depth of pit — $d_{75} = (d_{trial} \times 0.75) = \textbf{750.00}$ mm

50% depth of pit — $d_{50} = (d_{trial} \times 0.50) = \textbf{500.00}$ mm

25% depth of pit — $d_{25} = (d_{trial} \times 0.25) = \textbf{250.00}$ mm

Test 1 - time to fall from 75% depth to 25% depth — $T1 = \textbf{111}$ min

Test 2 - time to fall from 75% depth to 25% depth — $T2 = \textbf{111}$ min

Test 3 - time to fall from 75% depth to 25% depth — $T3 = \textbf{111}$ min

Longest time to fall from 75% depth to 25% depth — $t_{lg} = max(T1, T2, T3) = \textbf{111}$ min

Storage volume from 75% to 25% depth — $V_{p75\_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial} = \textbf{0.04} \text{ m}^3$

Internal surface area to 50% depth — $a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50}) = \textbf{0.61} \text{ m}^2$

Surface area of soakaway to 50% storage depth — $A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2 = \textbf{0.540} \text{ m}^2$

Soil infiltration rate — $f = V_{p75\_25} / (a_{p50} \times t_{lg}) = \textbf{8.83×10}^{-6} \text{ m/s}$

Wetted area of pit 50% full — $a_{s50} = l \times d + w \times d = \textbf{5297363} \text{ mm}^2$

Table equations

Inflow — $I = M10 \times A$

Outflow — $O = a_{s50} \times f \times D$

Storage — $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	10 year rainfall, M10 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
5	0.36	6.8	1.20	8.2	0.82	0.01	0.80
10	0.51	9.6	1.22	11.7	1.17	0.03	1.15
15	0.62	11.7	1.23	14.4	1.44	0.04	1.40

		Project		Job no.	
Tekla Tedds **Jrbdesigns Ltd** 1 Saville Street Cudworth Barnsley			Cross Lane		
		Calcs for Soakaway		Start page no./Revision 2	
		Calcs by JB	Calcs date 16/06/2017	Checked by	Checked date	Approved by	Approved date

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	1.85	0.08	1.77
60	1.00	18.9	1.24	23.4	2.34	0.17	2.18
120	1.22	23.1	1.24	28.6	2.86	0.34	2.52
240	1.48	28.0	1.23	34.4	3.44	0.67	2.76
360	1.67	31.6	1.22	38.4	3.84	1.01	2.83
600	1.90	35.9	1.20	43.2	4.32	1.68	2.63
1440	2.42	45.7	1.18	53.9	5.39	4.04	1.35

Required storage volume S_{req} = **2.83** m³

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **2.83** m³

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 8hr 24min 3s

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