



Section: **Soakaway No. 1**

Job No: **22668**
Prepared By: **S Hutchings**

ALTERNATIVE SOAKAWAY SIZES			
	trench soakaways		
	450	600	900
width of trench [mm]:	450	600	900
required trench length [m]:	31.06	24.32	16.98
	ring soakaways		
	1050	1350	1500
diameter of ring [mm]:	1050	1350	1500
required pit side length [m]:	2.30	2.29	3.66

* Based on effective depth and number of pits as in Soakaway Data table

SUMMARY OF CALCULATIONS			
critical design rainfall duration 't _{crit} ' =	240	min	
required storage volume 'V _{req} ' =	16.48	m ³	
provided storage volume 'V _{prov} ' =	61.21	m ³	
utilisation factor =	0.27	.OK	
required time to discharge 50% 't ₅₀ ' =	24.84	hours	
utilisation factor =	1.03	.NOT OK	

* Discharge time is assessed per soakaway rather than a group

GENERAL DATA	
site location:	England and Wales
soakaway type:	perforated concrete ring
pit shape:	square pit around ring
impermeable area drained to soakaway 'A' [m ²] =	300
60 min rainfall depth of 5 year return period 'R' [mm] =	20
M5-60 to M5-2d rainfall ratio 'r' =	0.50
allowance for climate change:	30%

SOAKAWAY DATA	
number of ring soakaways:	3
square pit side length 'L' [m] =	4.00
soakaway ring internal diameter 'D _{int} ' [mm] =	1200
total depth from ground level 'D _b ' [m] =	2.00
depth to drain invert level 'D _d ' [m] =	0.50
soakaway effective depth 'D _{eff} ' [m] =	1.50
free volume in infill aggregate [%] =	85

SOIL INFILTRATION DATA	
allowance for infiltration through soakaway base:	100%
available on-site infiltration test results:	☒ Yes ☐ No
use soakage trial pit table below	
internal surface area of trial pit 'a _{p50} ' [m ²] =	13.13
storage volume between 75-25% 'V _p ' [m ³] =	3.52
time for water to fall from 75-25% 't _p ' [min] =	1097.43
soil infiltration rate 'f' [m/s] =	4.08E-06

SOAKAGE TRIAL PIT DATA	
soakage trial pit width 'W _t ' [m] =	0.86
soakage trial pit length 'L _t ' [m] =	3.08
total depth from ground level 'D _{tb} ' [m] =	2.66
depth to pipe invert level 'D _{tp} ' [m] =	0.00
soakage trial pit effective depth 'D _{teff} ' [m] =	2.66
free volume in infill aggregate [%] =	100
NOTE: faces of excavation assumed to be vertical	

REQUIRED STORAGE CAPACITY PER RAINFALL DURATION													
rainfall duration [min]	rainfall factor Z1	M5-D rainfalls [mm]	M10-D			M50-D			M100-D			outflow from soakaway [m ³]	required storage [m ³]
			Z2	rainfalls [mm]	inflow [m ³]	Z2	rainfalls [mm]	inflow [m ³]	Z2	rainfalls [mm]	inflow [m ³]		
5	0.39	7.80	1.21	12.24	3.67	1.61	16.33	4.90	1.86	18.83	5.65	0.10	5.55
10	0.54	10.80	1.22	17.17	5.15	1.66	23.28	6.98	1.92	27.00	8.10	0.21	7.89
15	0.65	13.00	1.23	20.82	6.25	1.68	28.39	8.52	1.96	33.09	9.93	0.31	9.62
30	0.82	16.40	1.24	26.44	7.93	1.71	36.42	10.93	2.00	42.67	12.80	0.62	12.18
60	1.00	20.00	1.24	32.24	9.67	1.73	44.98	13.49	2.03	52.78	15.83	1.23	14.60
120	1.19	23.80	1.24	38.37	11.51	1.72	53.29	15.99	2.01	62.34	18.70	2.46	16.24
240	1.38	27.60	1.23	44.12	13.24	1.71	61.34	18.40	1.99	71.37	21.41	4.93	16.48
360	1.51	30.20	1.22	47.87	14.36	1.70	66.69	20.01	1.97	77.28	23.18	7.39	15.79
600	1.68	33.60	1.21	52.82	15.85	1.68	73.31	21.99	1.94	84.79	25.44	12.32	13.11
1440	2.03	40.60	1.19	62.74	18.82	1.64	86.37	25.91	1.89	99.50	29.85	29.58	0.27

* Z2 is growth factor from M5 rainfalls

SOAKAGE TRIAL PIT INFILTRATION TEST RESULTS																		
water level measurement N ^o :		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Soakage Trial 1	time [min] =	0	60	120	180	240	300	360	420	480	520	1440	1560	1620	1680	1740		
	depth to water [m] =	0.04	0.06	0.11	0.14	0.18	0.21	0.23	0.34	0.48	0.99	1.60	1.83	2.14	2.45	2.66		
Soakage Trial 2	time [min] =																	
	depth to water [m] =																	
Soakage Trial 3	time [min] =																	
	depth to water [m] =																	



ALTERNATIVE SOAKAWAY SIZES

	trench soakaways		
width of trench [mm]:	450	600	900
required trench length [m]:	26.84	20.81	14.68
	ring soakaways		
diameter of ring [mm]:	1050	1350	1500
required pit side length [m]:	2.13	2.12	2.11

* Based on effective depth and number of pits as in Soakaway Data table

SUMMARY OF CALCULATIONS

critical design rainfall duration 't _{crit} ' =	120	min
required storage volume 'V _{req} ' =	13.47	m ³
provided storage volume 'V _{prov} ' =	61.21	m ³
utilisation factor =	0.22	.OK
required time to discharge 50% 't ₅₀ ' =	11.69	hours
utilisation factor =	0.49	.OK

GENERAL DATA

site location:	England and Wales
soakaway type:	perforated concrete ring
pit shape:	square pit around ring
impermeable area drained to soakaway 'A' [m ²] =	300
60 min rainfall depth of 5 year return period 'R' [mm] =	20
M5-60 to M5-2d rainfall ratio 'r' =	0.50
allowance for climate change:	30%

SOAKAWAY DATA

number of ring soakaways:	3
square pit side length 'L' [m] =	4.00
soakaway ring internal diameter 'D _{int} ' [mm] =	1200
total depth from ground level 'D _b ' [m] =	2.00
depth to drain invert level 'D _d ' [m] =	0.50
soakaway effective depth 'D _{eff} ' [m] =	1.50
free volume in infill aggregate [%] =	85

SOIL INFILTRATION DATA

allowance for infiltration through soakaway base:	100%
available on-site infiltration test results:	☒ Yes ☐ No
use soakage trial pit table below	
internal surface area of trial pit 'a _{p50} ' [m ²] =	14.59
storage volume between 75-25% 'V _p ' [m ³] =	3.82
time for water to fall from 75-25% 't _p ' [min] =	504.29
soil infiltration rate 'f' [m/s] =	8.66E-06

SOAKAGE TRIAL PIT DATA

soakage trial pit width 'W _t ' [m] =	0.79
soakage trial pit length 'L _t ' [m] =	3.14
total depth from ground level 'D _{tb} ' [m] =	3.08
depth to pipe invert level 'D _{tp} ' [m] =	0.00
soakage trial pit effective depth 'D _{teff} ' [m] =	3.08
free volume in infill aggregate [%] =	100

NOTE: faces of excavation assumed to be vertical

REQUIRED STORAGE CAPACITY PER RAINFALL DURATION

rainfall duration [min]	rainfall factor Z1	M5-D rainfalls [mm]	M10-D			M50-D			M100-D			outflow from soakaway [m ³]	required storage [m ³]
			Z2	rainfalls [mm]	inflow [m ³]	Z2	rainfalls [mm]	inflow [m ³]	Z2	rainfalls [mm]	inflow [m ³]		
5	0.39	7.80	1.21	12.24	3.67	1.61	16.33	4.90	1.86	18.83	5.65	0.22	5.43
10	0.54	10.80	1.22	17.17	5.15	1.66	23.28	6.98	1.92	27.00	8.10	0.44	7.66
15	0.65	13.00	1.23	20.82	6.25	1.68	28.39	8.52	1.96	33.09	9.93	0.65	9.27
30	0.82	16.40	1.24	26.44	7.93	1.71	36.42	10.93	2.00	42.67	12.80	1.31	11.49
60	1.00	20.00	1.24	32.24	9.67	1.73	44.98	13.49	2.03	52.78	15.83	2.62	13.22
120	1.19	23.80	1.24	38.37	11.51	1.72	53.29	15.99	2.01	62.34	18.70	5.24	13.47
240	1.38	27.60	1.23	44.12	13.24	1.71	61.34	18.40	1.99	71.37	21.41	10.47	10.94
360	1.51	30.20	1.22	47.87	14.36	1.70	66.69	20.01	1.97	77.28	23.18	15.71	7.48
600	1.68	33.60	1.21	52.82	15.85	1.68	73.31	21.99	1.94	84.79	25.44	26.18	0.00
1440	2.03	40.60	1.19	62.74	18.82	1.64	86.37	25.91	1.89	99.50	29.85	62.83	0.00

* Z2 is growth factor from M5 rainfalls

SOAKAGE TRIAL PIT INFILTRATION TEST RESULTS

water level measurement N ^o :		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Soakage Trial 1	time [min] =	0	60	120	180	240	300	360	420	480	520	1440	1560	1620	1680	1740	1800	1860	1920	1980
	depth to water [m] =	0.07	0.08	0.10	0.14	0.15	0.18	0.22	0.35	0.48	0.61	0.76	0.97	1.02	1.22	1.53	1.82	1.97	2.18	2.44
Soakage Trial 2	time [min] =																			
	depth to water [m] =																			
Soakage Trial 3	time [min] =																			
	depth to water [m] =																			