

Section: L. Kennally - Sutton St James	Job No:	Revision	Page: C/01
	Prepared By: SLB	Date: 15/10/2025	

ALTERNATIVE SOAKAWAY SIZES			
	trench soakaways		
	width of trench [mm]:	450	600
required trench length [m]:	4.74	3.76	2.65
ring soakaways			
diameter of ring [mm]:	1050	1350	1500
required pit diameter [m]:	1.44	1.42	1.40

* 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} ' =	2.01	m ³
provided storage volume 'V _{prov} ' =	2.55	m ³
utilisation factor =	0.79	.OK
required time to discharge 50% 't ₅₀ ' =	4.17	hours
utilisation factor =	0.17	.OK

GENERAL DATA	
site location:	England and Wales
soakaway type:	geocellular units
impermeable area drained to soakaway 'A' [m ²] =	42
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	
soakaway width 'W' [m] =	1.50
soakaway length 'L' [m] =	2.00
total depth from ground level 'D _b ' [m] =	1.50
depth to drain invert level 'D _d ' [m] =	0.50
soakaway effective depth 'D _{eff} ' [m] =	1.00
free volume in infill aggregate [%] =	85

SOIL INFILTRATION DATA	
allowance for infiltration through soakaway base:	30%
available on-site infiltration test results:	<input checked="" type="radio"/> Yes <input type="radio"/> No
use soakage trial pit table below	
internal surface area of trial pit 'a _{p50} ' [m ²] =	1.80
storage volume between 75-25% 'V _p ' [m ³] =	0.22
time for water to fall from 75-25% 't _p ' [min] =	103.50
soil infiltration rate 'f' [m/s] =	1.93E-05

SOAKAGE TRIAL PIT DATA	
soakage trial pit width 'W _t ' [m] =	0.60
soakage trial pit length 'L _t ' [m] =	1.20
total depth from ground level 'D _{tb} ' [m] =	1.00
depth to pipe invert level 'D _{tp} ' [m] =	0.40
soakage trial pit effective depth 'D _{teff} ' [m] =	0.60
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	0.51	1.61	16.33	0.69	1.86	18.83	0.79	0.03	0.77	
10	0.54	10.80	1.22	17.17	0.72	1.66	23.28	0.98	1.92	27.00	1.13	0.05	1.08	
15	0.65	13.00	1.23	20.82	0.87	1.68	28.39	1.19	1.96	33.09	1.39	0.08	1.31	
30	0.82	16.40	1.24	26.44	1.11	1.71	36.42	1.53	2.00	42.67	1.79	0.15	1.64	
60	1.00	20.00	1.24	32.24	1.35	1.73	44.98	1.89	2.03	52.78	2.22	0.31	1.91	
120	1.19	23.80	1.24	38.37	1.61	1.72	53.29	2.24	2.01	62.34	2.62	0.61	2.01	
240	1.38	27.60	1.23	44.12	1.85	1.71	61.34	2.58	1.99	71.37	3.00	1.22	1.77	
360	1.51	30.20	1.22	47.87	2.01	1.70	66.69	2.80	1.97	77.28	3.25	1.84	1.41	
600	1.68	33.60	1.21	52.82	2.22	1.68	73.31	3.08	1.94	84.79	3.56	3.06	0.50	
1440	2.03	40.60	1.19	62.74	2.64	1.64	86.37	3.63	1.89	99.50	4.18	7.35	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	15	30	45	60	90	120	150	180	210										
	depth to water [m] =	0.00	0.30	0.49	0.64	0.75	0.80	0.85	0.90	0.95	1.00										
Soakage Trial 2	time [min] =	0	15	30	45	60	90	120	150	180	210										
	depth to water [m] =	0.00	0.29	0.46	0.62	0.73	0.78	0.83	0.88	0.93	0.98										
Soakage Trial 3	time [min] =	0	15	30	45	60	90	120	150	180	210										
	depth to water [m] =	0.00	0.27	0.45	0.60	0.71	0.76	0.81	0.86	0.91	0.95										

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ALTERNATIVE SOAKAWAY SIZES

	trench soakaways		
	450	600	900
width of trench [mm]:	4.84	3.83	2.69
required trench length [m]:			
ring soakaways			
diameter of ring [mm]:	1050	1350	1500
required pit diameter [m]:	1.45	1.43	1.42

SUMMARY OF CALCULATIONS

critical design rainfall duration 't _{crit} ' =	120	min
required storage volume 'V _{req} ' =	2.05	m ³
provided storage volume 'V _{prov} ' =	2.55	m ³
utilisation factor =	0.80	.OK
required time to discharge 50% 't ₅₀ ' =	4.48	hours
utilisation factor =	0.19	.OK

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

GENERAL DATA

site location:	England and Wales
soakaway type:	geocellular units
impermeable area drained to soakaway 'A' [m ²] =	42
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

soakaway width 'W' [m] =	1.50
soakaway length 'L' [m] =	2.00
total depth from ground level 'D _b ' [m] =	1.50
depth to drain invert level 'D _d ' [m] =	0.50
soakaway effective depth 'D _{eff} ' [m] =	1.00
free volume in infill aggregate [%] =	85

SOIL INFILTRATION DATA

allowance for infiltration through soakaway base:	30%
available on-site infiltration test results:	<input checked="" type="radio"/> Yes <input type="radio"/> No
use soakage trial pit table below	
internal surface area of trial pit 'a _{p50} ' [m ²] =	1.80
storage volume between 75-25% 'V _p ' [m ³] =	0.22
time for water to fall from 75-25% 't _p ' [min] =	111.39
soil infiltration rate 'f' [m/s] =	1.80E-05

SOAKAGE TRIAL PIT DATA

soakage trial pit width 'W _t ' [m] =	0.60
soakage trial pit length 'L _t ' [m] =	1.20
total depth from ground level 'D _{tb} ' [m] =	1.00
depth to pipe invert level 'D _{tp} ' [m] =	0.40
soakage trial pit effective depth 'D _{teff} ' [m] =	0.60
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]		
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30	0.82	16.40	1.24	26.44	1.11	1.71	36.42	1.53	2.00	42.67	1.79	0.14	1.65
60	1.00	20.00	1.24	32.24	1.35	1.73	44.98	1.89	2.03	52.78	2.22	0.28	1.93
120	1.19	23.80	1.24	38.37	1.61	1.72	53.29	2.24	2.01	62.34	2.62	0.57	2.05
240	1.38	27.60	1.23	44.12	1.85	1.71	61.34	2.58	1.99	71.37	3.00	1.14	1.86
360	1.51	30.20	1.22	47.87	2.01	1.70	66.69	2.80	1.97	77.28	3.25	1.71	1.54
600	1.68	33.60	1.21	52.82	2.22	1.68	73.31	3.08	1.94	84.79	3.56	2.84	0.72
1440	2.03	40.60	1.19	62.74	2.64	1.64	86.37	3.63	1.89	99.50	4.18	6.83	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	15	30	45	60	90	120	150	180	210									
	depth to water [m] =	0.00	0.40	0.57	0.71	0.79	0.85	0.89	0.93	0.97	1.00									
Soakage Trial 2	time [min] =	0	15	30	45	60	90	120	150	180	210									
	depth to water [m] =	0.00	0.38	0.56	0.69	0.78	0.83	0.87	0.91	0.95	0.98									
Soakage Trial 3	time [min] =	0	15	30	45	60	90	120	150	180	210									
	depth to water [m] =	0.00	0.35	0.54	0.68	0.73	0.79	0.82	0.86	0.90	0.94									