

**SHOLING FC
PORTSMOUTH ROAD
SHOLING
SOUTHAMPTON
HAMPSHIRE**

INFILTRATION BASIN CALCULATIONS FOR GRANDSTAND & HARDSTANDING

For:

SHOLING FC

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SHOLING FC

SOAKAGE TEST PROCEDURE

1. Excavate by machine a soakage test pit approximately 0.6m wide x 1.0m long x 1.6m deep.
2. Trim sides vertical and square and clean off any clay 'cake'. Measure accurately and record the pit dimensions below.
3. Ensure that the sides of the pit remain stable throughout and do not enter the pit under any circumstances. If in doubt refer to the engineer.
4. Using a bowser or other suitable means, rapidly fill the pit with water to a depth of 0.8m below ground level (the effective depth) and allow it to drain.
5. Refill the pit with water to the effective depth and record the drop in water level at 20 minute intervals, entering the readings on the chart below.
6. Allow the pit to drain to near empty.
7. Repeat the procedure two more times.
8. When the test is completed backfill the pit with compacted granular material and make safe.

PIT DIMENSIONS

WIDTH 600 mm
 LENGTH 1000 mm
 DEPTH 1600 mm

Time from filling (minutes)	Depth below ground surface (1 st test) (mm)	Depth below ground surface (2 nd test) (mm)	Depth below ground surface (3 rd test) (mm)
0 (maximum depth)	800	800	800
20	1200	1150	1000
40	1600	1400	1250
60		1600	1500
80			1600
100			
120			
140			
160			
180			
200			
220			
240			
260			
280			
300			
320			
340			
360			
380			
400			

SOAKAGE TEST 1 600 wd x 1000 lg x 1600 dp		Depth from ground level (mm)
Time (mins)	Water Depth (mm)	
0	800	800
20	400	1200
40	0	1600

SOAKAGE TEST 2 600 wd x 1000 lg x 1600 dp		Depth from ground level (mm)
Time (mins)	Water Depth (mm)	
0	800	800
20	450	1150
40	200	1400
60	0	1600

SOAKAGE TEST 3 600 wd x 1000 lg x 1600 dp		Depth from ground level (mm)
Time (mins)	Water Depth (mm)	
0	800	800
20	600	1000
40	350	1250
60	100	1500
80	0	1600

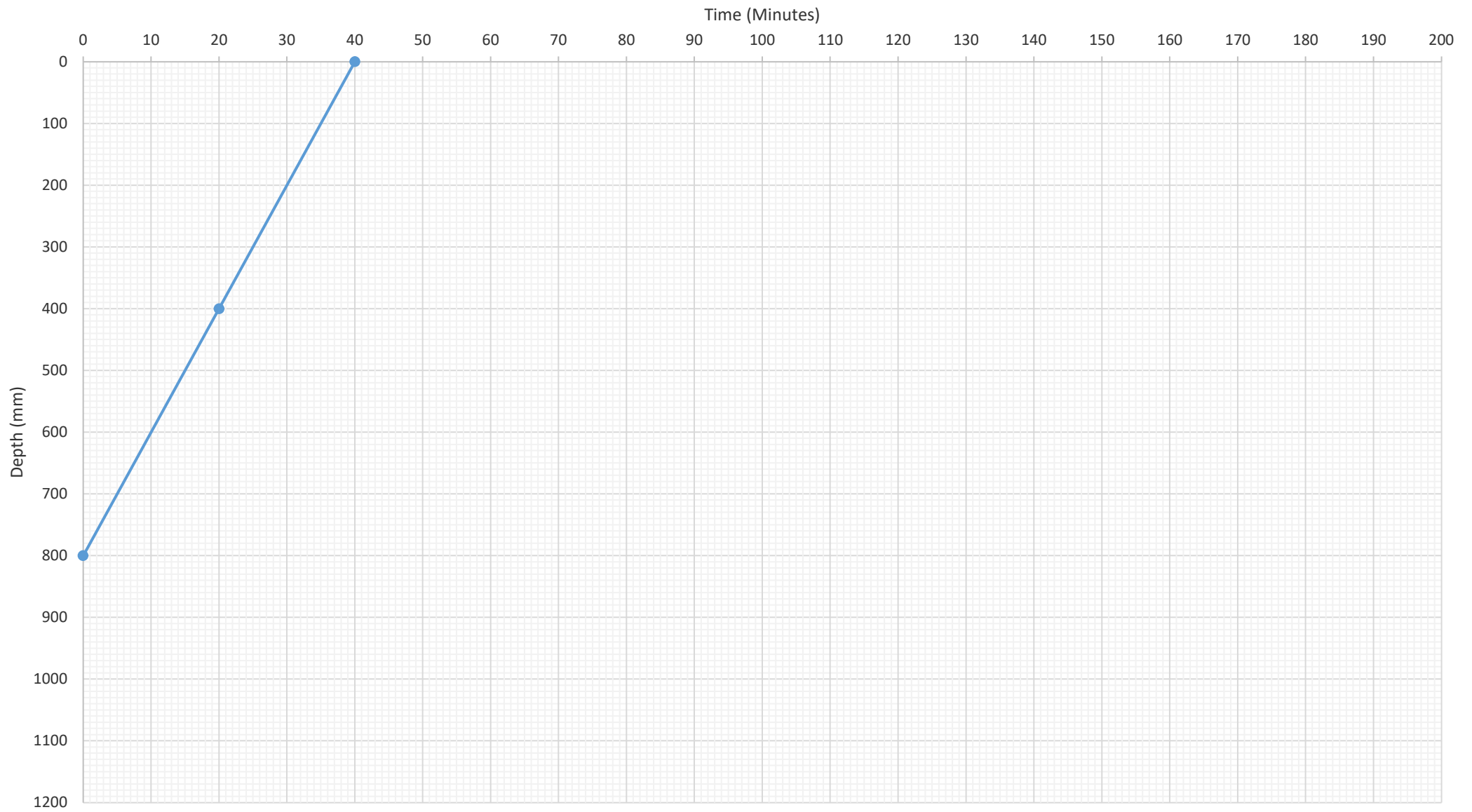
SOAKAGE PIT 1

NOTE: soakage results supplied by the Contractor

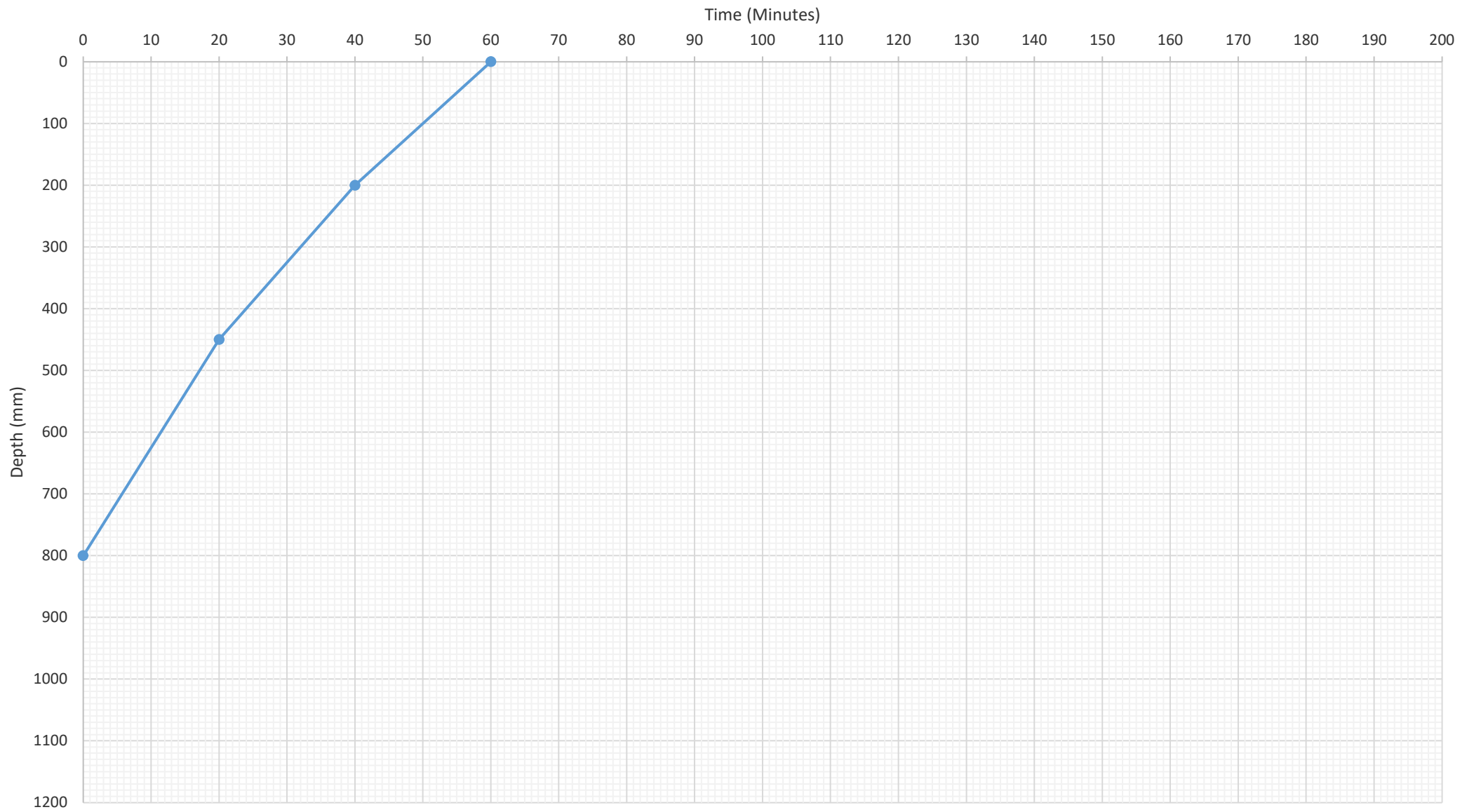
SOAKAGE TEST RESULTS

Site @ Sholing Football Club, Portsmouth Road, Bursledon, Hampshire.

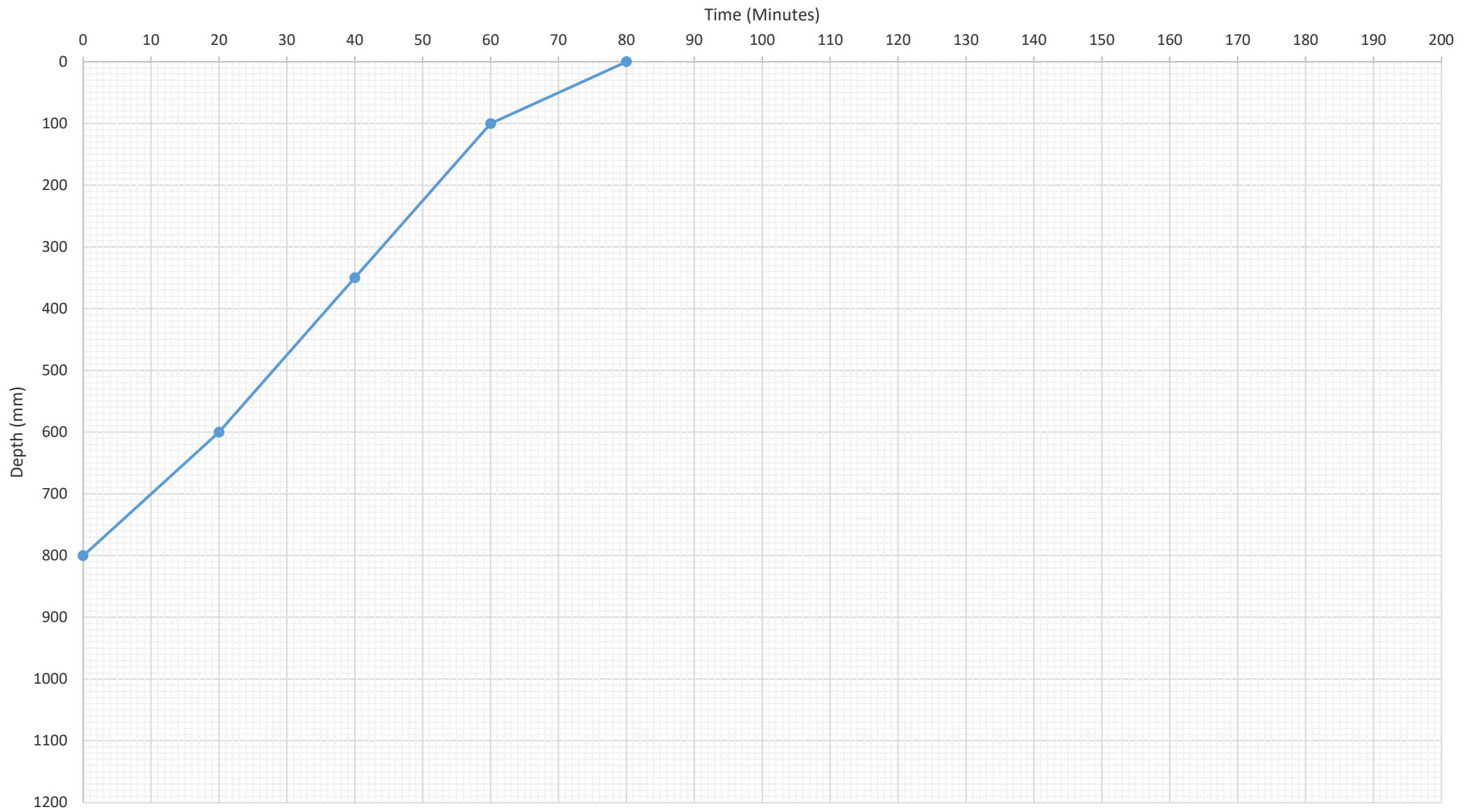
SOAKAGE PIT 1 - TEST 1



SOAKAGE PIT 1 - TEST 2



SOAKAGE PIT 1 - TEST 3



Soakage Pit 1 Test 1	Storage volume 75% to 25%	0.60	wide	
		1.00	long	
		0.40	deep	
	Total	0.24	m3	
	Surface area 50% inc. base	0.60 x 1.00	0.600	
		0.60 x 0.40	0.240	
		0.60 x 0.40	0.240	
		1.00 x 0.40	0.400	
		1.00 x 0.40	0.400	
	Total	1.880	m2	
	Time for water to drop from 75% to 25%	75%	10	
		25%	30	
		Total	20	mins
			1200	secs
	Soil infiltration rate	1.06E-04		

NOTE: soakage results supplied by the Contractor

SOIL INFILTRATION RATE CALCULATIONS

Site @ Sholing Football Club, Portsmouth Road, Bursledon, Hampshire.

Soakage Pit 1 Test 2	Storage volume 75% to 25%	0.60	wide	
		1.00	long	
		0.40	deep	
	Total	0.24	m3	
Surface area 50% inc. base	0.60 x 1.00	0.600		
	0.60 x 0.40	0.240		
	0.60 x 0.40	0.240		
	1.00 x 0.40	0.400		
	1.00 x 0.40	0.400		
	Total	1.880	m2	
Time for water to drop from 75% to 25%	75%	12		
	25%	40		
	Total	28	mins	
		1680	secs	
Soil infiltration rate			7.60E-05	

NOTE: soakage results supplied by the Contractor

SOIL INFILTRATION RATE CALCULATIONS

Site @ Sholing Football Club, Portsmouth Road, Bursledon, Hampshire.

Soakage Pit 2 Test 3	Storage volume 75% to 25%	0.60	wide	
		1.00	long	
		0.40	deep	
	Total	0.24	m3	
	Surface area 50% inc. base	0.60 x 1.00	0.600	
		0.60 x 0.40	0.240	
		0.60 x 0.40	0.240	
		1.00 x 0.40	0.400	
		1.00 x 0.40	0.400	
		Total	1.880	m2
Time for water to drop from 75% to 25%	75%	20		
	25%	52		
	Total	32	mins	
		1920	secs	
Soil infiltration rate			6.65E-05	

NOTE: soakage results supplied by the Contractor

SOIL INFILTRATION RATE CALCULATIONS

Site @ Sholing Football Club, Portsmouth Road, Bursledon, Hampshire.

Job No.	424686	Sheet		Date	May-24
Job	SHOLING FC	By	TB	Checked	CMW

Infiltration Basin Design for Grandstand & Hardstanding

Area	100.000 m ²
Urban Creep	1.100
	110.000 m ²

10 year return period

		Storm duration (Min.)
R5	0.009 m	5
R10	0.012 m	10
R15	0.015 m	15
R30	0.020 m	30
R60	0.025 m	60
R120	0.030 m	120
R240	0.036 m	240
R360	0.041 m	360
R600	0.047 m	600
R1440	0.058 m	1440

Inflow to attenuation system

I5	0.96 m ³
I10	1.36 m ³
I15	1.68 m ³
I30	2.16 m ³
I60	2.73 m ³
I120	3.33 m ³
I240	3.99 m ³
I360	4.50 m ³
I600	5.13 m ³
I1440	6.36 m ³

Outflow from Tank

f	6.65E-05 m ³ /s
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Soakaway dims:

Length	8 m
Width	5 m
Depth	0.4 m

(800mm depth but taking into account banked sides)

As50	5.2
Void ratio	100 %

Outflow from Tank:

O5	0.1037 m ³
O10	0.2075 m ³
O15	0.3112 m ³
O30	0.6224 m ³
O60	1.2449 m ³
O120	2.4898 m ³
O240	4.9795 m ³
O360	7.4693 m ³
O600	12.4488 m ³
O1440	29.8771 m ³

Storage required:

S5	0.85 m ³
S10	1.16 m ³
S15	1.37 m ³
S30	1.53 m ³
S60	1.48 m ³
S120	0.84 m ³
S240	-0.99 m ³
S360	-2.97 m ³
S600	-7.32 m ³
S1440	-23.52 m ³

Time to drain:

ts50	0.34 hours
ts50	0.46 hours
ts50	0.55 hours
ts50	0.62 hours
ts50	0.60 hours
ts50	0.34 hours
ts50	-0.40 hours
ts50	-1.19 hours
ts50	-2.94 hours
ts50	-9.45 hours

Storage provided	16.0 m ³
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Critical storm =	S30
Storage required =	1.54
Time to discharge =	0.62 Hours
	0.03 Days

Allowance for extra rain during storage period (assume average rainfall)

Average daily rain	2.60 mm
Extra rain during storage	0.01 m ³

Soakaway size proposed is satisfactory

Job No.	424686	Sheet	Date	May-24
Job	SHOLING FC	By TB	Checked	CMW

Infiltration Basin Design for Grandstand & Hardstanding

Area	100.000 m ²
Urban Creep	1.100
	110.000 m ²

30 year return period + 45%

		Storm duration (Min.)
R5	0.023 m	5
R10	0.029 m	10
R15	0.032 m	15
R30	0.040 m	30
R60	0.050 m	60
R120	0.061 m	120
R240	0.075 m	240
R360	0.085 m	360
R600	0.099 m	600
R1440	0.127 m	1440

Inflow to attenuation system

I5	2.51 m ³
I10	3.14 m ³
I15	3.57 m ³
I30	4.43 m ³
I60	5.47 m ³
I120	6.74 m ³
I240	8.28 m ³
I360	9.33 m ³
I600	10.84 m ³
I1440	13.99 m ³

Outflow from Tank

f	6.65E-05 m ³ /s
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Soakaway dims:

L	8 m
W	5 m
Depth	0.4 m

As50	5.2
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Void ratio	100 %
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Outflow from Tank:

O5	0.1037 m ³
O10	0.2075 m ³
O15	0.3112 m ³
O30	0.6224 m ³
O60	1.2449 m ³
O120	2.4898 m ³
O240	4.9795 m ³
O360	7.4693 m ³
O600	12.4488 m ³
O1440	29.8771 m ³

Storage required:

S5	2.41 m ³
S10	2.94 m ³
S15	3.26 m ³
S30	3.81 m ³
S60	4.23 m ³
S120	4.25 m ³
S240	3.30 m ³
S360	1.86 m ³
S600	-1.61 m ³
S1440	-15.89 m ³

Time to half drain:

ts50	0.97 hours
ts50	1.18 hours
ts50	1.31 hours
ts50	1.53 hours
ts50	1.70 hours
ts50	1.71 hours
ts50	1.33 hours
ts50	0.75 hours
ts50	-0.65 hours
ts50	-6.38 hours

Storage provided	16.0 m ³
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Critical storm = **S120**

Storage required = **4.25**

Time to half discharge = **1.71** Hours (Acceptable time as 1/30 year storm)

Soakaway size proposed is satisfactory

For increase from 10 year storm to 30 year storm use,

Bilham's formula $r \text{ (mm)} = (((1.25T)/N)^{(1/3.55)}) \times 25.4$

T = storm duration in hours

N = No. of storms in 10 years

T	N	r	0.4 10 year return period
0.083333	0.333333	0.015764	0.022857307 R5
0.166667	0.333333	0.01971	0.02857988 R10
0.25	0.333333	0.022402	0.032483485 R15
0.5	0.333333	0.02778	0.040281636 R30
1	0.333333	0.034318	0.049761211 R60
2	0.333333	0.042265	0.061284753 R120
4	0.333333	0.051926	0.075292981 R240
6	0.333333	0.058516	0.084848578 R360
10	0.333333	0.07	0.09854993 R600
24	0.333333	0.087685	0.127142549 R1440

Job No.	424686	Sheet	Date	May-24
Job	SHOLING FC	By TB	Checked	CMW

Infiltration Basin Design for Grandstand & Hardstanding

Area	100.000 m ²
Urban Creep	1.100
	110.000 m ²

100 year return period + 45%

		Storm duration (Min.)
R5	0.034 m	5
R10	0.042 m	10
R15	0.047 m	15
R30	0.058 m	30
R60	0.071 m	60
R120	0.088 m	120
R240	0.107 m	240
R360	0.121 m	360
R600	0.140 m	600
R1440	0.180 m	1440

Inflow to attenuation system

I5	3.69 m ³
I10	4.58 m ³
I15	5.18 m ³
I30	6.38 m ³
I60	7.85 m ³
I120	9.63 m ³
I240	11.79 m ³
I360	13.27 m ³
I600	15.38 m ³
I1440	19.80 m ³

Outflow from Tank

f	6.65E-05 m ³ /s
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Soakaway dims:

L	8 m
W	5 m
Depth	0.4 m

As50	5.2
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Void ratio	100 %
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Outflow from Tank:

O5	0.1037 m ³
O10	0.2075 m ³
O15	0.3112 m ³
O30	0.6224 m ³
O60	1.2449 m ³
O120	2.4898 m ³
O240	4.9795 m ³
O360	7.4693 m ³
O600	12.4488 m ³
O1440	29.8771 m ³

Storage required:

S5	3.59 m ³
S10	4.37 m ³
S15	4.87 m ³
S30	5.76 m ³
S60	6.60 m ³
S120	7.14 m ³
S240	6.81 m ³
S360	5.80 m ³
S600	2.93 m ³
S1440	-10.08 m ³

Time to half drain:

ts50	1.44 hours
ts50	1.75 hours
ts50	1.96 hours
ts50	2.31 hours
ts50	2.65 hours
ts50	2.87 hours
ts50	2.74 hours
ts50	2.33 hours
ts50	1.18 hours
ts50	-4.05 hours

Storage provided	16.0 m ³
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(inc pipework storage)

Critical storm = **S120**

Storage required = **7.14**

Time to half discharge = **2.87** Hours (Acceptable time as 1/100 year storm)

Soakaway size proposed is satisfactory

For increase from 10 year storm to 100 year storm use,

Bilham's formula $r \text{ (mm)} = (((1.25T)/N)^{(1/3.55)}) \times 25.4$

T = storm duration in hours

N = No. of storms in 10 years

T	N	r	0.4 10 year return period
0.083333	0.1	0.023154	0.033572958 R5 0.0087 m
0.166667	0.1	0.028694	0.04160602 R10 0.0124 m
0.25	0.1	0.032473	0.047085706 R15 0.0153 m
0.5	0.1	0.040022	0.058032361 R30 0.0196 m
1	0.1	0.0492	0.071339314 R60 0.0248 m
2	0.1	0.060356	0.087515488 R120 0.0303 m
4	0.1	0.073917	0.107179538 R240 0.0363 m
6	0.1	0.083168	0.120593207 R360 0.0409 m
10	0.1	0.10	0.139826482 R600 0.0466 m
24	0.1	0.124113	0.179963372 R1440 0.0578 m

STORAGE IN PIPES

Total length of pipework	0 m
Pipe diameter	0 mm
Volume in pipework	0 m ³