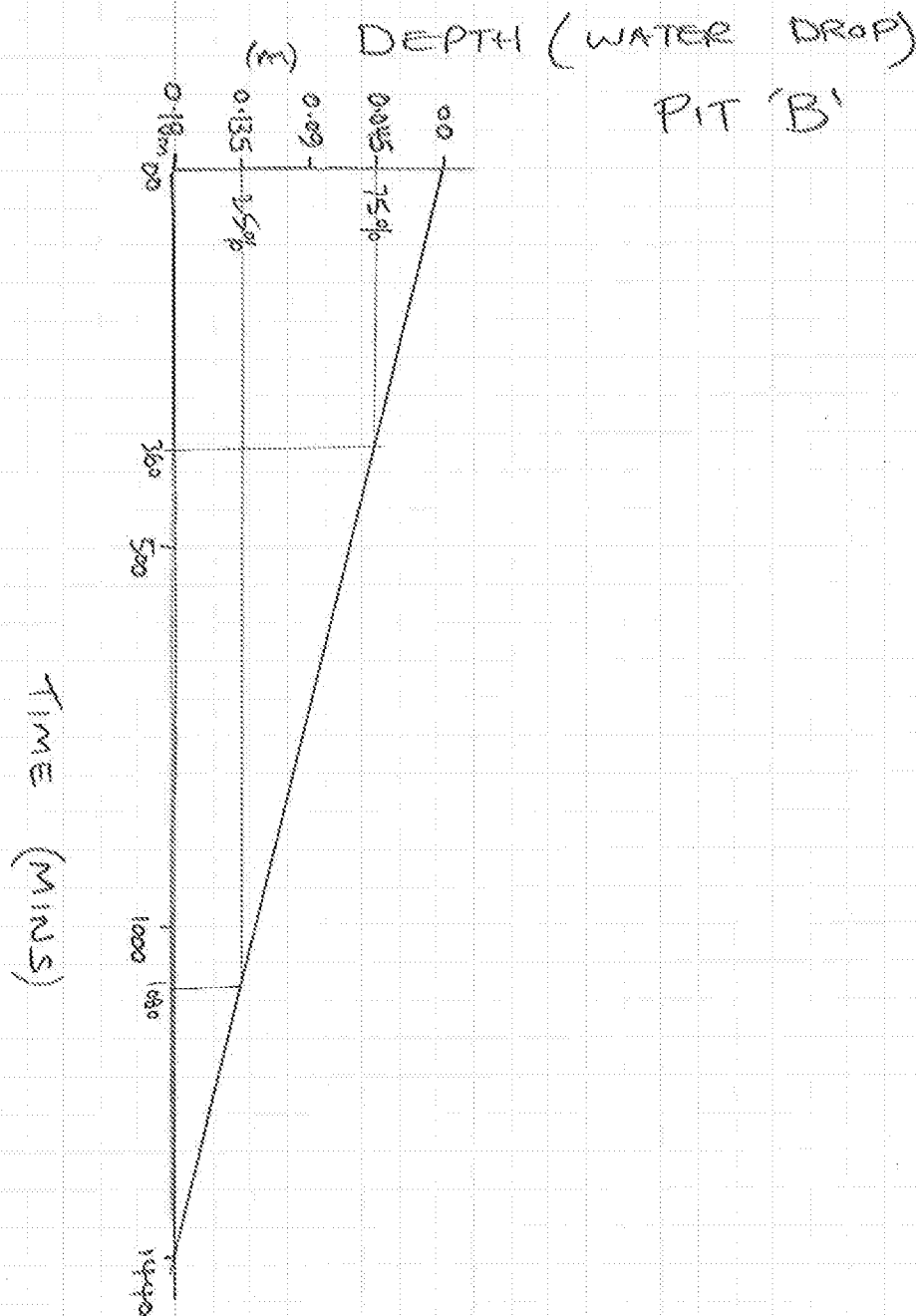


Sketch/Calc ☒ Site Visit ☐ Memo ☐
 Phone Call ☐ Meeting ☐ File Note ☐

Project No./Ref: SEFTER FARM
 Project: SOIL INFILTRATION RATE
 Section: CALCULATION

28725
Archibald Shaw
 Consulting Civil and Structural Engineers
 www.archibaldshaw.co.uk

Prepared: PEF Checked: ©Date: FEB-2018 Time:



PIT SIZE
 = 1m LONG
 1m WIDE
 1m DEEP

$$1080 - 360 = 720 \text{ mins}$$

$$= 0.0055 \text{ m/hr}$$

 Tekla Tedds Archibald Shaw 1 Little London Chichester West Sussex	Project 28725 Seftor Farm				Job no. 28725	
	Calcs for Seftor Farm				Start page no./Revision 28725 1	
	Calcs by PEF	Calcs date 08/02/2018	Checked by	Checked date	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.03

Design rainfall intensity

Location of catchment area Leeds
 Impermeable area drained to the system $A = 100.0 \text{ m}^2$
 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 $M5_{60\text{min}} = 19.0 \text{ mm}$
 Increase of rainfall intensity due to global warming $p_{clmate} = 0 \%$

Soakaway / infiltration trench details

Soakaway type Rectangular
 Minimum depth of pit (below incoming invert) $d = 10573 \text{ mm}$
 Width of pit $w = 1000 \text{ mm}$
 Length of pit $l = 1000 \text{ mm}$
 Percentage free volume $V_{free} = 30 \%$

Soil Infiltration rate (BRE digest 365)

Length of trial pit $l_{trial} = 1000 \text{ mm}$
 Width of trial pit $b_{trial} = 1000 \text{ mm}$
 Depth of trial pit (below invert) $d_{trial} = 180 \text{ mm}$
 Free volume (if fill used) $V_{trial} = 100 \%$
 75% depth of pit $d_{75} = (d_{trial} \times 0.75) = 135.00 \text{ mm}$
 50% depth of pit $d_{50} = (d_{trial} \times 0.50) = 90.00 \text{ mm}$
 25% depth of pit $d_{25} = (d_{trial} \times 0.25) = 45.00 \text{ mm}$
 Test 1 - time to fall from 75% depth to 25% depth $T1 = 720 \text{ min}$
 Test 2 - time to fall from 75% depth to 25% depth $T2 = 720 \text{ min}$
 Test 3 - time to fall from 75% depth to 25% depth $T3 = 720 \text{ min}$
 Longest time to fall from 75% depth to 25% depth $t_g = \max(T1, T2, T3) = 720 \text{ min}$
 Storage volume from 75% to 25% depth $V_{p75_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial} = 0.09 \text{ m}^3$
 Internal surface area to 50% depth $a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50}) = 1.36 \text{ m}^2$
 Surface area of soakaway to 50% storage depth $A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2 = 0.360 \text{ m}^2$
 Soil infiltration rate $f = V_{p75_25} / (a_{p50} \times t_g) = 1.53 \times 10^{-6} \text{ m/s}$
 Wetted area of pit 50% full $a_{s50} = l \times d + w \times d = 21146474 \text{ mm}^2 = 0.0055 \text{ m/hr}$

Table equations

Inflow (cl.3.3.1) $I = M10 \times A$
 Outflow (cl.3.3.2) $O = a_{s50} \times f \times D$
 Storage (cl.3.3.3) $S \geq I - O$

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;	0.81
10	0.51;	9.7;	1.22;	11.8;	1.18;	0.02;	1.16
15	0.62;	11.8;	1.23;	14.5;	1.45;	0.03;	1.42
30	0.79;	15.0;	1.24;	18.6;	1.86;	0.06;	1.80

Archibald Shaw Limited		Page 1
One Little London Chichester Sussex PO19 1PP	SEFTER FARM PAGHAM POROUS CAR PARK	
Date Feb 2018 File porous car park.SRC	Designed By PF Checked By	
Micro Drainage	Source Control W.11.2	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 440 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m³)	Status
15 Summer	0.1	0.1	100.0437	0.0438	1.7	O K
30 Summer	0.1	0.1	100.0618	0.0618	2.5	FLOOD RISK
60 Summer	0.1	0.1	100.0807	0.0808	3.2	FLOOD RISK
120 Summer	0.1	0.1	100.0983	0.0983	3.9	FLOOD RISK
180 Summer	0.1	0.1	100.1058	0.1058	4.2	FLOOD RISK
240 Summer	0.1	0.1	100.1097	0.1098	4.4	FLOOD RISK
360 Summer	0.1	0.1	100.1127	0.1128	4.5	FLOOD RISK
480 Summer	0.1	0.1	100.1143	0.1143	4.6	FLOOD RISK
600 Summer	0.1	0.1	100.1143	0.1143	4.6	FLOOD RISK
720 Summer	0.1	0.1	100.1138	0.1138	4.6	FLOOD RISK
960 Summer	0.1	0.1	100.1123	0.1123	4.5	FLOOD RISK
1440 Summer	0.1	0.1	100.1052	0.1053	4.2	FLOOD RISK
2160 Summer	0.1	0.1	100.0933	0.0933	3.7	FLOOD RISK
2880 Summer	0.1	0.1	100.0813	0.0813	3.2	FLOOD RISK
4320 Summer	0.1	0.1	100.0618	0.0617	2.5	FLOOD RISK
5760 Summer	0.1	0.1	100.0498	0.0497	2.0	O K
7200 Summer	0.1	0.1	100.0437	0.0437	1.7	O K
8640 Summer	0.1	0.1	100.0387	0.0387	1.6	O K
10080 Summer	0.1	0.1	100.0352	0.0352	1.4	O K
15 Winter	0.1	0.1	100.0502	0.0503	2.0	FLOOD RISK
30 Winter	0.1	0.1	100.0713	0.0713	2.8	FLOOD RISK
60 Winter	0.1	0.1	100.0922	0.0923	3.7	FLOOD RISK
120 Winter	0.1	0.1	100.1123	0.1123	4.5	FLOOD RISK
180 Winter	0.1	0.1	100.1217	0.1218	4.9	FLOOD RISK
240 Winter	0.1	0.1	100.1263	0.1263	5.1	FLOOD RISK
360 Winter	0.1	0.1	100.1312	0.1313	5.2	FLOOD RISK
480 Winter	0.1	0.1	100.1318	0.1318	5.3	FLOOD RISK

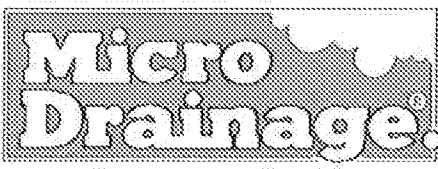
Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	122.43	19
30 Summer	92.24	33
60 Summer	52.66	62
120 Summer	32.50	122
180 Summer	24.12	182
240 Summer	19.39	240
360 Summer	14.27	338
480 Summer	11.46	392
600 Summer	9.66	454
720 Summer	8.40	520
960 Summer	6.72	654
1440 Summer	4.91	924
2160 Summer	3.57	1320
2880 Summer	2.85	1700
4320 Summer	2.07	2420
5760 Summer	1.64	3064
7200 Summer	1.38	3816
8640 Summer	1.19	4504
10080 Summer	1.06	5248
15 Winter	122.43	18
30 Winter	92.24	33
60 Winter	52.66	62
120 Winter	32.50	120
180 Winter	24.12	178
240 Winter	19.39	234
360 Winter	14.27	346
480 Winter	11.46	450

Archibald Shaw Limited		Page 2
One Little London Chichester Sussex PO19 1PP	SEFTER FARM PAGHAM POROUS CAR PARK	
Date Feb 2018 File porous car park.SRC	Designed By PF Checked By	
Micro Drainage	Source Control W.11.2	

Summary of Results for 100 year Return Period (+30%)

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m³)	Status
600 Winter	0.1	0.1	100.1308	0.1308	5.2	FLOOD RISK
720 Winter	0.1	0.1	100.1298	0.1298	5.2	FLOOD RISK
960 Winter	0.1	0.1	100.1257	0.1258	5.0	FLOOD RISK
1440 Winter	0.1	0.1	100.1148	0.1148	4.6	FLOOD RISK
2160 Winter	0.1	0.1	100.0953	0.0953	3.8	FLOOD RISK
2880 Winter	0.1	0.1	100.0758	0.0768	3.1	FLOOD RISK
4320 Winter	0.1	0.1	100.0512	0.0512	2.9	FLOOD RISK
5760 Winter	0.1	0.1	100.0417	0.0417	1.7	O K
7200 Winter	0.1	0.1	100.0358	0.0357	1.4	O K
8640 Winter	0.1	0.1	100.0313	0.0312	1.2	O K
10080 Winter	0.1	0.1	100.0277	0.0277	1.1	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
600 Winter	9.66	488
720 Winter	8.40	558
960 Winter	6.72	712
1440 Winter	4.91	1010
2160 Winter	3.57	1428
2880 Winter	2.85	1792
4320 Winter	2.07	2424
5760 Winter	1.64	3168
7200 Winter	1.38	3888
8640 Winter	1.19	4584
10080 Winter	1.06	5344

Archibald Shaw Limited		Page 3
One Little London Chichester Sussex PO19 1PP	SEFTER FARM PAGHAM POROUS CAR PARK	
Date Feb 2018 File porous car park.SRC	Designed By PF Checked By	
Micro Drainage	Source Control W.11.2	

Rainfall Details

Region	ENC+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	20.000	Shortest Storm (mins)	15	Climate Change %	+30
Ratio-R	0.350	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.010

Time (mins)	Area (ha)
from: to:	
0 4	0.010

Archibald Shaw Limited		Page 4
One Little London Chichester Sussex PO19 1PP	SEFTER FARM PAGHAM POROUS CAR PARK	
Date Feb 2018 File porous car park.SRC	Designed By PF Checked By	
Micro Drainage		Source Control W.11.2

Porous Car Park Details

Infil Coef - Base (m/hr)	0.005500	Invert Level (m)	100.000
Membrane Percolation (mm/hr)	1000	Cover Level (m)	100.250
Safety Factor	1.5	Slope (1:x)	0.0
Porosity	0.40	Max Percolation (l/s)	27.8
Length (m)	10.0	Depression Storage (mm)	5
Width (m)	10.0	Evaporation (mm/day)	3

MAX WATER LEVEL
= 132mm

ALL WATER IS RETAINED WITHIN
250mm DEEP CAR PARK
CONSTRUCTION