STEVENSON ASSOCIATES

COMMON ROAD, BRIERLEY

Drainage Statement

Unit 2, Hillcrest, Monk Fryston, Leeds, LS25 5EX
Email LS255WZ@btinternet.com; stevensonassociates@hotmail.co.uk;
Telephone 01977 682824

CONTENTS

Existing Ground / Soakaway Tests 3

Design Considerations 4

Appendix 1 – Infiltration Tests 5

Appendix 2 - Soakaway Calculation 8

Appendix 3 – Indicative Layout 9

EXISTING GROUND / SOAKAWAY TESTS

1 A soakaway test in accordance with BRE Digest 365 was repeated three times on 2nd 3rd 4th May 2017 to the rear of the new dwelling within the old quarry. The area had been partially filled to a depth of around 1.4m above the former base of the quarry; the material appears to be recycled material (crushed rock and concrete aggregates sands and limited clay etc) – materials of this type are usually graded to Highway Works Class 6F1 /6F4 or 6F2, pieces less than 125mm, but without certification the particular grading is unknown.

2 The trial-hole trench was taken down to the depth of the original quarry workings prior to refilling.

3 Although water does soak away slowly the test results are considered to be poor: infiltration rates of between $3.21e^{-7}$ m/s and $4.06e^{-7}$ m/s – the lower figure then being used for design purposes.



DESIGN CONSIDERATIONS

4 The current edition of BRE Digest 365 states that soakaways should be designed so as not to cause flooding during storms with an annual probability of 1% (1 in 100-years) and additional measures taken for climate change – currently regarded as 30% increase in rainfall intensities.

5 The area to be drained is some 400 square metres and calculations show that 32 cubic metres of water would need to be stored for a storm of 6 hour duration and 43 cubic metres for a 24 hour storm.

6 The guide also states that soakaways should empty by half within 24 hours of the storm but calculations show this would not happen and therefore it will be necessary to provide additional storage within the system to accommodate successive rainfall events. It is proposed to provide an additional 50% storage capacity to the 6-hour requirement – an additional 16 cubic metres.

7 Using modular cell type units (StormCell, AquaCell etc) a soakaway 64 metres in length, 1m deep and 800mm wide (two 400mm cells) will provide 48.64 cubic metres of storage capacity – an indicative layout is appended to the report.

M. Stevenson

Michael Stevenson

24th May 2017

APPENDIX 1 – INFILTRATION TESTS

PERMEABILITY TEST

2, 3 4 May 2017
Weather: dry period, warm

Common Road,
Brierley
Barnsley

Time	Duration (mins)	Depth [dip] (m)	Width 0.3	Length 1.55	Pit Depth 1.4	Permeability (per section)	Permeability 75%-25%
08:00:00	0	0.820					
09:30:01	90	0.830				3.32E-07	
12:00:00	240	0.835				1.01E-07	
15:00:00	420	0.850				2.55E-07	
16:30:01	510	0.870				6.99E-07	
08:00:00	1441	0.930				2.16E-07	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	

Design Figure 3.21E-07

Design Figure is carried over into 'Soakaway Design'

STEVENSON ASSOCIATES
Unit 2, Hillcrest
Monk Fryston
Leeds
LS25 5EX

PERMEABILITY TEST

2, 3 4 May 2017
Weather: dry period, warm

Common Road,
Brierley
Barnsley

Time	Duration (mins)	Depth [dip] (m)	Width	Length	Pit Depth	Permeability (per section)	Permeability 75%-25%
			0.3	1.55	1.4		
09:00:00	0	0.350					
10:50:00	110	0.390				6.59E-07	
13:00:00	240	0.430				5.78E-07	
14:45:00	345	0.440				1.83E-07	
16:40:00	460	0.470				5.10E-07	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	

Design Figure 4.82E-07

Design Figure is carried over into 'Soakaway Design'

STEVENSON ASSOCIATES
Unit 2, Hillcrest
Monk Fryston
Leeds
LS25 5EX

PERMEABILITY TEST

2, 3 4 May 2017
Weather: dry period, warm

Common Road,
Brierley
Barnsley

Time	Duration (mins)	Depth [dip] (m)	Width 0.3	Length 1.55	Pit Depth 1.4	Permeability (per section)	Permeability 75%-25%
07:30:00	0	0.620					
09:00:00	90	0.650				7.84E-07	
10:30:00	180	0.660				2.67E-07	
12:00:00	270	0.670				2.70E-07	
13:30:00	360	0.680				2.74E-07	
15:00:00	450	0.695				4.16E-07	
16:30:00	540	0.710				4.24E-07	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	
	invalid	0.000				Invalid	

Design Figure 4.06E-07

Design Figure is carried over into 'Soakaway Design'

STEVENSON ASSOCIATES
Unit 2, Hillcrest
Monk Fryston
Leeds
LS25 5EX

APPENDIX 2 - SOAKAWAY CALCULATION

SOAKAWAY SIZE CALCULATION

Common Road, Brierley

			100-YEAR STORM	STORM + 30%
M5-60 = 19mm		Duration (min)	Rainfall (mm/hr)	Rainfall (mm/hr)
r= 0.35				
		15	89.01	115.71
		30	59.84	77.79
Infiltration rate		60 - 1 hr	38.41	49.93
(worse case)	3.21E-07	120 - 2hrs	23.81	30.95
		180 - 3hrs	17.74	23.06
Infiltration		240 - 4 hrs	14.29	18.58
Test 1	3.21E-07	360 - 6 hrs	10.55	13.72
Test 2	4.82E-07	720 -12 hrs	6.17	8.02
Test 3	4.06E-07	1440 - 24 hrs	3.59	4.67

SOAKAWAY SIZE	
Length (m)	64
Width (m)	0.8
Depth (m)	1
StormCell	
Soakaway	
1/2 Internal side area (m2)	64.8
95% Voids	48.64

DRAINED AREA (sq.m) 400

		INFLOW (m3)	OUTFLOW (m3)	STORAGE REQUIRED	SIZE OK	
15 minute		11.57	0.00	11.57	Pass	15
30 minute		15.56	0.01	15.55	Pass	30
60 minute	- 1 hr	19.97	0.03	19.94	Pass	60
120 minute	-2 hrs	24.76	0.08	24.69	Pass	120
180 minute	- 3 hrs	27.67	0.13	27.55	Pass	180
240 minute	-4 hrs	29.72	0.18	29.54	Pass	240
360 minute	-6 hrs	32.92	0.30	32.61	Pass	360
720 minute	-12 hrs	38.50	0.71	37.79	Pass	720
1440 minute	- 24 hrs	44.80	1.65	43.15	Pass	1440

STEVENSON ASSOCIATES
Unit 2, Hillcrest
Monk Fryston
Leeds
LS25 5EX

APPENDIX 3 – INDICATIVE LAYOUT

