

18th September 2015
Our Ref: 15.8794

Herongate Homes
10 The Arcade,
Bognor Regis,
PO21 1LH

FAO Thomas Elliott

Soil Infiltration Testing – Plot 5 Hobbs Farm

Dear Thomas,

I write further to the completion of Soil Infiltration testing recently carried out at the above site as instructed by Herongate Homes. This factual letter provides copies of the test data obtained and discusses any relevant limitations to the test procedure.

The aim of this investigation was to assist in determining an infiltration rate of the underlying soils with regards to final drainage design.

Site works

The site works were completed over a single day's operation on the 15th September 2015, supervised by an Engineering Geologist from CE.

In total two (2no.) Infiltration tests were completed in positions determined by on site conditions.

The testing was carried out in general accordance with BRE365 methods; following the mechanical excavation and squaring of the pit sides, each trial pit was filled rapidly with clean water and the subsequent fall in water level monitored over time. The aim of the test is to reach the 25% fill depth marker to determine an infiltration rate for the soil.

Ground Conditions

The relevant 1:50,000 British Geological Survey Map (332, Bognor) indicates the site to be directly underlain by bedrock geology of the Upper Chalk with superficial deposits of Brickearth.

The following strata conditions were encountered during the intrusive works:

Made Ground – Made ground soils were proven to 0.45mbgl. SA1 displayed a dark grey sandy Gravel of black tarmac and pink purple road chippings. SA2 was recorded as a light to dark brown sandy cobbly Clay with coarse gravel to cobble sized angular brick fragments.

Sandy Clay – Recorded from 0.35mbgl to a maximum depth of 1.40mbgl. This was described as a soft consistency brown gently fissured sandy Clay with occasional rootlets and orange and black mottling.

Results

SA1

A 1.30m deep pit was filled to 0.60mbgl. Over 360 minutes (6 hours) of monitoring the resulting water level had only fallen 320mm, therefore reaching the 54% marker. Due to the low drop in water level, and the 25% marker having not been reached within the allowable time, an accurate infiltration rate could not be calculated for these soils. Extrapolation of the data suggests that the 25% would be reached in approximately 2040 minutes (34 hours), and an estimated infiltration rate of 1.77×10^{-6} has been calculated for this single test.

SA2

A 1.40m deep pit was filled to 0.69mbgl. Over 260 minutes (4 hours 40 minutes) of monitoring the resulting water level had only fallen 200mm, therefore reaching the 72% marker. Due to the low drop in water level, and the 25% marker having not been reached within the allowable time, an accurate infiltration rate could not be calculated for these soils. Extrapolation of the data suggests that the 25% would be reached in approximately 1473 minutes (24 hours 33 minutes), and an estimated infiltration rate of 2.48×10^{-6} has been calculated for this single test.

The table below shows some of the details for each soakaway test. The full results of the BRE tests are appended.

BRE Test	Pit dimensions (m)			Water Depth (mbgl)		Length of test (minutes)	Time at (minutes)		Extrapolated infiltration rate (m/s)
	Depth	Width	Length	Start	End		75%	25%	
SA1	1.3	1.1	2.0	0.60	0.92	360	140	-	1.77×10^{-6}
SA2	1.4	1.1	2.1	0.69	0.89	260	160	-	2.48×10^{-6}

In light of these figures, the extrapolated results correlate to 'poor' drainage (Ref: 'Soil Mechanics in Engineering Practice' by Karl Terzaghi, Ralph B. Peck and Gholamreza Mesri; Table 14.1 Permeability and drainage characteristics of soils (after Casagrande and Fadum 1940)) and it should be stated that this is based upon invalid tests using extrapolated data and the results are likely to be even lower, particularly within saturated soil conditions. We would suggest that if full confirmation of the soil infiltration rate is required then further testing should be considered.

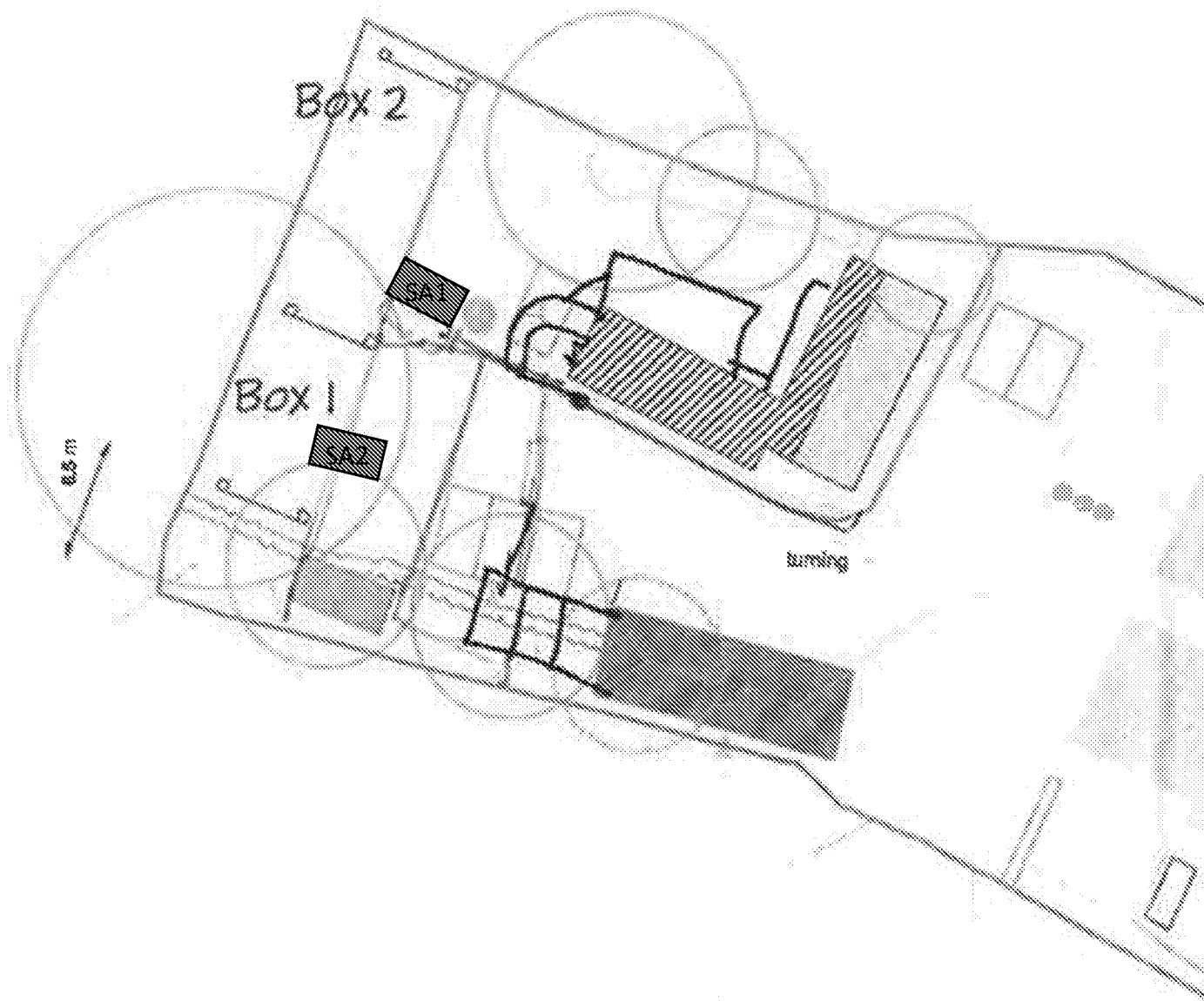
I trust the above information is sufficient for your requirements in this matter, should you have any queries please do not hesitate to contact me.

Kind Regards,

Constructive Evaluation Limited

Stuart Milne MSc, BSc
Engineering Geologist

Encl: Appendix A - Site Plan
Appendix B - Infiltration Results



Legend



Infiltration Test Location



Project: 15.8794

**Location: Plot 5 Hobbs
Farm**

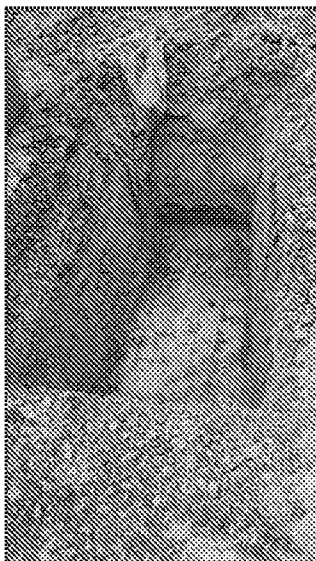
Client: Herongate Homes

Investigation Photographs

Project Ref: 15.8794

Site Name: Plot 5 Hobbs Farm

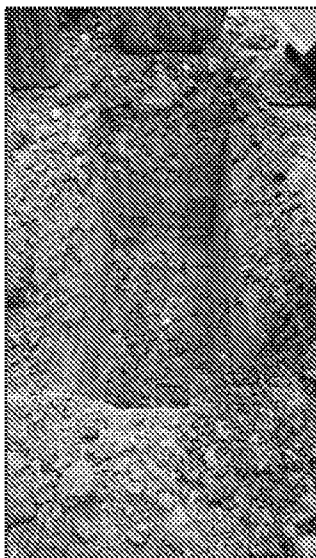
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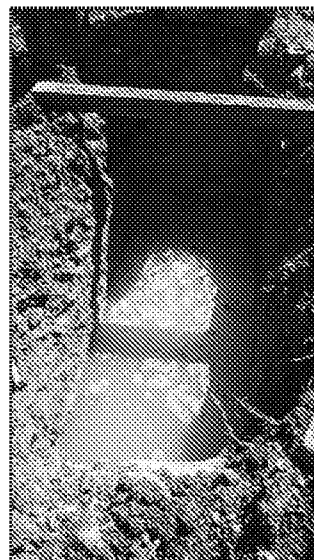
2.



3.



4.



- 1) SA1 Excavation.
- 2) SA1 Test.
- 3) SA2 Excavation.
- 4) SA2 Test.



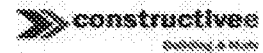
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Soakaway Test Results & Soil Infiltration Rate

Site: Plot 5 Hobbs Farm

Job No: 15.8794

Trial Hole: SA1



Test 1

Time in minutes	Depth in meters to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.600	0.70	100.0%
0.50	0.600	0.70	100.0%
1.00	0.610	0.69	98.6%
1.50	0.610	0.69	98.6%
2.00	0.620	0.68	97.1%
3.00	0.620	0.68	97.1%
4.00	0.620	0.68	97.1%
5.00	0.630	0.67	95.7%
7.00	0.640	0.66	94.3%
8.00	0.640	0.66	94.3%
9.00	0.650	0.65	92.9%
10.00	0.650	0.65	92.9%
15.00	0.650	0.65	92.9%
20.00	0.660	0.64	91.4%
25.00	0.660	0.64	91.4%
30.00	0.670	0.63	90.0%
35.00	0.670	0.63	90.0%
40.00	0.670	0.63	90.0%
45.00	0.680	0.62	88.6%
50.00	0.680	0.62	88.6%
60.00	0.690	0.61	87.1%
75.00	0.700	0.60	85.7%
90.00	0.710	0.59	84.3%
100.00	0.725	0.58	82.1%
120.00	0.750	0.55	78.6%
140.00	0.760	0.54	77.1%
180.00	0.800	0.50	71.4%
200.00	0.815	0.49	69.3%
240.00	0.840	0.46	65.7%
280.00	0.880	0.42	60.0%
320.00	0.890	0.41	58.6%
360.00	0.920	0.38	54.3%
360.00	0.920	0.38	54.3%

WARNING DOES NOT FALL TO 25% OF START DEPTH-Refer to graph sheet for calculation

Pit Size	Time in mins
Length 2.00	140 75%
Width 1.10	25%
Depth 1.30	

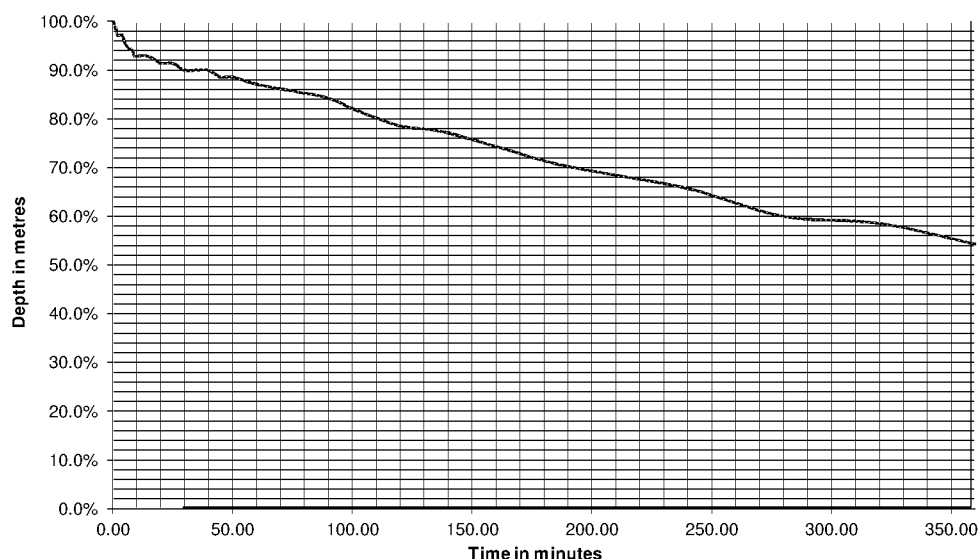
invalid 25% and/or 75% times

Infiltration Rate

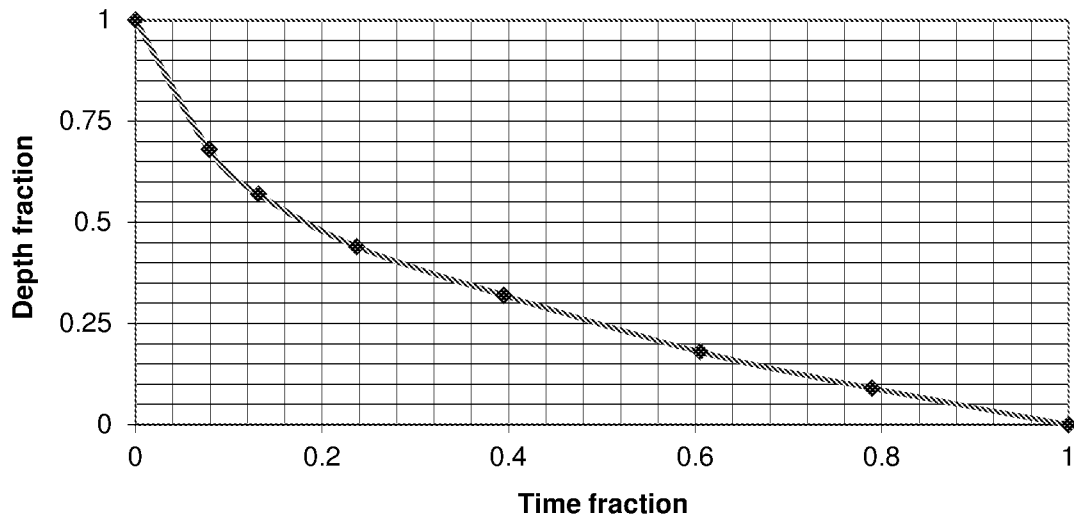
from 75%-25%

not valid

Permeability Graph SA1



BRE 365 data



Pit dimensions

width 1.1
length 2

Design depth of water in soakaway

depth 1.125

Depth of water at start of test

depth 0.700 m
fraction 0.622

Depth of water at end of test

depth 0.380 m
fraction 0.338

Elapsed time

360 mins

Drained fraction

0.284

Time fraction for start depth fraction

0.135

Time fraction for end depth fraction

0.210

Elapsed time fraction

0.075

Time fraction to drain depth fraction 0.75 to 0.25

0.425

Predicted drainage time for depth fraction 0.75 to 0.25

2040 mins

(Elapsed time x 0.425 / Elapsed time fraction)

V_{p75-25} 1.24 m³

a_{p50} 3.49 m²

a_{p50} 5.69 m²

without base

with base

Filtration rates

f 2.89901E-06 m/s

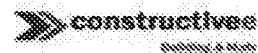
f 1.77763E-06 m/s

Soakaway Test Results & Soil Infilltration Rate

Site: Plot 5 Hobbs Farm

Job No: 15.8794

Trial Hole: SA2



Test 1

Time in minutes	Depth in meters to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.690	0.71	100.0%
0.50	0.690	0.71	100.0%
1.00	0.700	0.70	98.6%
1.50	0.700	0.70	98.6%
2.00	0.700	0.70	98.6%
3.00	0.710	0.69	97.2%
4.00	0.710	0.69	97.2%
5.00	0.720	0.68	95.8%
7.00	0.720	0.68	95.8%
8.00	0.730	0.67	94.4%
9.00	0.740	0.66	93.0%
10.00	0.740	0.66	93.0%
15.00	0.740	0.66	93.0%
20.00	0.750	0.65	91.5%
25.00	0.750	0.65	91.5%
30.00	0.760	0.64	90.1%
35.00	0.760	0.64	90.1%
40.00	0.765	0.64	89.4%
45.00	0.770	0.63	88.7%
50.00	0.770	0.63	88.7%
60.00	0.785	0.62	86.6%
75.00	0.800	0.60	84.5%
90.00	0.800	0.60	84.5%
100.00	0.810	0.59	83.1%
120.00	0.815	0.59	82.4%
140.00	0.820	0.58	81.7%
180.00	0.860	0.54	76.1%
200.00	0.860	0.54	76.1%
220.00	0.870	0.53	74.6%
240.00	0.880	0.52	73.2%
260.00	0.890	0.51	71.8%
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260.00	0.890	0.51	71.8%

WARNING DOES NOT FALL TO 25% OF START DEPTH-Refer to graph sheet for calculation

Pit Size	Time in mins
Length 2.10	160 75%
Width 1.10	25%
Depth 1.40	

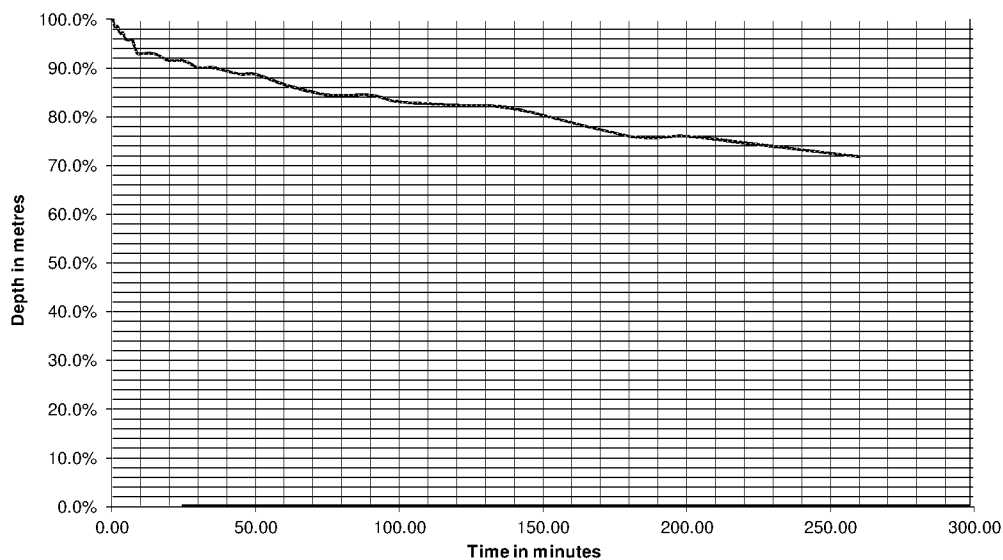
invalid 25% and/or 75% times

Infiltration Rate

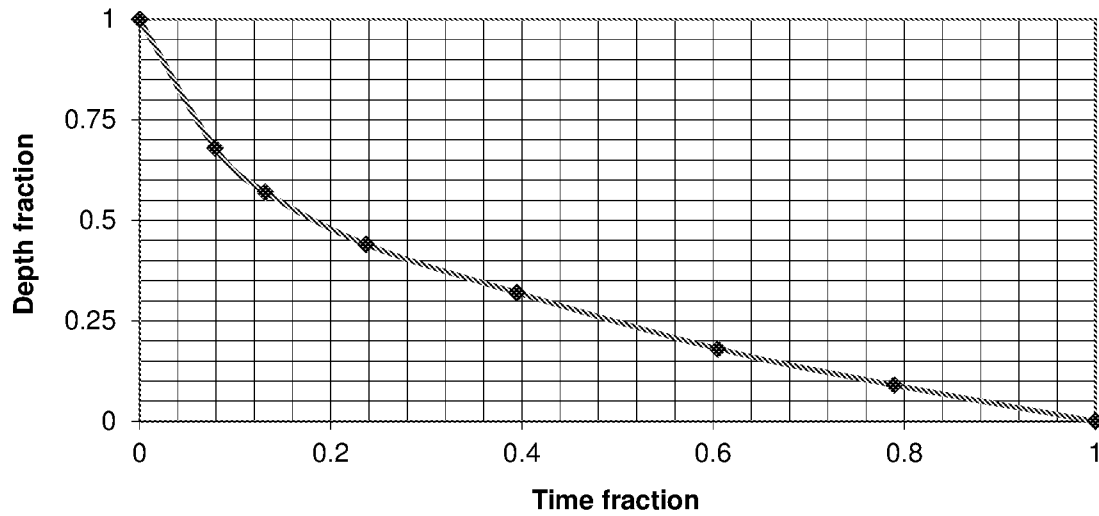
from 75%-25%

not valid

Permeability Graph SA1



BRE 365 data



Pit dimensions

width 1.1
length 2.1

Design depth of water in soakaway

depth 1.125

Depth of water at start of test

depth 0.710 m
fraction 0.631

Depth of water at end of test

depth 0.510 m
fraction 0.453

Elapsed time

260 mins

Drained fraction

0.178

Time fraction for start depth fraction

0.135

Time fraction for end depth fraction

0.210

Elapsed time fraction

0.075

Time fraction to drain depth fraction 0.75 to 0.25 0.425

Predicted drainage time for depth fraction 0.75 to 0.25

1473 mins

(Elapsed time x 0.425 / Elapsed time fraction)

V_{p75-25} 1.30 m³

a_{p50} 3.60 m²

a_{p50} 5.91 m²

without base

with base

Filtration rates

f 4.083E-06 m/s

f 2.48711E-06 m/s