

12th June 2019

Our ref: GE18233/GR02/190612

Lance Else
Bovis Homes Ltd
Central 40
Lime Tree Way
Chineham Business Park
Basingstoke
RG24 8GU

Dear Lance,

RE: Burndell Road, Yapton

Further to your instruction, we write to present the findings of the recent trial pit soakage testing undertaken on this site.

Background

2015 Investigation

A ground investigation was undertaken by BRD Environmental Limited in 2015 (report ref. BRD2484-OR2-A, dated December 2015) on which Bovis is understood to have formal reliance. With reference to the BRD report, the ground conditions encountered were reported as primarily silt and clay with varying but sub-ordinate proportions of sand and gravel across the site. Chalk was encountered in four window sample boreholes from depths in the range 4.05-4.95m bgl.

Groundwater was reportedly encountered in several exploratory holes during the intrusive investigation, including some superficial strata noted to be more evidently 'moist' and this being assessed as indicative of possible groundwater.

Subsequent monitoring undertaken between mid-November and mid-December 2015 reported groundwater standing at depths in the range 1.6-3.9m bgl, but generally at 1.6-2.9m bgl in December 2015. The monitoring also recorded a 0.5m rise between the mid-November and late November monitoring rounds. Reference to rainfall records from Thorney Island for November 2015 indicate spikes in rainfall of 12mm, 4mm and 7mm on the 16th, 19th and 25th of November, respectively. Thus, correlation between recorded rainfall and groundwater monitoring results indicates that changes in groundwater level were likely to be relatively responsive to rainfall events.

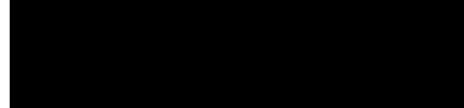
More intense rain, i.e. more frequent and longer periods of heavy rainfall were recorded for the following winter months and thus a seasonal shallowing of groundwater would be expected.

Current status

The site comprises a parcel of former agricultural land which is in the process of being developed for housing.

As part of the ongoing development, additional soakage testing requirements have been stipulated by the LPA.

Geo-Environmental Services Ltd
Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL



s | Site Investigation

Geo-Environmental Services Ltd incorporated in England number 3214980 VAT number 679544479



Geo-Environmental



The trial pit soakage test locations and pit depths were confirmed by Odyssey, the Client's Drainage Designer, and comprised a total of 10No. locations, with 4No. soakage tests (pits 1, 5, 6 & 7) at 0.75m bgl; 3No. tests (pits 4, 7 & 10) at 1m bgl; 2No. tests (pits 8 & 9) at 2.0m bgl; and 1No. test (pit 2) at 2.5m bgl. Positions were indicated on a sketch plan provided by Odyssey. Positions 3, 7 and 10 were subsequently moved slightly due to on-site constraints at the time of testing.

The LPA's stated preference is for soakage testing to be undertaken during winter months in order to best reflect the likely performance of soakaways and SuDS systems during the period(s) of greatest stress, i.e. when the ground is more likely to be saturated and groundwater at its seasonal shallowest due to winter rainfall. Given that instruction to undertake the testing was received outside of the winter period, it was agreed with Bovis that the test locations would be pre-soaked prior to commencing the soakage testing and that where infiltration did occur, as many tests as possible would be undertaken during the site works period (one week).

Soakage Testing

Trial pit soakage testing was undertaken between 3rd and 7th of June 2019. Testing positions are shown in Figure 1, with trial pit logs and test records appended to this letter.

The ground conditions encountered within the trial pits were broadly consistent with those anticipated from published geological mapping and from the 2015 intrusive investigation, i.e. predominantly silty clay soils with variable sub-ordinate proportions of sand. No appreciable gravel content was recorded in the strata exposed in the trial pits excavated.

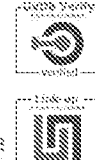
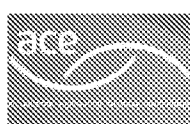
Groundwater was not encountered during the excavation of the trial pits and was not present in shallow pits where tests ran to full depth. Testing at depths in excess of 1m bgl was very slow and the presence of 'test water' in the pits for the duration of the testing could have masked any groundwater presence.

Soakage testing was undertaken in all 10No. trial pits in accordance with BRE DG365:2016. However, it should be noted that BRE DG365 requires three test cycles to be completed to a 75% drained condition in quick succession at each given location. Of the 10No. locations tested, testing in 5No. pits (TP02, TP03, TP08, TP09 & TP10) did not even achieve a single completed test cycle over the week of testing. In addition, testing at TP04 only completed one full and a second partial test cycle over the testing period. Of the remaining 4No. locations, three test cycles were completed in TP05 and TP07, and four test cycles were completed in TP01 and TP04. As such, whilst pre-soaking the ground was planned prior to completing testing, this was only achieved in two of the ten trial pit locations due to the low permeability of the ground beneath the site. Test results are summarised in Table 1 which presents the lowest infiltration rate for the testing at that location.

Location	Pit depth (m bgl)	No. of test cycles completed	Infiltration rate (m/s)
TP01	0.75	4	1.06×10^{-6}
TP02	2.0	<1	Insufficient fall in head
TP03	1.0	<1	Insufficient fall in head
TP04	1.0	2*	3.2×10^{-7}
TP05	0.75	3	9.8×10^{-7}
TP06	0.75	4	1.0×10^{-6}
TP07	0.75	3	1.3×10^{-6}
TP08	2.0	<1	Insufficient fall in head
TP09	2.0	<1	Insufficient fall in head
TP10	1.0	<1	Insufficient fall in head

NOTE: * Test cycle 2 not fully complete to 75% drained

Table 1 Summary of trial pit soakage test results



With reference to the infiltration rate presented in Table 1 for TP04, the second test cycle was considered sufficiently complete to facilitate plausible extrapolation and an estimate of permeability. The result ($3.2 \times 10^{-7} \text{m/s}$) was similar to that from test cycle 1 ($3.3 \times 10^{-7} \text{m/s}$) in this location.

Whilst infiltration rates have been calculated where sufficient fall if head of water occurred, BRE DG365 also includes a requirement for a functioning soakaway to discharge half its volume (typically taken as from full to half drained) in any given 24hour period such that it can cope with any subsequent storm event. Where testing achieves less than the half drained down condition in a 24hour period, it is considered to have failed in accordance with BRE DG365. On the basis of the 24hour half drain requirement alone, tests in TP02, TP03, TP04, TP08, TP09 and TP10 all failed and the test in TP05 only just passed, i.e. only three of the ten test locations passed the half drained time requirement.

For the three locations in which multiple test cycles could be completed and from which both infiltration rates could be calculated and the 24hour half drain condition was met, the infiltration rates varied from $1.6 \times 10^{-6} \text{m/s}$ to $1.0 \times 10^{-6} \text{m/s}$, with a mean infiltration rate of $1.3 \times 10^{-6} \text{m/s}$. All three of these locations (TP01, TP06 and TP07) comprised testing at 0.75m bgl. Infiltration rates of $3.2 \times 10^{-7} \text{m/s}$ and $9.8 \times 10^{-7} \text{m/s}$ were derived for the testing undertaken in TP04 and TP05 respectively.

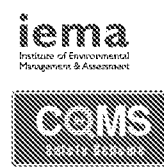
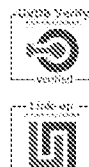
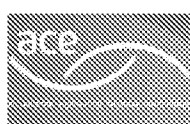
As noted above, the LPA generally requires testing to be undertaken during winter months to reflect typical worst infiltration conditions. Whilst testing was undertaken outside of winter months, it did comply with BRE DG365 for the required three completed test cycles and in TP01 and TP06, four test cycles were completed. However, it remains likely that during periods of prolonged wet weather, e.g. winter months and seasonal storm events, actual infiltration to the ground would be impeded further and thus lower infiltration rates would be achieved than those from testing presented herein. Testing on this site showed a general trend of reducing infiltration rate with successive soaking cycles.

It is also understood that the LPA has raised concerns regarding winter groundwater levels being at shallow depth beneath the site. Whilst a complete set of winter groundwater monitoring has not been undertaken for this site, monitoring from November and December 2015 recorded groundwater at depths of 1.6-2.9m bgl and demonstrated a relatively quick response for groundwater levels to rise following rainfall. Moreover, the presence of groundwater at shallow depths would only serve to inhibit infiltration in to the ground and thus even lower rates would be achievable if groundwater was present at depths where testing has been completed. Whilst not part of this site, Geo-Environmental is aware of monitoring undertaken on nearby sites where winter groundwater levels have risen to within the top metre of ground and if this were to occur on this site it would be expected to inhibit infiltration such that rates lower than $1 \times 10^{-6} \text{m/s}$ would be likely. Such conditions are considered unsuitable for use of soakaways, permeable paving or other SuDS infiltration systems and would require on-site storage during storm events and attenuation of discharge to a suitable alternative outfall, e.g. surface water network.

Monitoring to date has shown a relatively rapid response time for groundwater rising following rainfall and this presumably reflects the wider environmental setting, e.g. infiltration across a wider catchment, rather than conditions solely beneath this site. If winter groundwater levels rise to shallow depth beneath this site, then infiltration via systems such as permeable paving, soakaways or the like would surcharge the groundwater thereby increasing the risk of groundwater flooding across the site and this should be avoided.

Conclusions

Soakage testing has been undertaken in ten trial pits across this site. Testing in five of the ten pits failed to achieve a single completed test cycle over the week long testing period such that infiltration rates could not be determined. Testing in six of the ten pits failed to meet the 24hour half drain requirement of BRE DG365. Where





testing was completed, 2-4 test cycles were completed depending on location, with infiltration rates of 1.6×10^{-6} m/s to 3.2×10^{-7} m/s being calculated. Infiltration with a minimum 3 completed test cycles was only achieved in pits 0.75m deep, i.e. all testing deeper failed.

Winter monitoring (November to December 2015 only) recorded groundwater generally at 1.6-2.9m bgl but also showed levels to rise in relatively quick response to rainfall.

The presence of shallow groundwater would further impede infiltration and rates would be lower than those determined from testing completed to date.

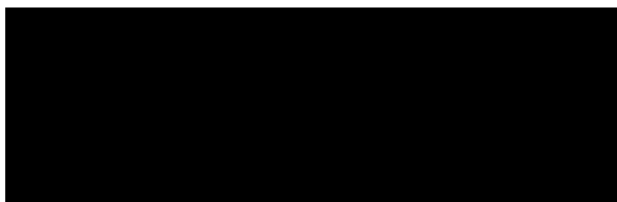
On the basis of the testing undertaken, it is concluded that discharge of storm water via infiltration systems to the ground, whether by conventional soakaway or permeable paving, will fail to perform to a satisfactory standard and alternative drainage solutions will be required. These should include on-site storage and attenuation of peak storm flow.

Closure

We trust we have provided sufficient information for your current requirements and to enable progression of a suitable drainage solution for this site. Should you have any queries please do not hesitate to contact us.

Yours sincerely

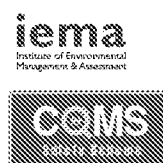
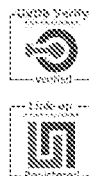
For and on Behalf of Geo-Environmental



Gavin Roberts CGeol, BEng (Hons), MSc, FGS
Technical Director



Enc Figure 1 Trial Pit Soakage Test Location Plan
 Trial pit logs
 Soakage test results





Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL

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Trial Pit Log

Trial Pit No

TP01

Sheet 1 of 1

Project Name: Burndell Road, Yapton

Project No.
GE18233

Co-ords: -
Level:

Date
03/06/2019

Location: Burndell Road, Yapton

Dimensions (m): 2.00

Depth
0.75

0.60

Scale
1:25

Logged
JN/DW

Client: Bovis Homes

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Orangish brown silty sandy CLAY RIVER TERRACE DEPOSITS	
				0.75			Orangish brown silty sandy CLAY RIVER TERRACE DEPOSITS	
							End of Pit at 0.75m	
								1
								2
								3
								4
								5
Water Strike Depth Strike			Remarks Stable during excavation. Position fenced off for soakage testing.					
Stability			AGS					



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BN6 9GL

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Trial Pit Log

Trial Pit No

TP02

Sheet 1 of 1

Project Name: Burndell Road, Yapton

Project No.
GE18233

Co-ords: -
Level:

Date
03/06/2019

Location: Burndell Road, Yapton

Dimensions (m): 3.70

Depth
2.50

0.60

Scale
1:25

Logged
JN/DW

Client: Bovis Homes

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				1.70			Orangish brown silty sandy CLAY RIVER TERRACE DEPOSITS	1
				2.50			Orangish brown and grey mottled silty very sandy CLAY RIVER TERRACE DEPOSITS	2
							End of Pit at 2.50m	3
								4
								5

Water Strike

Depth Strike

Remarks Stable during excavation. Position fenced off for soakage testing.

Stability



Trial Pit Log

Project Name: Burndell Road, Yapton

Project No.
GE18233

Co-ords: -
Level:

Date
03/06/2019

Location: Burndell Road, Yapton

Dimensions (m):	2.20
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Scale
1:25

Client: Bovis Homes

Depth
1.40

0.60

Logged
JN/DW

[illegible]



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Date
03/06/2019

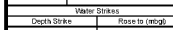
Scale
1:25

Client: Bovis Homes

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.10		 Orangish brown slightly clayey SAND with some fine rootlets RIVER TERRACE DEPOSITS  Orangish brown sandy CLAY with some fine rootlets RIVER TERRACE DEPOSITS	
				0.80		 Orangish brown silty sandy CLAY RIVER TERRACE DEPOSITS	
				1.00		 End of Pit at 1.00m	1
							2
							3
							4
							5

Water Strikes	
Depth Strike	Rose to (mlog)

Water Strikes	
Depth Strike	Rose to (mlog)



Trial Pit Log

Project Name: Burndell Road, Yapton

Project No.
GE18233

Co-ords: -
Level:

Date
03/06/2019

Location: Burndell Road, Yapton

Dimensions (m):	0	1.40
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Scale
1:25

Client: Bovis Homes

Depth
0.75

0.60

Logged
JN/DW

[illegible]



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Date
03/06/2019

Logged
JN/DW

[illegible]



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Hurstpierpoint
BN6 9GL

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Trial Pit Log

Trial Pit No

TP08

Sheet 1 of 1

Project Name: Burndell Road, Yapton

Project No.
GE18233

Co-ords: -
Level:

Date
03/06/2019

Location: Burndell Road, Yapton

Dimensions (m): 2.80

Depth
2.00

0.60

Scale
1:25

Logged
JN/DW

Client: Bovis Homes

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.10			Orangish brown slightly clayey SAND with some roots and rootlets RIVER TERRACE DEPOSITS Orangish brown silty sandy CLAY RIVER TERRACE DEPOSITS	1
				1.70			Orangish brown and grey mottled very silty sandy CLAY RIVER TERRACE DEPOSITS	2
				2.00			End of Pit at 2.00m	3
								4
								5
Water Strike		Remarks		Stable during excavation. Position fenced off for soakage testing.				
Depth Strike		Stability						



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TrialPit No
TP09
Sheet 1 of 1

Date
03/06/2019

Scale
1:25

Logged
JN/DW





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Hurstpierpoint
BN6 9GL

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Trial Pit Log

Trial Pit No
TP10
Sheet 1 of 1

Project Name: Burndell Road, Yapton

Project No.
GE18233

Co-ords: -
Level:

Date
03/06/2019

Location: Burndell Road, Yapton

Dimensions (m):
Depth 1.00

2.20

Scale
1:25

Logged
JN/DW

Client: Bovis Homes

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.10			Orangish brown slightly clayey SAND with some roots and rootlets RIVER TERRACE DEPOSITS Orangish brown silty sandy CLAY RIVER TERRACE DEPOSITS		
				1.00			End of Pit at 1.00m	1	
								2	
								3	
								4	
								5	
Water Strike Depth Strike			Remarks Stable during excavation. Position fenced off for soakage testing.						
Stability									



 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited
Project Name : Burndell Road, Yapton Client : Bovis		

Pit reference	TP01
Pit depth (m)	0.75
Pit width (m)	0.60
Pit length (m)	2.00
Depth to standing water (m)	

Test 1

Time (min)	Depth (m)
0.0	0.35
1.0	0.36
3.0	0.37
5.0	0.38
10.0	0.39
15.0	0.40
20.0	0.41
25.0	0.42
30.0	0.43
60.0	0.49
120.0	0.51
175.0	0.63
233.0	0.68
291.0	0.71
1340.0	0.75

< Pit dry

Test 2

Time (min)	Depth (m)
0.0	0.30
5.0	0.30
20.0	0.32
50.0	0.35
85.0	0.38
153.0	0.42
207.0	0.46
1295.0	0.75

< Pit dry

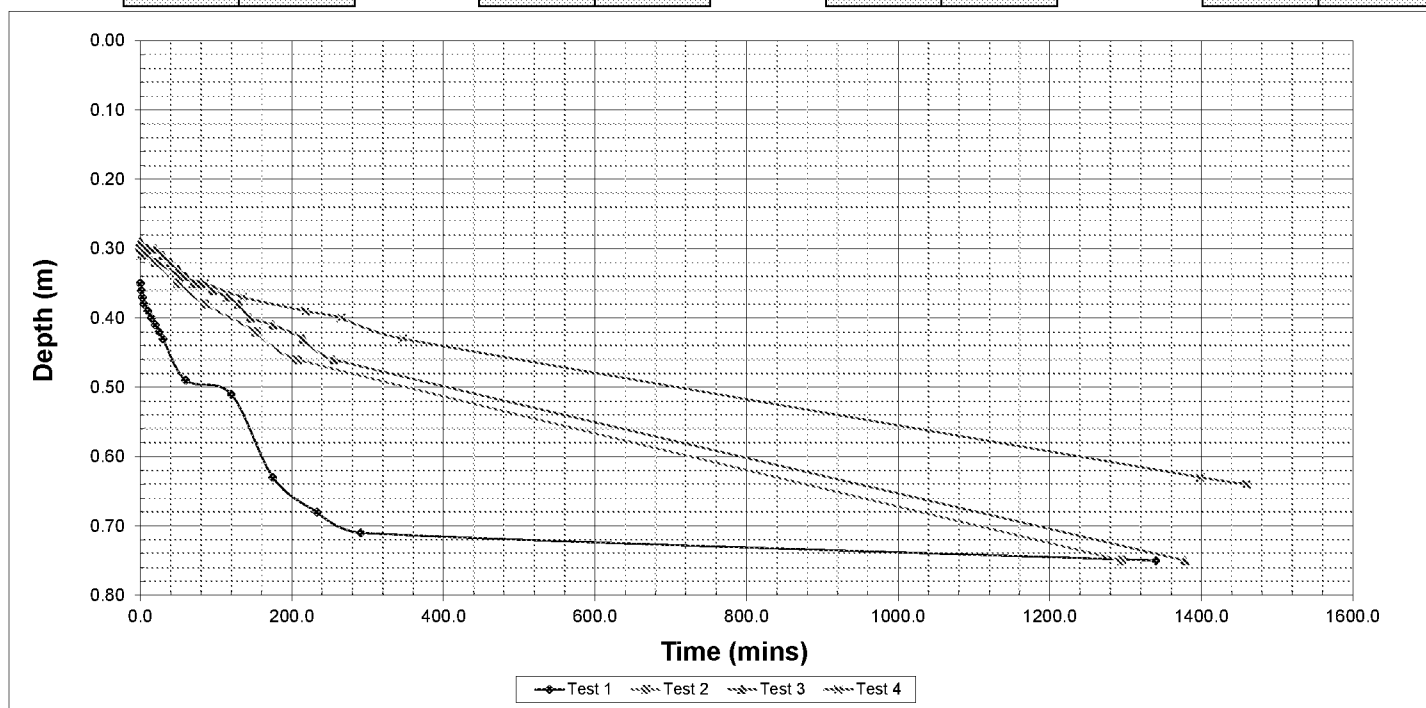
Test 3

Time (min)	Depth (m)
0.0	0.29
10.0	0.30
20.0	0.30
30.0	0.31
40.0	0.32
50.0	0.33
60.0	0.34
70.0	0.35
80.0	0.35
95.0	0.36
115.0	0.37
130.0	0.38
145.0	0.40
175.0	0.41
215.0	0.43
255.0	0.46
1378.0	0.75

< Pit dry

Test 4

Time (min)	Depth (m)
0.0	0.31
5.0	0.31
10.0	0.31
53.0	0.34
85.0	0.35
135.0	0.37
218.0	0.39
265.0	0.40
346.0	0.43
1399.0	0.63
1460.0	0.64



Pit depth at end of test (m)	0.75	0.75	0.75	0.75
Effective depth (m)	0.40	0.45	0.46	0.44
75% effective depth (m)	0.45	0.41	0.41	0.42
50% effective depth (m)	0.55	0.53	0.52	0.53
25% effective depth (m)	0.65	0.64	0.64	0.64
t75 (min)	45.00	140.00	175.00	310.00
t50 (min)	140.00	460.00	480.00	880.00
t25 (min)	190.00	885.00	960.00	1460.00
Vp 75-25	0.24	0.27	0.28	0.26
ap 50	2.24	2.37	2.396	2.344
tp 75-25	145.00	745.00	785.00	1150.00

Soil infiltration rate (m/s)	1.2E-05	2.5E-06	2.4E-06	1.6E-06
Soil infiltration rate (mm/hr)	4.43E+01	9.18E+00	8.80E+00	5.88E+00

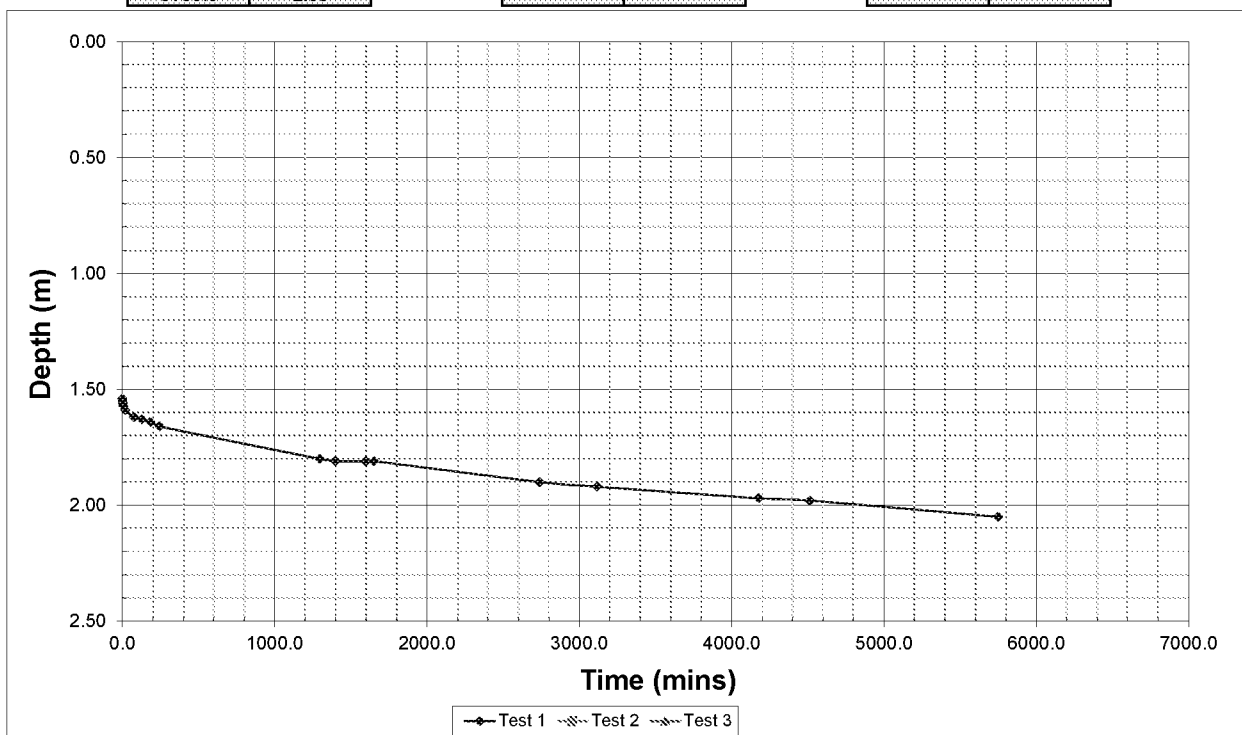
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Burndell Road, Yapton		Job No. : GE18233
Client : Bovis		Date : 03-07/06/2019

Pit reference	TP02
Pit depth (m)	2.50
Pit width (m)	0.60
Pit length (m)	3.70
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	1.54
1.0	1.55
3.0	1.56
5.0	1.57
10.0	1.57
20.0	1.59
75.0	1.62
127.0	1.63
185.0	1.64
244.0	1.66
1295.0	1.80
1400.0	1.81
1599.0	1.81
1653.0	1.81
2740.0	1.90
3117.0	1.92
4177.0	1.97
4514.0	1.98
5750.0	2.05

Test 2	
Time (min)	Depth (m)

Test 3	
Time (min)	Depth (m)



Pit depth at end of test (m)	2.50	2.50	2.50
Effective depth (m)	0.96	2.50	2.50
75% effective depth (m)	1.78	0.63	0.63
50% effective depth (m)	2.02	1.25	1.25
25% effective depth (m)	2.26	1.88	1.88
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	1.07	2.78	2.78
ap 50	6.348	12.97	12.97
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test	
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test	

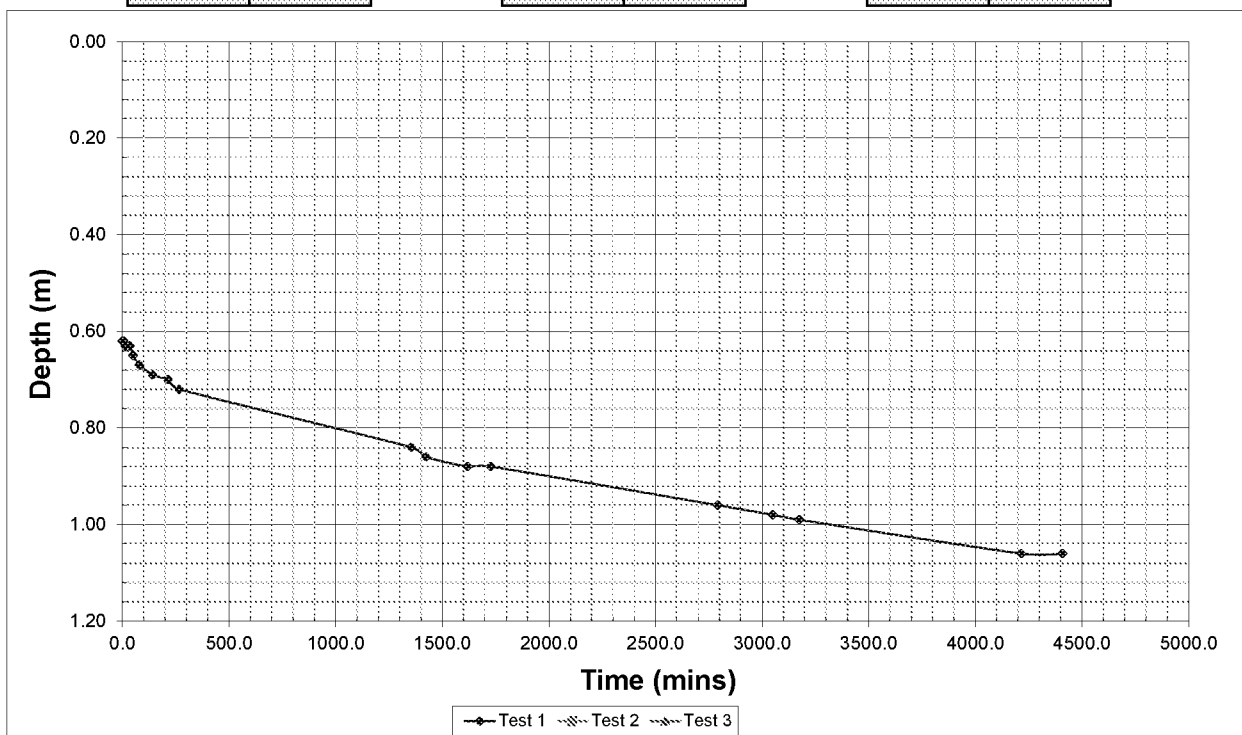
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Burndell Road, Yapton		Job No. : GE18233
Client : Bovis		Date : 03-07/06/2019

Pit reference	TP03
Pit depth (m)	1.40
Pit width (m)	0.60
Pit length (m)	2.20
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.62
5.0	0.62
15.0	0.63
35.0	0.63
50.0	0.65
80.0	0.67
142.0	0.69
213.0	0.70
267.0	0.72
1355.0	0.84
1425.0	0.86
1618.0	0.88
1727.0	0.88
2792.0	0.96
3051.0	0.98
3174.0	0.99
4216.0	1.06
4410.0	1.06

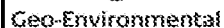
Test 2	
Time (min)	Depth (m)

Test 3	
Time (min)	Depth (m)



Pit depth at end of test (m)	1.40	1.40	1.40
Effective depth (m)	0.78	1.40	1.40
75% effective depth (m)	0.82	0.35	0.35
50% effective depth (m)	1.01	0.70	0.70
25% effective depth (m)	1.21	1.05	1.05
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.51	0.92	0.92
ap 50	3.504	5.24	5.24
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test



Geo-Environmental Services Limited
Unit 7 Danworth Farm, Cuckfield Road,
Hurstpierpoint, West Sussex BN6 9GL

Client : Bovis

Test 1

Test 2

Test 3

Time (mins)	Test 1 Depth (m)	Test 2 Depth (m)	Test 3 Depth (m)
0	0.65	0.60	0.55
200	0.72	0.68	0.62
400	0.75	0.70	0.65
1400	0.78	0.80	0.70
1700	0.80	-	-
2800	0.83	-	-
3200	0.85	-	-
4200	0.88	-	-
5700	0.92	-	-

Soil infiltration rate (m/s)	3.3E-07	3.2E-07	
Soil infiltration rate (mm/hr)	1.20E+00	1.16E+00	

 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hove, Brighton BN1 4SA
		Project Name : Burndell Road, Yapton Client : Bovis

Pit reference	TP05
Pit depth (m)	0.75
Pit width (m)	0.60
Pit length (m)	1.40
Depth to standing water (m)	

< pit base reduced during testing due to localised side collapse

Test 1

Time (min)	Depth (m)
0.0	0.30
1.0	0.31
3.0	0.31
5.0	0.31
10.0	0.31
15.0	0.31
20.0	0.32
30.0	0.32
60.0	0.34
135.0	0.37
1212.0	0.56
1295.0	0.60
1358.0	0.63

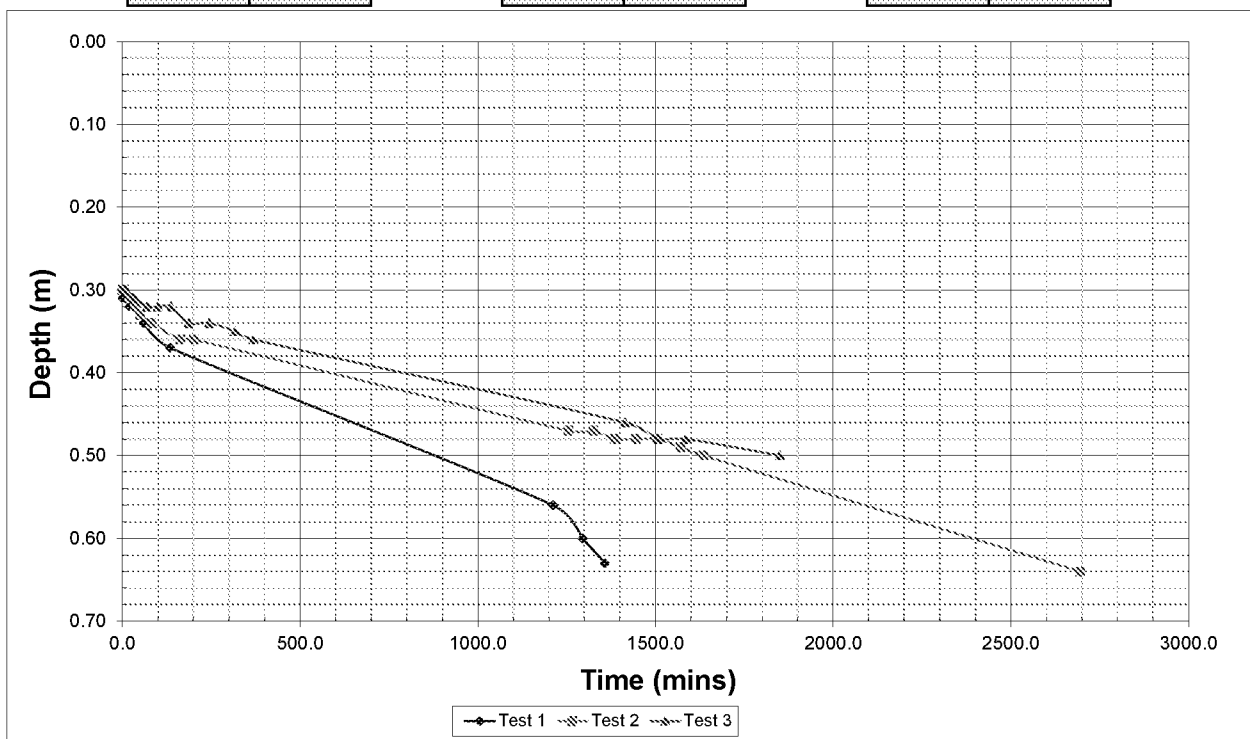
Test 2

Time (min)	Depth (m)
0.0	0.30
5.0	0.30
20.0	0.31
35.0	0.32
50.0	0.33
81.0	0.34
163.0	0.36
201.0	0.36
1255.0	0.47
1325.0	0.47
1385.0	0.48
1445.0	0.48
1506.0	0.48
1570.0	0.49
1635.0	0.50
2695.0	0.64

< Pit dry

Test 3

Time (min)	Depth (m)
0.0	0.30
5.0	0.30
10.0	0.30
35.0	0.31
70.0	0.32
100.0	0.32
137.0	0.32
187.0	0.34
244.0	0.34
317.0	0.35
369.0	0.36
1414.0	0.46
1505.0	0.48
1586.0	0.48
1850.0	0.50



Pit depth at end of test (m)	0.67	0.64	0.56
Effective depth (m)	0.37	0.34	0.26
75% effective depth (m)	0.39	0.39	0.37
50% effective depth (m)	0.49	0.47	0.43
25% effective depth (m)	0.58	0.56	0.50
t75 (min)	250.00	550.00	500.00
t50 (min)	800.00	1255.00	1250.00
t25 (min)	1250.00	2150.00	1850.00
Vp 75-25	0.16	0.14	0.11
ap 50	1.58	1.52	1.36
tp 75-25	1000.00	1600.00	1350.00

Soil infiltration rate (m/s)	1.6E-06	9.8E-07	9.9E-07
Soil infiltration rate (mm/hr)	5.90E+00	3.52E+00	3.57E+00

 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hunston, West Sussex BN16 9GJ
Project Name : Burndell Road, Yapton Client : Bovis		Date : 05-07/06/2019

Pit reference	TP06
Pit depth (m)	0.75
Pit width (m)	0.60
Pit length (m)	1.70
Depth to standing water (m)	

Test 1

Time (min)	Depth (m)
0.0	0.30
5.0	0.30
10.0	0.31
20.0	0.32
30.0	0.33
97.0	0.36
1176.0	0.54
1252.0	0.56
1317.0	0.58
1557.0	0.64

Test 2

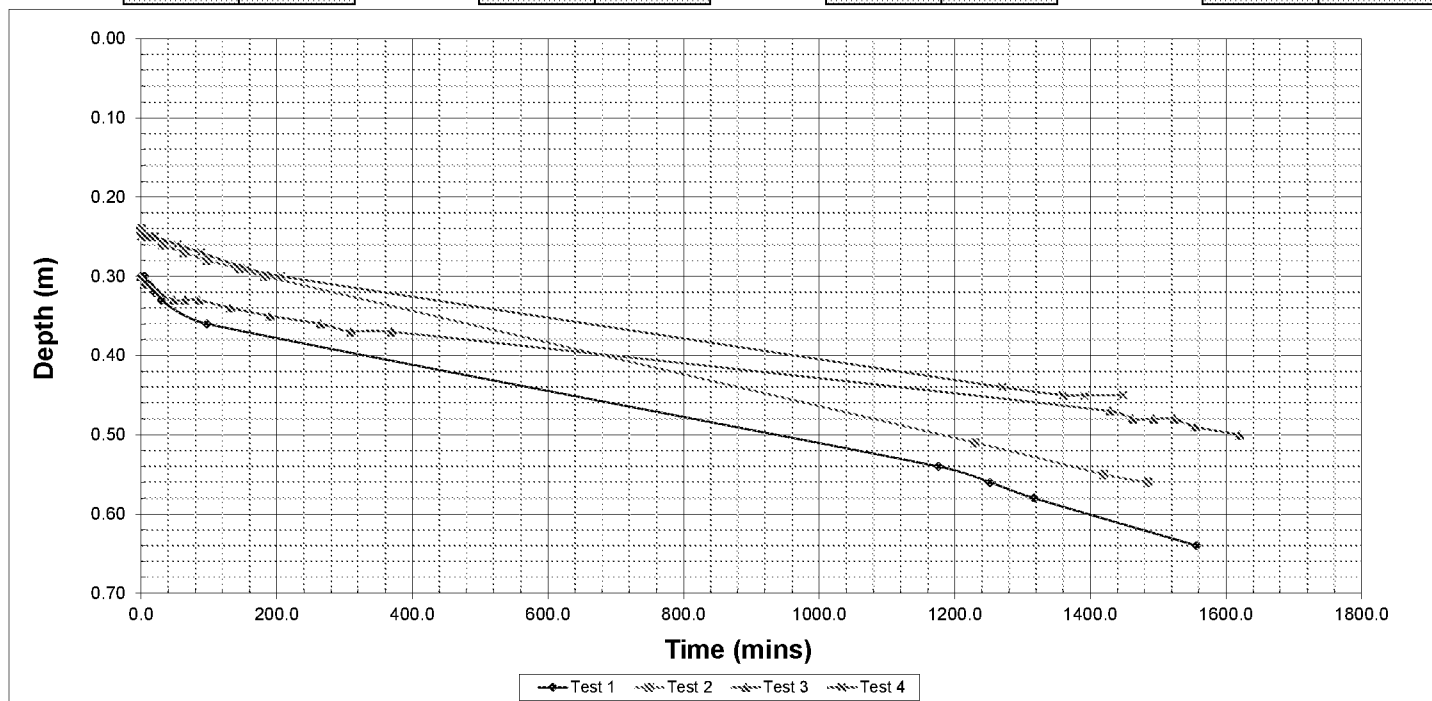
Time (min)	Depth (m)
0.0	0.24
6.0	0.25
16.0	0.25
32.0	0.26
64.0	0.27
98.0	0.28
144.0	0.29
183.0	0.30
1230.0	0.51
1420.0	0.55
1485.0	0.56

Test 3

Time (min)	Depth (m)
0.0	0.30
5.0	0.31
15.0	0.31
25.0	0.32
48.0	0.33
65.0	0.33
85.0	0.33
132.0	0.34
190.0	0.35
264.0	0.36
310.0	0.37
370.0	0.37
1429.0	0.47
1462.0	0.48
1493.0	0.48
1524.0	0.48
1555.0	0.49
1620.0	0.50

Test 4

Time (min)	Depth (m)
0.0	0.25
10.0	0.25
20.0	0.25
53.0	0.26
88.0	0.27
156.0	0.29
206.0	0.30
1270.0	0.44
1360.0	0.45
1392.0	0.45
1448.0	0.45



Pit depth at end of test (m)	0.75	0.66	0.56	0.49
Effective depth (m)	0.45	0.42	0.26	0.24
75% effective depth (m)	0.41	0.35	0.37	0.31
50% effective depth (m)	0.53	0.45	0.43	0.37
25% effective depth (m)	0.64	0.56	0.50	0.43
t75 (min)	380.00	440.00	310.00	280.00
t50 (min)	1100.00	720.00	1020.00	740.00
t25 (min)	1557.00	1485.00	1620.00	1220.00
Vp 75-25	0.23	0.21	0.13	0.12
ap 50	2.055	1.986	1.618	1.572
tp 75-25	1177.00	1045.00	1310.00	940.00

Soil infiltration rate (m/s)	1.6E-06	1.7E-06	1.0E-06	1.4E-06
Soil infiltration rate (mm/hr)	5.69E+00	6.19E+00	3.75E+00	4.97E+00

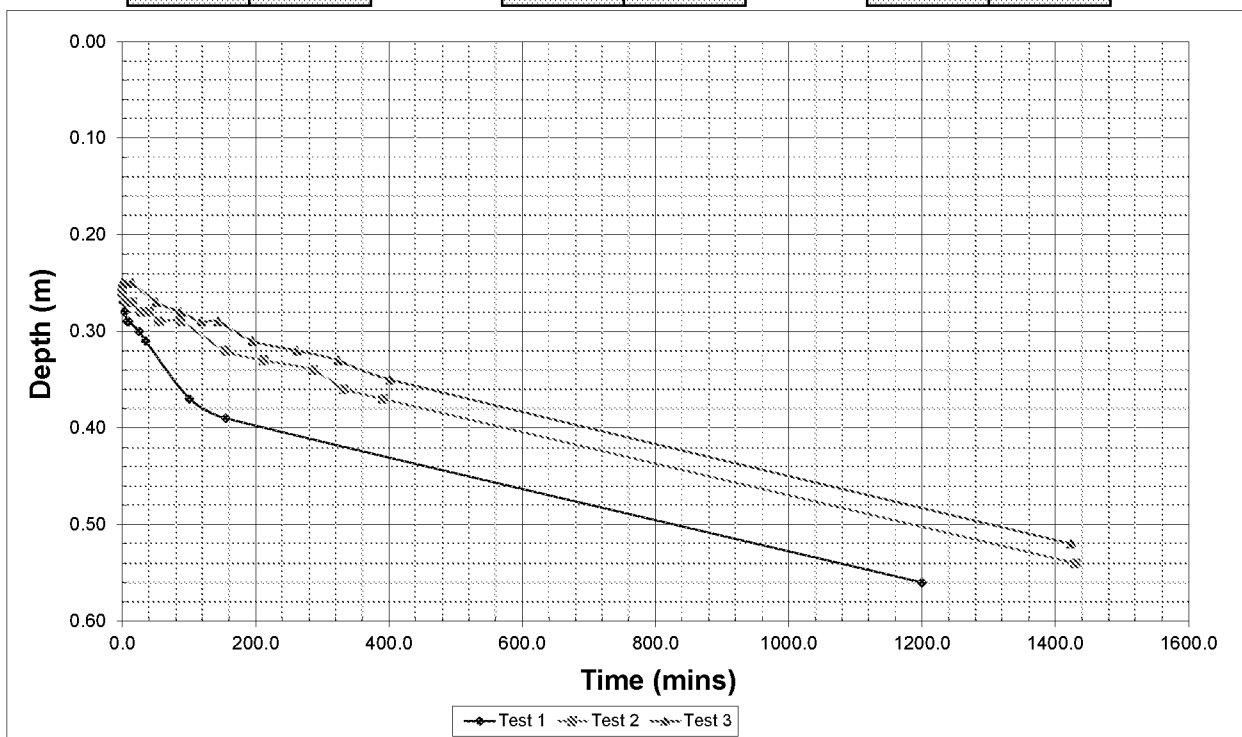
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited
Project Name : Burndell Road, Yapton		
Client : Bovis		Date : 03-07/06/2019

Pit reference	TP07
Pit depth (m)	0.75
Pit width (m)	0.60
Pit length (m)	2.20
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.26
2.0	0.27
4.0	0.28
7.0	0.29
10.0	0.29
25.0	0.30
35.0	0.31
101.0	0.37
155.0	0.39
1200.0	0.56

Test 2	
Time (min)	Depth (m)
0.0	0.26
5.0	0.27
15.0	0.27
28.0	0.28
40.0	0.28
55.0	0.29
87.0	0.29
155.0	0.32
212.0	0.33
286.0	0.34
332.0	0.36
391.0	0.37
1430.0	0.54

Test 3	
Time (min)	Depth (m)
0.0	0.25
5.0	0.25
15.0	0.25
51.0	0.27
87.0	0.28
118.0	0.29
144.0	0.29
195.0	0.31
262.0	0.32
324.0	0.33
402.0	0.35
1424.0	0.52



Pit depth at end of test (m)	0.56	0.54	0.54
Effective depth (m)	0.30	0.28	0.50
75% effective depth (m)	0.34	0.33	0.32
50% effective depth (m)	0.41	0.40	0.40
25% effective depth (m)	0.49	0.47	0.47
t75 (min)	70.00	212.00	262.00
t50 (min)	260.00	550.00	700.00
t25 (min)	780.00	1000.00	1140.00
Vp 75-25	0.20	0.18	0.19
ap 50	2.16	2.104	2.72
tp 75-25	710.00	788.00	878.00

Soil infiltration rate (m/s)	2.2E-06	1.9E-06	1.3E-06
Soil infiltration rate (mm/hr)	7.75E+00	6.69E+00	4.81E+00



Soakaway Test Results (after BRE Digest 365)

Geo-Environmental Services Limited
Unit 7, Burnthorpe Farm, Burnthorpe Road, Loughborough, Leics, LE12 7JH

Project Name : Burndell Road, Yapton

Client : Bovis

Pit reference	TP08
Pit depth (m)	2.00
Pit width (m)	0.60
Pit length (m)	2.60
Depth to standing water (m)	

Test 1

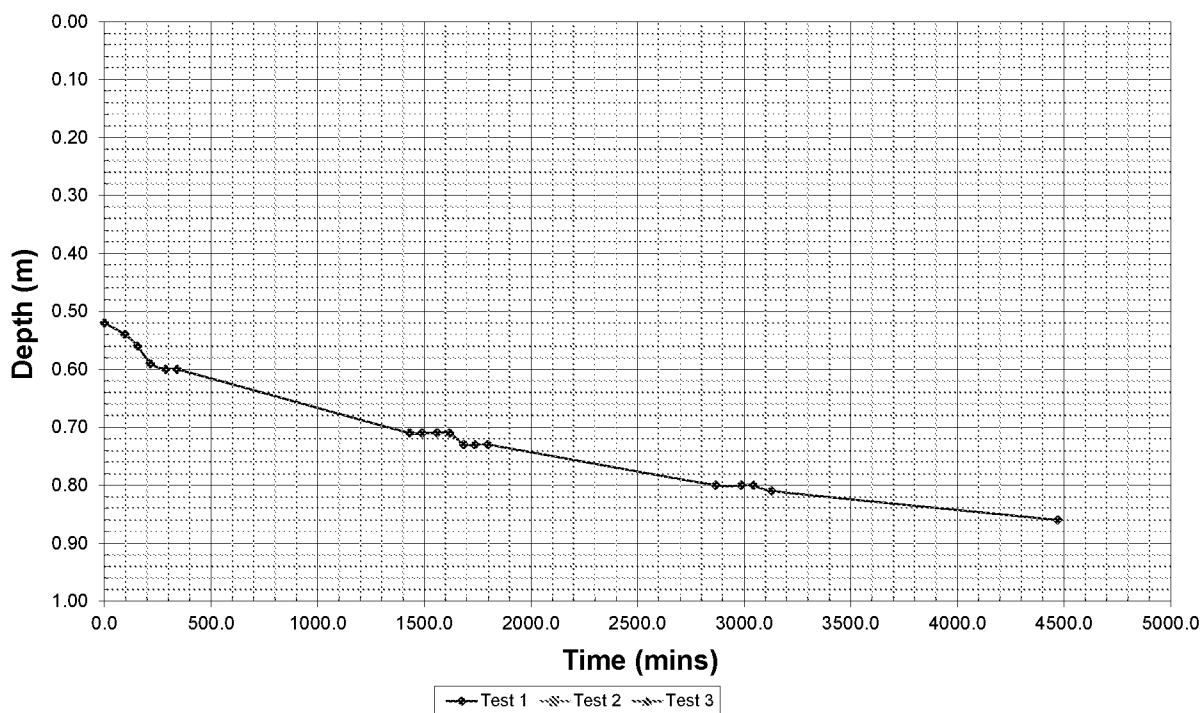
Time (min)	Depth (m)
0.0	0.52
96.0	0.54
156.0	0.56
216.0	0.59
287.0	0.60
341.0	0.60
1431.0	0.71
1491.0	0.71
1561.0	0.71
1618.0	0.71
1685.0	0.73
1738.0	0.73
1800.0	0.73
2867.0	0.80
2988.0	0.80
3045.0	0.80
3130.0	0.81
4471.0	0.86

Test 2

Time (min)	Depth (m)

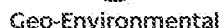
Test 3

Time (min)	Depth (m)



Pit depth at end of test (m)	2.00	2.00	2.00
Effective depth (m)	1.48	2.00	2.00
75% effective depth (m)	0.89	0.50	0.50
50% effective depth (m)	1.26	1.00	1.00
25% effective depth (m)	1.63	1.50	1.50
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	1.15	1.56	1.56
ap 50	6.296	7.96	7.96
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test



Geo-Environmental Services Limited
Unit 7 Danworth Farm, Cuckfield Road,
Hurstpierpoint, West Sussex BN6 9GL

Client : Bovis

Test 1

Test 2

Test 3

The graph displays the relationship between Depth (m) and Time (mins) for three different tests. The Y-axis represents Depth (m) from 0.00 to 1.40, and the X-axis represents Time (mins) from 0.0 to 5000.0. Test 1 (solid line with diamond markers) shows a steady decrease in depth over time. Test 2 (dashed line with cross markers) and Test 3 (dotted line with triangle markers) show a rapid initial decrease in depth followed by a plateau.

Time (mins)	Test 1 Depth (m)	Test 2 Depth (m)	Test 3 Depth (m)
0	0.95	0.95	0.95
100	0.96	0.96	0.96
200	0.97	0.97	0.97
300	0.98	0.98	0.98
400	0.99	0.99	0.99
500	1.00	1.00	1.00
1000	1.03	1.03	1.03
1500	1.08	1.08	1.08
2000	1.12	1.08	1.08
2500	1.16	1.08	1.08
3000	1.18	1.08	1.08
3500	1.20	1.08	1.08
4000	1.22	1.08	1.08
4500	1.25	1.08	1.08

Soil infiltration rate (m/s)	Insufficient fall in water to complete test	
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test	

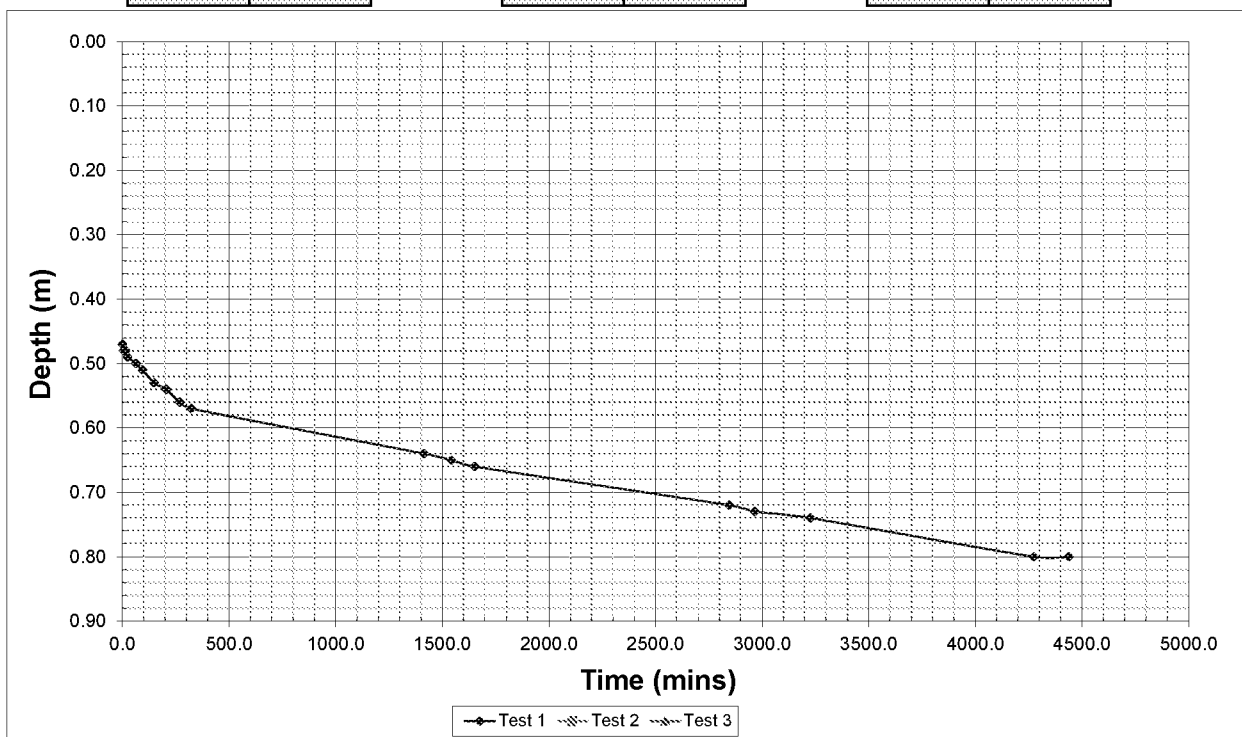
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hove, Brighton BN1 4SA
		Project Name : Burndell Road, Yapton Client : Bovis
		Date : 03-07/06/2019

Pit reference	TP10
Pit depth (m)	1.00
Pit width (m)	0.60
Pit length (m)	2.20
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.47
5.0	0.48
15.0	0.48
25.0	0.49
65.0	0.50
95.0	0.51
149.0	0.53
205.0	0.54
269.0	0.56
323.0	0.57
1415.0	0.64
1543.0	0.65
1653.0	0.66
2846.0	0.72
2967.0	0.73
3228.0	0.74
4275.0	0.80
4440.0	0.80

Test 2	
Time (min)	Depth (m)

Test 3	
Time (min)	Depth (m)



Pit depth at end of test (m)	1.00	1.00	1.00
Effective depth (m)	0.53	1.00	1.00
75% effective depth (m)	0.60	0.25	0.25
50% effective depth (m)	0.74	0.50	0.50
25% effective depth (m)	0.87	0.75	0.75
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.35	0.66	0.66
ap 50	2.804	4.12	4.12
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test