

Reside Developments c/o Paul Basham Associates

F.A.O Rob Wilson

Via email only: [REDACTED]

7th September 2020

Our Ref.: 18158/addendum report

Dear Rob

Re: Land West of Fontwell Avenue, Eastergate, Chichester, West Sussex PO20 3RX

Reside Developments commissioned Soils Limited to undertake supplementary intrusive works in the form of windowless sampler boreholes to confirm ground conditions and assist in finalising the drainage scheme for the site. The supplementary trial holes were intended to confirm geology in the area of proposed crate soakaways to assess viability of the alternative drainage proposal presented in drawing 020.5360 SK4 prepared by Paul Basham Associates Ltd.

Ground Conditions

On 27th August 2020, six windowless sampler boreholes (WS-A, WS-B, WS-C, WS-E, WS-G & WS-H) were drilled to depths ranging between 2.00m and 5.60m below ground level (bgl) at locations approximate to their corresponding catchment (Catchment A – Catchment G) as indicated on drainage proposal drawing 020.5360 SK4 prepared by Paul Basham Associates Ltd. Catchments D and F are informed by SA2 and SA1, respectively, excavated as part of previous intrusive works reported in Soils Limited report reference 18158/FLR Rev 1.02, dated February 2020.

All windowless sampler boreholes were terminated on contact with dense soils at depth which could not be safely penetrated with the equipment available.

The locations of all trial holes referenced in this report have been appended in Figure 1.

The ground conditions encountered have been summarised in Table 1 and the full engineers logs have been appended to this report.

Table I – Summary of Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Description
	Top	Base	
Topsoil	0.00	0.15 – 0.35	Turf over brown slightly gravelly slightly sandy SILT with frequent roots/rootlets. Gravel was medium to coarse subangular clasts of flint.
Head	0.15 – 0.35	>2.00 ¹ – >5.10 ¹	Orange and brown slightly sandy gravelly CLAY over calcareous light grey and orange brown gravelly CLAY, clayey sandy GRAVEL and silty SAND & GRAVEL with occasional nodular flint cobbles. Gravel was fine to medium angular to subrounded clasts of flint and chalk.

Notes: ¹ Encountered to base of trial hole. 0.00 denotes ground level.

Discussion

In light of the wider dataset now available on the site, it is now possible to conclude that bedrock chalk is absent across the site and the underlying ground conditions are more in-line with the BGS 1:50,000 geology maps for the site.

The soils of the Head were demonstrated to be persistent across the site to depths exceeding 5.60m bgl as encountered in the depth of investigation of the supplementary windowless sampler boreholes and are anticipated to be underlain by soils of the Lambeth Group at greater depth, based on the geology maps and local historical borehole information.

The soils described as chalk within the initial three windowless sampler boreholes undertaken in December 2017 for the purpose of installing monitoring wells, whilst including a significant chalk component, have now been confirmed to instead comprise part of the superficial Head material encountered based on the findings from the supplementary investigation and the wider dataset now available.

Trial holes SA1 – SA3 excavated in February 2020 to undertake infiltration testing further demonstrate the absence of bedrock chalk underlying the site. The findings of this investigation were reported in Soils Limited report reference 18158/FLR Rev 1.02, dated February 2020, and appended to this report.

Conclusion

Based on the newly available information on the ground conditions underlying the site, soakaway bases located at depths of up to 2.50m bgl according to the drawing mentioned above will not penetrate the bedrock chalk as this has now been proven to be absent across the site to depths of at least 5.60m bgl and are anticipated to be underlain by predominantly cohesive soils of the Lambeth Group at depth. The requirement to keep soakaway depths to <1.40m bgl on this basis should be no longer applicable as the risk of dissolution is removed and no additional contamination pathway is being created into the chalk aquifer.

Furthermore, given the absence of bedrock chalk, required offset distances from building foundations may also be relaxed from those typically required for a 'chalk site'.

The following attachments make up the remainder of this letter report.

Figure 1. Trial Hole Location Plan

Appendix A. Field Logs

Appendix B. Infiltration Testing Factual Letter Report

Should you have any further questions please do not hesitate to contact the undersigned.

Yours sincerely,



Tim Rudkin BSc. (Hons.), MSc., FGS.

Geo-Environmental Engineer



For and on behalf of Soils Limited



Figure number

1

Title

Trial Hole Location Plan

Project

Land west of Fontwell Avenue

Date

September 2020

Client

Reside Developments

Reference

18158/addendum report

Appendix A. Field Logs

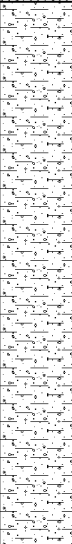
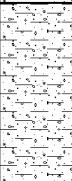
	Contract Name: Land West of Fontwell Avenue				Client: Reside Developments Ltd			Hole ID: WSA						
	Contract Number: 18158		Start and End Date: 27-08-20		Logged By: TR		Checked By: TR		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREMIER 3		Print Date: 07-09-2020		Scale: 1:50			
Weather: Raining				Termination: Hole backfilled								Sheet 1 of 1		
Samples & In Situ Testing					Strata Details								Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.10	D			0.20		Brown slightly gravelly slightly sandy SILT with frequent rootlets. Gravel is medium to coarse subangular clasts of flint. TOPSOIL								
0.50	D			(0.55)		Light brown very silty sandy GRAVEL. Gravel is fine to medium occasionally coarse subangular to angular clasts of flint. Occasional rootlets.								
0.90	D			0.75		Dark brown slightly sandy gravelly CLAY. Gravel is fine to medium occasionally coarse subangular clasts of flint. Occasional rootlets.						1		
				(0.45)										
1.50	D			1.20		Light brown calcareous silty sandy GRAVEL with occasional cobbles. Cobbles are subangular nodular rimmed flints. Gravel is subrounded to angular clasts of flint.								
				(1.30)								2		
2.40	D			2.50		Light brown silty SAND & GRAVEL with occasional inclusions of dark brown gravelly CLAY. Gravel was recovered as fine to medium occasionally coarse angular clasts of flint.								
2.80	D											3		
3.30	D											4		
3.80	D											5		
4.30	D											6		
				(2.00)								7		
												8		
												9		
												10		
				4.50		End of Borehole at 4.50m								
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

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	Contract Name: Land West of Fontwell Avenue				Client: Reside Developments Ltd			Hole ID: WSC						
	Contract Number: 18158		Start and End Date: 27-08-20		Logged By: TR		Checked By: TR		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREMIER 3		Print Date: 07-09-2020		Scale: 1:50			
Weather: Raining				Termination: Hole backfilled								Sheet 1 of 1		
Samples & In Situ Testing					Strata Details								Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.10	D			0.15		Brown slightly gravelly slightly sandy SILT with frequent rootlets. Gravel is medium to coarse subangular clasts of flint. TOPSOIL								
0.50	D			(0.45)		Light brown very silty sandy GRAVEL. Gravel is fine to medium occasionally coarse subangular to angular clasts of flint. Occasional rootlets.								
0.90	D			0.60		Dark brown slightly sandy gravelly CLAY. Gravel is fine to medium occasionally coarse subangular clasts of flint. Occasional rootlets.						1		
1.50	D			1.20		Dark brown gravelly CLAY. Gravel subangular to angular clasts of rinded flints.								
2.50	D			(1.75)								2		
3.20	D			2.95		Light brown and off white silty SAND & GRAVEL with occasional inclusions of dark brown gravelly CLAY. Gravel was recovered as fine to medium occasionally coarse angular clasts of flint and fine intact clasts of chalk						3		
4.00	D			(2.65)								4		
5.00	D			5.60								5		
						End of Borehole at 5.60m						6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

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		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. SA2 Sheet 1 of 1	
Project Name: Land West of Fontwell Avenue				Project No.: 18158		Method:		Hole Type TP
Location: Eastergate, Chichester, West Sussex, PO20 3RX				Plant: 5t		Support:		
Client: Reside Developments Ltd				Trial Pit Length: 1.80m		Trial Pit Width: 0.60m		Scale 1:25 Logged By GB
Dates: 03-02-2020			Level:		Co-ords:			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D		0.30			Turf over light grey and brown slightly gravelly CLAY with frequent rootlets. Gravel is fine to medium subangular clasts of flint.	
	0.50	D					Orange and brown slightly sandy gravelly CLAY. Gravel is fine to medium angular to subangular clasts of flint.	
	1.00	D						
	1.50	D		2.10				
	2.00	D						
	2.50	D					Light grey and orange brown gravelly calcareous CLAY. Gravel is fine to medium angular to subangular clasts of flint and chalk.	
				2.70			End of Pit at 2.700m	
General Remarks: Pit walls unstable								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

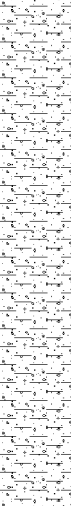
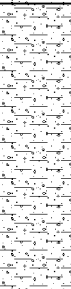


Contract Name: Land West of Fontwell Avenue			Client: Reside Developments Ltd			Hole ID: WSE
Contract Number: 18158	Start and End Date: 27-08-20	Logged By: DW	Checked By: TR	Status: FINAL	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: PREMIER 3	Print Date: 07-09-2020	Scale: 1:50	

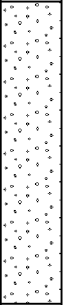
Weather: Raining				Termination: Hole backfilled				Sheet 1 of 1			
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Samples & In Situ Testing				Strata Details						Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/Installation
0.20	D			(0.30)		Very soft, greyish brown, slightly sandy, gravelly desiccated SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets. TOPSOIL.					
0.50	D			0.30		Greyish brown to brown with depth, slightly sandy, silty/clayey, angular to sub-angular, fine to coarse flint GRAVEL. Silt is desiccated. Occasional rootlets. Rare sub-angular flint cobbles. Becomes slightly clayey at 0.7m bgl.					
0.80	D			(0.65)		Soft to firm, light brown, slightly sandy, very gravelly SILT/very silty GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint. Frequent coarse sand sized chalk fragments.				1	
1.10	D			0.95		Soft to firm, light brown, slightly sandy, very gravelly SILT/very silty GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint. Frequent coarse sand sized chalk fragments.					
1.60	D			(1.35)		Soft to firm, light brown, slightly sandy, very gravelly SILT/very silty GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint. Frequent coarse sand sized chalk fragments.				2	
2.20	D			2.30		Soft to firm, light brown, slightly sandy, very gravelly SILT/very silty GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint. Frequent coarse sand sized chalk fragments.					
						End of Borehole at 2.30m					
										3	
										4	
										5	
										6	
										7	
										8	
										9	
										10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Rootlets observed to 0.8m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
RUN DISTRICT COUNCIL BN/50/20/PL									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. SA3 Sheet 1 of 1	
Project Name: Land West of Fontwell Avenue				Project No.: 18158		Method:		Hole Type TP
Location: Eastergate, Chichester, West Sussex, PO20 3RX				Plant: 5t		Support:		
Client: Reside Developments Ltd				Trial Pit Length: 2.50m		Trial Pit Width: 0.60m		Scale 1:25
Dates: 03-02-2020			Level:		Co-ords:			Logged By GB
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D		0.30			Turf over light grey and brown slightly gravelly CLAY with frequent rootlets. Gravel is fine to medium subangular clasts of flint.	
	0.50	D					Orange and brown slightly sandy gravelly CLAY. Gravel is fine to medium angular to subangular clasts of flint.	
	1.00	D						
	1.50	D		2.00				
	2.00	D					Light grey and orange brown gravelly calcareous CLAY. Gravel is fine to medium angular to subangular clasts of flint and chalk.	
	2.50	D						
	3.00	D		3.00		End of Pit at 3.000m		
General Remarks: Pit walls unstable								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

	Contract Name: Land West of Fontwell Avenue				Client: Reside Developments Ltd				Hole ID: WSG					
	Contract Number: 18158		Start and End Date: 27-08-20		Logged By: DW		Checked By: TR		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREMIER 3		Print Date: 07-09-2020		Scale: 1:50			
Weather: Raining				Termination: Hole backfilled						Sheet 1 of 1				
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.10	D			(0.30)		Very soft, greyish brown, slightly sandy, gravelly desiccated SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets. TOPSOIL.								
0.40	D			0.30 (0.30)		Brown, slightly sandy, silty, angular to sub-angular, fine to coarse flint GRAVEL. Silt is desiccated. Occasional rootlets. Rare sub-angular flint cobbles.								
0.80	D			0.60		Stiff to very stiff, brown to greyish brown with depth, slightly sandy, clayey GRAVEL/very gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional rootlets. Occasional sub-angular flint cobbles.						1		
1.30	D			(1.25)										
1.90	D			1.85 2.00		Soft, light brown, slightly sandy, very gravelly SILT. Gravel is angular to sub-rounded, fine to coarse flint. Frequent coarse sand sized chalk fragments.						2		
						End of Borehole at 2.00m								
												3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.6m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Land West of Fontwell Avenue				Client: Reside Developments Ltd				Hole ID: WSH					
	Contract Number: 18158		Start and End Date: 27-08-20		Logged By: DW		Checked By: TR		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREMIER 3		Print Date: 07-09-2020		Scale: 1:50			
Weather: Raining				Termination: Hole backfilled								Sheet 1 of 1		
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.20	D			(0.35)		Very soft, greyish brown, slightly sandy, very gravelly desiccated SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets. Rare coarse sand sized brick fragments. TOPSOIL. Brown, slightly sandy, silty, angular to sub-angular, fine to coarse flint GRAVEL. Silt is desiccated. Occasional rootlets. Rare sub-angular flint cobbles. Firm, slightly black speckled, brown to greyish brown with depth, slightly sandy, very gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional sub-angular flint cobbles. Rare rootlets. <i>Light brown mottled from 0.9 m bgl.</i>						1		
0.50	D			0.35										
0.60	D			0.60										
0.80	D			(0.70)		Soft, light brown, slightly sandy, very gravelly SILT. Gravel is angular to sub-rounded, fine to coarse flint. Frequent coarse sand sized chalk fragments.						2		
1.20	D			1.30										
1.50	D			(0.70)										
1.90	D			2.00		End of Borehole at 2.00m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.2m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

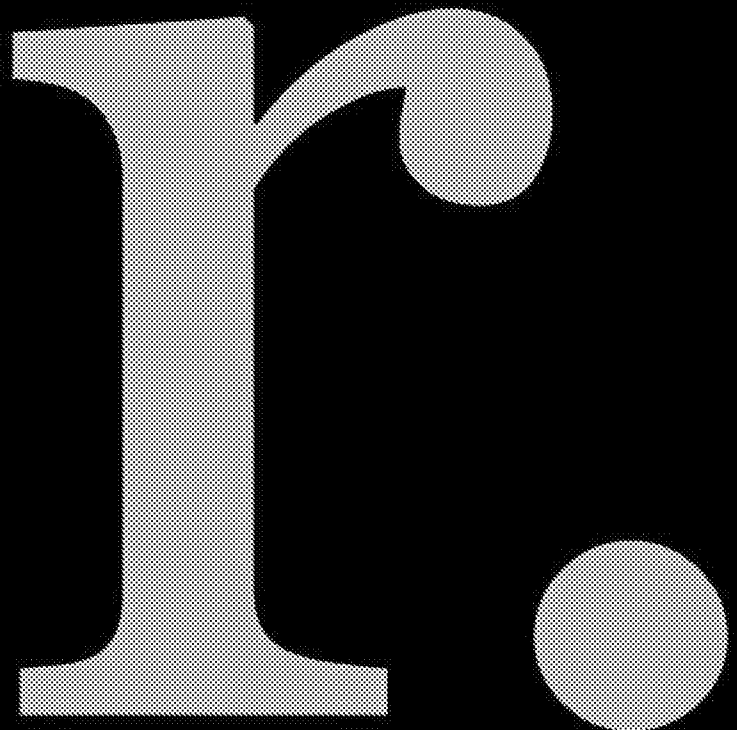
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Appendix B. Infiltration Testing Factual Letter Report

reside.

Land west of Fontwell Avenue, Eastergate

Factual Letter Report 18158/FLR Rev 1.02 February 2020



Reside Developments

F.A.O Andrew Munton
Via email only: amunton@residedevelopments.co.uk

01962 673 330
soilslimited.co.uk

February 2020
Our Ref.: 18158/FLR Rev 1.02

Dear Andrew

Re: Land west of Fontwell Avenue, Eastergate, Chichester, West Sussex PO20 3RX

We are writing regarding the intrusive investigation undertaken at the above-named site.

Brief

Soils Limited quotation (Q22341/rev102, dated 17th January 2020) set the scope of the investigation. The investigation was to comprise the machine excavation of trial pits with subsequent infiltration testing in accordance with the principles of BRE DG 365:2016 and to produce a Factual Letter Report. 4No. rounds of soil gas and groundwater monitoring were also requested, undertaken using monitoring standpipes previously installed onsite in December 2017 (Soils Limited report ref.: 16695/LR, dated June 2018).

This letter report has been updated to include the final results of the soil gas and groundwater monitoring, which concluded March 2020.

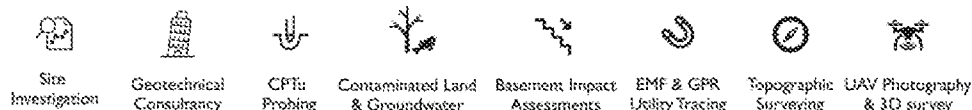
General

The site was located west of Fontwell Avenue, Eastergate, Chichester, West Sussex PO20 3RX and has an OS Land Ranger Grid Reference of SU 947 062.

A site location plan has been included as Figure 1.

Anticipated Geology

1:50 000 BGS geology maps showed the site to be located on Lambeth Group over undifferentiated Lewes Nodular, Seaford and Newhaven Chalk Formation, with superficial deposits of Head overlying.



Soils Limited is a limited company registered in England and Wales number 1612073. VAT number 318273558

Head

Head deposit are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands gravels and chalk of local derivation

Lambeth Group

Woolwich and Reading Beds, occurs in the London and Hampshire Basins, where it directly overlies the Chalk or Thanet Sand Formation, and is succeeded by the Harwich and London Clay Formations. Although generally less than 50 metres thick, it's lithological variability and position beneath much of London has concerned tunnelling engineers since the early 19th century.

The relationship between the different depositional environments is seen in central and south-east London, where deposits of fine-grained sand, flint gravel beds, mottled clay, shell beds and altered beds form a complex interdigitating sequence, which is divided into three formations, the Woolwich and the Reading Formation, depending on the local succession, both overlying the Upnor Formation.

Vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate.

The top of the Lambeth Group is marked by the eroded or interburrowed surface at the base of the overlying Thames Group. The uppermost part of the Lambeth Group can be the Reading Formation or the Woolwich Formation, depending on the local succession, or the Upnor Formation, depending on the depth of pre-Thames Group erosion. The Lambeth Group is overlain by sands, silts, clays or gravel beds of the Harwich Formation, depending on the local sequences, or gravelly sandy clays at the base of the London Clay Formation.

In the Hampshire Basin and the west of the London Basin, the Lambeth Group overlies the Chalk Group.

Lewes Nodular, Seaford and Newhaven Chalk Formation (undifferentiated)

Lewes Nodular Chalk Formation is composed of hard to very hard nodular chalks and hardgrounds (which resist scratching by finger-nail) with interbedded soft to medium hard chalks (some grainy) and marls; some griotte chalks. The softer chalks become more abundant towards the top. Nodular chalks are typically lumpy and iron-stained (usually marking sponges). Brash is rough and flaggy or rubbly, and tends to be dirty. First regular seams of nodular flint, some large, commence near the base and continue throughout

Seaford Chalk Formation can be described as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

The Newhaven Chalk Formation is a soft white friable microporous limestone composed of coccolith biomicrites with a varying proportion of larger shell fragments.

At various levels clay sized material occurs as marl seams and partings. Close to the surface the upper few metres are invariably discoloured brown, due to leaching from the overlying strata. The interface with any overlying stratum is invariably extremely irregular as a result of localised weathering and general solution. Weathering by frost action may extend to a depth of several metres.

Chalk is a weak rock and as such it should be noted that the drilling, excavating and sampling process is detrimental to its fabric and structure. Chalk samples that have been machine sampled will therefore appear to be of a lower descriptive grade, as given in CIRIA C574, than the in-situ chalk. Soil sampling and visual observations from open excavations i.e. trial pits would allow chalk description and classification in accordance with CIRIA 574 including commenting for any aperture and discontinuities in the chalk structure.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits, are found in the chalk. The features sometimes manifest themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse.

Site Works

Site Works were undertaken on 3rd February 2020 and comprised the machine excavation of three trial pits (SA1 – SA3), using 5 tonne tracked 360 excavator, to depths ranging between 2.10m and 3.00m below ground level (bgl) at locations selected by the client.

Following construction of the trial holes, infiltration testing accordance with the principles of BRE DG 365:2016 were performed in each trial pit, with the exception of SA1, whereby pit wall instability rendered it unsafe to complete the testing.

On completion, all trial holes were backfilled with arisings with excess mounded over to allow for future settlement.

A trial hole location plan is included as Figure 2.

Ground Conditions

The ground conditions encountered during the site investigation have been summarised in Table 1. Please note that the chalk was not encountered within the test holes. Full field logs are presented in Appendix A.

Table 1 – Summary of Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Description
	Top	Base	
Topsoil	0.00	0.30	Turf over light grey and brown slightly gravelly CLAY with frequent rootlets. Gravel was fine to medium subangular clasts of flint.
Head	0.30	2.10 ¹ – 3.00 ¹	Orange and brown slightly sandy gravelly CLAY over light grey and orange brown gravelly highly calcareous CLAY. Gravel was fine to medium angular to subangular clasts of flint and chalk.

Notes: ¹ Encountered to base of trial hole. 0.00 denotes ground level.

Infiltration Testing

Infiltration testing comprised piping water via water tanker and bowser into an open trial hole, the drop in water level is measured over time was then recorded to give an indication of soakage potential.

BRE DG365, 2016 states that for an accurate infiltration rate to be obtained a soakage pit needs to be filled three times in quick succession. Each test was completed once 75% of the water present has drained away, in order to determine whether the underlying ground conditions may be suitable for surface water drainage.

Pit walls of all three trial pits were highly unstable and was observed to influence the head within each pit during the test.

The results from the infiltration testing are summarized in Table 2. Full results are presented in Appendix B.

Table 2 – Summary of Infiltration Test Results

Trial Hole (Test No.)	Test Stratum	Trial Pit Depth (m bgl)	Water Level Start of Test (m bgl)	Infiltration Rate (m/sec)	Comments
SA2(1)	HEAD	2.40	1.90	3.29×10^{-5}	Pit walls collapsing during test.
SA1(2)	HEAD	2.40	1.60	n/a	Pit walls collapsing during test. Test did not complete within observation period. 300mm fall in head observed over 78 minutes.
SA3(1)	HEAD	2.50	2.10	2.65×10^{-4}	Pit walls collapsing during test.
SA3(2)	HEAD	2.44	1.60	1.07×10^{-4}	Pit walls collapsing during test.
SA3(3)	HEAD	2.40	1.52	8.57×10^{-5}	Pit walls collapsing during test.

It should be noted that the Environment Agency must be consulted on any works which may impact groundwater sources.

Soil Gas and Groundwater Monitoring

Four rounds of soil gas and groundwater monitoring were requested, using monitoring standpipes (WS1 – WS3) installed onsite in December 2017. In addition to this, water levels were taken from each standpipe at the time of this intrusive investigation.

The locations of the standpipes are included within trial hole location plan in Figure 2.

The monitoring results have been presented in Table 3.

Table 2 – Soil Gas and Groundwater Monitoring Results to Date

Date	Trial Hole	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	H ₂ S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flow (l/h)	Dp (Pa)	H ₂ O (m bgl)	Base of well (m bgl)
27/01/20 ¹	ATM	0.0	0.0	19.7	0.0	0.0	0.0	996	0.0	0.0	-	-
	WS1	0.0	4.1	11.9	0.0	0.0	0.0	996	0.0	0.0	2.92	5.00
	WS2	0.0	3.6	17.7	0.0	0.0	0.0	998	0.0	0.0	3.96	5.00
	WS3	0.0	2.3	17.0	0.0	0.0	0.0	997	0.0	0.0	3.46	5.00
03/02/20	ATM	Only groundwater level measurements recorded at time of intrusive investigation.									-	-
	WS1										2.80	5.00
	WS2										3.87	5.00
	WS3										3.40	5.00
12/02/20	ATM	0.0	0.0	20.2	0.0	0.0	0.0	1013	0.0	0.0	-	-
	WS1	0.0	3.8	12.9	0.0	0.0	0.0	1013	0.0	0.0	2.90	5.00
	WS2	0.0	3.3	15.0	0.0	0.0	0.0	1013	0.0	0.0	3.92	5.00
	WS3	0.0	2.4	17.2	0.0	0.0	0.0	1013	0.0	0.0	3.43	5.00
27/02/20	ATM	0.0	0.0	20.7	0.0	0.0	0.0	1005	0.0	0.0	-	-
	WS1	0.0	2.0	15.6	0.0	0.0	0.0	1005	0.0	0.0	2.40	5.00
	WS2	0.0	2.1	16.3	0.0	0.0	0.0	1005	0.0	0.0	3.33	5.00
	WS3	0.0	1.8	16.8	0.0	0.0	0.0	1005	0.0	0.0	2.78	5.00
19/03/20	ATM	0.0	0.0	19.8	0.0	0.0	0.0	1023	0.0	0.0	-	-
	WS1	0.0	3.5	12.4	0.0	0.0	0.0	1023	0.0	0.0	2.43	5.00
	WS2	0.0	3.3	13.7	0.0	0.0	0.0	1022	0.0	0.0	3.25	5.00
	WS3	0.0	0.1	19.7	0.0	0.0	0.0	1022	0.0	0.0	2.67	5.00

Note: reading of 0.0 = not detected (below detection level). VOC=Volatile Organic Compounds. Dp=Pressure Difference. ¹ Strong wind conditions recorded.

The following attachments make up the remainder of this letter report.

Figure 1. Site Location Plan

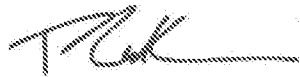
Figure 2. Trial Hole Location Plan

Appendix A. Field Logs

Appendix B. Field Data.

Should you have any further questions, please do not hesitate to contact the undersigned.

Yours sincerely

A handwritten signature in black ink, appearing to read 'TR', followed by a horizontal line.

T. Rudkin BSc. (Hons.), MSc., FGS.

Geo-Environmental Engineer

tr@soilslimited.co.uk

For and on behalf of Soils Limited.

Enc.



Figure number

2

Title

Trial Hole Location Plan

Project

Land west of Fontwell Avenue

Date

February 2020

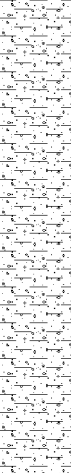
Client

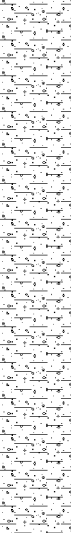
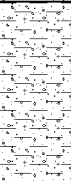
Reside Developments

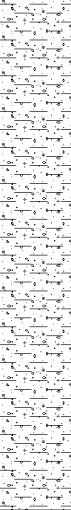
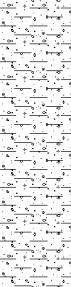
Reference

I8158/FLR

Appendix A. Field Logs

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. SA1 Sheet 1 of 1	
Project Name: Northfield Cottages				Project No.: 18158		Method:		Hole Type TP
Location: Fontwell Avenue, Eastergate, Chichester, West Sussex, PO20 3RX						Plant: 5t		
Client: Reside Developments Ltd				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 03-02-2020				Level:		Co-ords:		Logged By GB
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D		0.30			Turf over light grey and brown slightly gravelly CLAY with frequent rootlets. Gravel is fine to medium subangular clasts of flint.	
	0.50	D					Orange and brown slightly sandy gravelly CLAY. Gravel is fine to medium angular to subangular clasts of flint.	
	1.00	D						
	1.50	D						
	2.00	D		1.90			Light grey and orange brown gravelly calcareous CLAY. Gravel is fine to medium angular to subangular clasts of flint and chalk.	
				2.10		End of Pit at 2.100m		
General Remarks: Pit collapsed, infiltration testing not possible								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. SA2 Sheet 1 of 1	
Project Name: Northfield Cottages				Project No.: 18158		Method:		Hole Type TP
Location: Fontwell Avenue, Eastergate, Chichester, West Sussex, PO20 3RX						Plant: 5t		
Client: Reside Developments Ltd				Trial Pit Length: 1.80m		Trial Pit Width: 0.60m		Scale 1:25
Dates: 03-02-2020			Level:		Co-ords:			Logged By GB
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D		0.30			Turf over light grey and brown slightly gravelly CLAY with frequent rootlets. Gravel is fine to medium subangular clasts of flint.	
	0.50	D					Orange and brown slightly sandy gravelly CLAY. Gravel is fine to medium angular to subangular clasts of flint.	
	1.00	D						
	1.50	D						
	2.00	D						
	2.50	D		2.70		Light grey and orange brown gravelly calcareous CLAY. Gravel is fine to medium angular to subangular clasts of flint and chalk.		
End of Pit at 2.700m								
General Remarks: Pit walls unstable Groundwater Remarks: Sample Type D: Disturbed B: Bulk J: Jar W: Water								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. SA3 Sheet 1 of 1	
		Project Name: Northfield Cottages		Project No.: 18158		Method:		Hole Type TP
Location: Fontwell Avenue, Eastergate, Chichester, West Sussex, PO20 3RX		Support:		Scale 1:25		Logged By GB		
Client: Reside Developments Ltd		Trial Pit Length: 2.50m		Trial Pit Width: 0.60m				
Dates: 03-02-2020		Level:		Co-ords:				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D		0.30			Turf over light grey and brown slightly gravelly CLAY with frequent rootlets. Gravel is fine to medium subangular clasts of flint.	
	0.50	D					Orange and brown slightly sandy gravelly CLAY. Gravel is fine to medium angular to subangular clasts of flint.	
	1.00	D						
	1.50	D		2.00				
	2.00	D					Light grey and orange brown gravelly calcareous CLAY. Gravel is fine to medium angular to subangular clasts of flint and chalk.	
	2.50	D						
	3.00	D		3.00		End of Pit at 3.000m		
General Remarks: Pit walls unstable								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

Appendix B. Field Data

Soakaway Calculations

Soakaway Test No.	SA2 Test 1
Contract:	Northfield Cottages
Contract No.	18158

Field Test

Trial Pit Log (include details of groundwater):

See trial Pit record

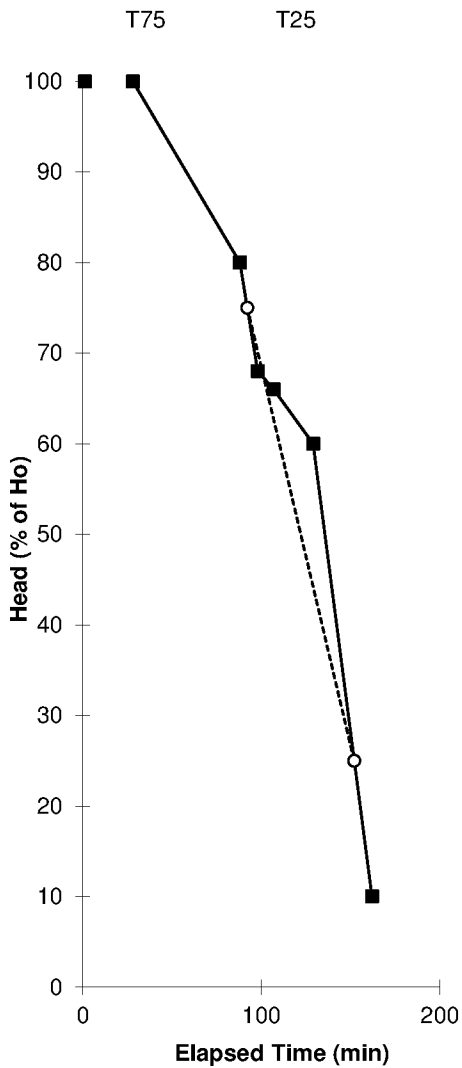
Depth of Pit	2.40 m
Width of Pit	0.60 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.50 m

ap50	2.28 m2
vp75-25	0.27 m3
ev5-25	59.9 min
water used	0.5400 m3
$\dot{e}$	3.293E-05 m/sec.

Field Data

[illegible]

T75	92.167	75
T25	152.100	25
T75-25	59.933	Derived from Best Fit



Comments

Pit walls collapsing resulting in raise in head

SOILS LIMITED

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Surrey, KT20 5SR**

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Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	SA2 Test 2
Contract:	Northfield Cottages
Contract No.	18158

Field Test

Trial Pit Log (include details of groundwater):

See trial Pit record

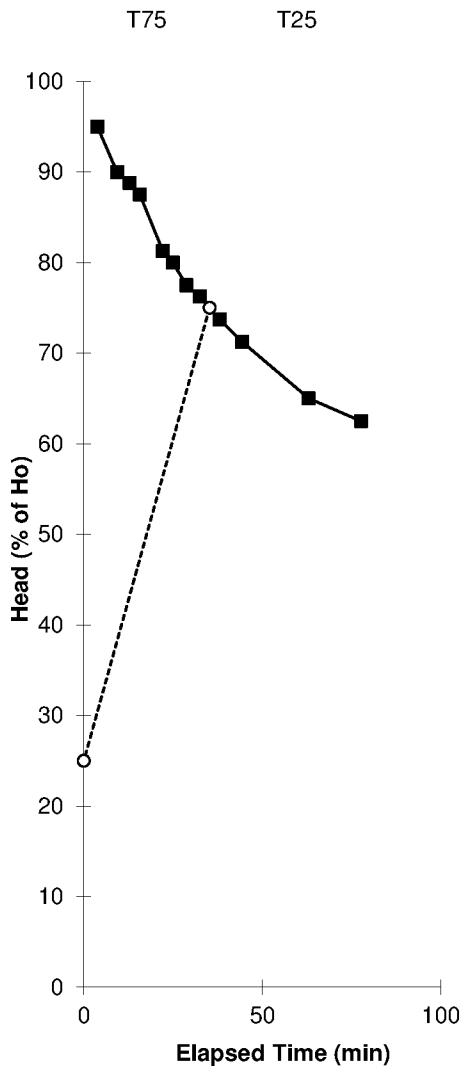
Depth of Pit	2.40 m
Width of Pit	0.60 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.80 m

ap50	3	m2
q _{p75-25}	0.432	m3
t ₇₅₋₂₅	-35.2	min
water used	0.8640	m3
i	n/a	m/sec.

Field Data

[illegible]

T75	35.215	75
T25	0.000	25
T75-25	-35.215	Derived from Best Fit



Comments

Pit walls collapsing. Test not complete within observation period.

SOILS LIMITED

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Soakaway Calculations

Soakaway Test No.	SA3 Test 1
Contract:	Northfield Cottages
Contract No.	18158

Field Test

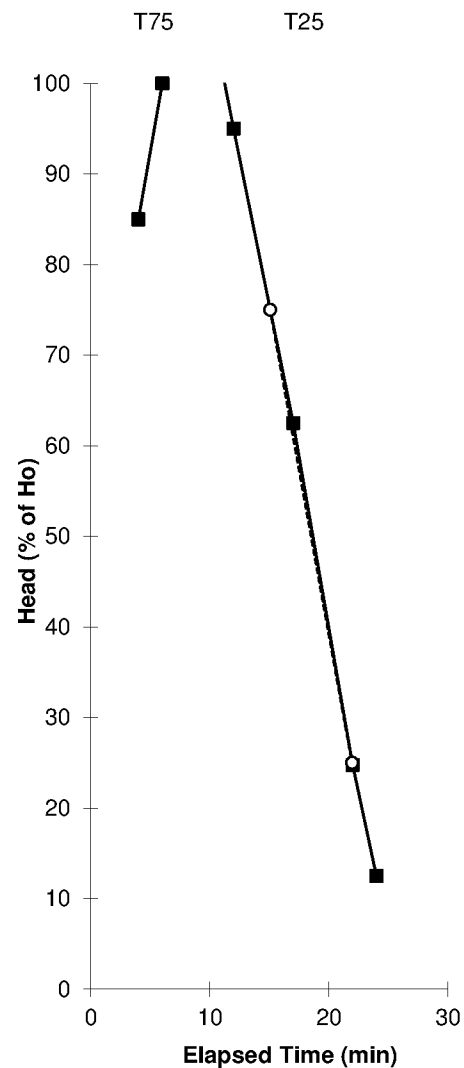
Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.50 m
Width of Pit	0.60 m
Length of Pit	2.50 m
Depth of Pit Soaked	0.40 m
ap50	2.74 m ²
$\sqrt{p_{75-25}}$	0.3 m ³
t_{75-25}	6.9 min
water used	0.6000 m ³
$\dot{e}$	2.649E-04 m/sec.

Field Data

[illegible]

T75	15.077	75
T25	21.967	25
T75-25	6.890	Derived from Best Fit



Comments

Pit walls collapsing resulting in raise in head

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Soakaway Calculations

Soakaway Test No.	SA3 Test 2
Contract:	Northfield Cottages
Contract No.	18158

Field Test

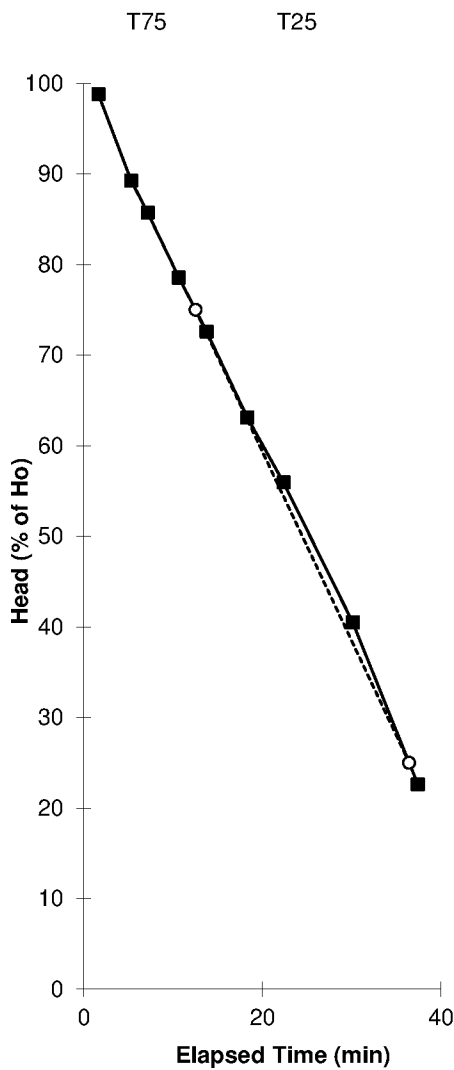
Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.44 m
Width of Pit	0.60 m
Length of Pit	2.50 m
Depth of Pit Soaked	0.84 m
ap50	4.104 m ²
q _p 75-25	0.63 m ³
e75-25	23.9 min
water used	1.2600 m ³
f	1.068E-04 m/sec.

Field Data

[illegible]

T75	12.510	75
T25	36.455	25
T75-25	23.945	Derived from Best Fit



Comments

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Soakaway Calculations

Soakaway Test No.	SA3 Test 3
Contract:	Northfield Cottages
Contract No.	18158

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

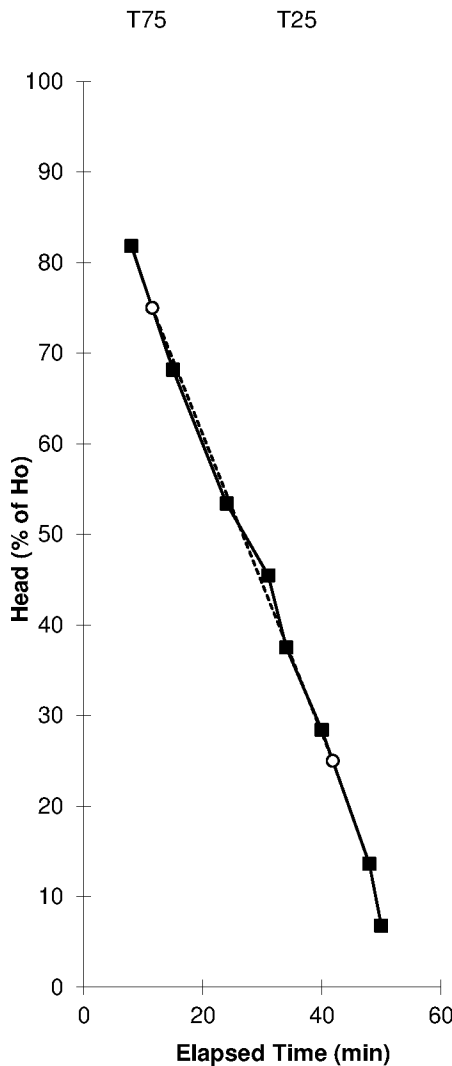
Depth of Pit	2.40 m
Width of Pit	0.60 m
Length of Pit	2.50 m
Depth of Pit Soaked	0.88 m

ap50	4.228 m2
vp75-2%	0.66 m3
ct5-28	30.3 min
water used	1.3200 m3
τ	8.573E-05 m/sec.

Field Data

[illegible]

T75	11.500	75
T25	41.846	25
T75-25	30.346	Derived from Best Fit



Comments

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Report presented by

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