



CABLE AND PERCUSSION BOREHOLE
FOR
PILED FOUNDATION DESIGN
AND
SURFACE WATER DRAINAGE

CONSTRUCTION OF NEW HOMES
LAND ADJ. TO 40 FAIRFAX ROAD, CAVERSHAM, RG4 6DA
ON BEHALF OF
SHANLY HOMES (NORTH LONDON) Limited
REPORT 16-281.02
OCTOBER 2017 : Revision A

1.0 Introduction

At the instruction of Shanly Homes (North London) Limited [The Client] Aviron Associates Limited [Aviron] has completed the drilling of one cable and percussion borehole to enable evaluation of deeper ground conditions for the design of a piled foundation solution.

The borehole shall also be installed with liner pipe to construct and test a deep borehole soakaway, providing infiltration rates for soakaway design.

2.0 Field Work : Borehole Drilling

Ground investigation works were completed using a Dando 2000 cable and percussion drilling rig on 12 October 2017.

Figure 1 is appended as a Borehole Location Plan.

Borehole BH1 was positioned in the north-west corner of the site where indicated on the surface water drainage drawings. The exact positioning of the borehole was limited by the size of the drilling rig and safe working area required in the vicinity of the site boundary.

The borehole was cased to 15m below ground level (bgl) and bored at 200mm diameter to a depth of 20m bgl. The borehole was cased to 15m in lieu of the requirement to install soakaway liner pipe.

Standard penetration tests (SPTs) were completed at 1m intervals to circa 10m bgl and 2m intervals thereafter. The first SPT was taken at 1.2m bgl in the base of a hand excavated starter pit. Disturbed soil samples were collected throughout the borehole to enable strata logging and laboratory testing, as necessary.

Detailed strata descriptions are presented on the 'draft' **borehole log** which is **appended** though in general ground conditions comprise;

- 🌿 TOPSOIL to a depth of 0.2m bgl.
- 🌿 Firm the stiff brown silty CLAY (Langley Silt) to a depth of 1.6m bgl.
- 🌿 CHALK (Seaford Chalk Formation and Newhaven Chalk Formation) of weathering Grade Dm to 2.0m bgl above Grade C to 7m bgl, above Grade B/C to 20m bgl.

Groundwater was struck at 11.7m bgl and rose to 11.3m bgl. Upon completion of the borehole groundwater was measured at 11.3m bgl.

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The deep borehole soakaway was installed as follows from the base of the borehole:

- 🌱 20m bgl – 10.5m bgl. 10mm pea shingle was introduced to provide hydraulic continuity through the aquifer and to ensure the borehole was constructed circa 1m above the aquifer.
- 🌱 10.5m bgl – 4m bgl. Slotted 140mm ED/125mm ID borehole liner pipe with 10mm pea shingle packing within the borehole annular.
- 🌱 4m bgl – GL. Plain (casing) 140mm ED/125mm ID borehole liner pipe with bentonite seal.
- 🌱 Headworks of the borehole protrude by 0.2m and a yellow push fit cover has been fixed to the top of the borehole.

Table 2 presents a diagram of the borehole soakaway detail and complete installation.

Table 2 : Borehole Soakaway Detail

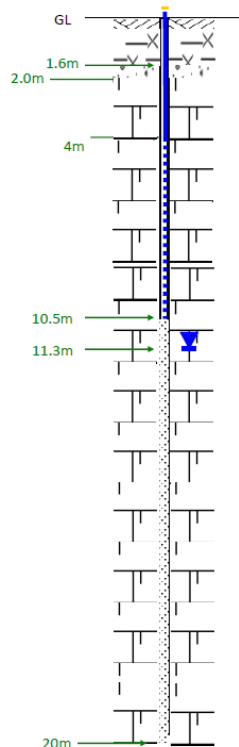


Diagram of installation

Photograph of completed installation

3.0 Field Work : Infiltration Testing

Flushing out of the borehole soakaway was completed on 16 October 2017 prior to testing in order to mobilise any 'silty, chalky, fines' held within the installation following construction and prior to formal testing. This was completed by rapidly introducing 150 litres of drinking water quality into the borehole from adjacent water containers.

Following 'flushing out' falling head tests were completed using drinking water standard water pumped from a water bowser on 17 October 2017. Prior to testing the borehole installation was 'dry' and measured at 10.5m bgl.

A litres per second (l/s) rate was requested. In order to determine the flow rate of the pump an 80 litres domestic bin was filled and the time taken to fill was taken.

The borehole was then filled with water by maintaining the same pump rate. The time taken to fill and subsequently drain was measured.

Three falling head tests were completed; the first at an ambient pumping rate and the second and third tests with the pump working at 'full power'.



On all three occasions; upon completion of pumping, removal of pumping hose from the borehole and placing a 'dip metre' down the borehole no head of water was measured. Thus the borehole was effectively draining at a greater rate than could be pumped/measured.

Table 3 presents the results of testing completed on 17 October 2017.

Table 3 : Infiltration Test Results						
Test	Pump Rate Measurement			BH Infiltration Test		
	Volume (litres)	Time (seconds)	Rate (l/s)	Filling Time (seconds)	Volume water (litres)	Rate (l/s)
1	80	46	1.74	1320	2139	>1.74
2	80	12	6.67	81	540	>6.67
3	80	14	5.71	377	2153	>5.71

As no head of water could be measured upon completion of testing the infiltration rate of the borehole is reported as greater than the pumping rate.

4.0 In-situ Testing

As previously mentioned Standard Penetration Tests were undertaken at 1.0m to 2.0m intervals within the borehole in accordance with BS EN ISO 22476-3 "Standard Penetration Test 2005".

Disturbed samples were collected in plastic tubs at roughly 1m centres.

A programme of geotechnical laboratory testing was undertaken at K4 Soils and i2 Analytical Limited. The test procedures used were generally in accordance with the methods described in BS1377:1990. Details of testing are provided in table 4.

Table 4 : Soil Geotechnical Testing		
Test	Standard	No. Tests
Atterberg Limits (incl. moisture content) - to determine plasticity, volume change potential, desiccation potential of fine soils (clay).	BS1377:1990:Part 2:Clauses 3.2, 4.4 & 5	1 (K4)
Saturated Moisture Content and Dry Density - to determine density of chalk	BS1377:1990:Part 2:Clauses 3.3	3 (K4)
Aviron LC Suite (pH, water soluble sulphate, total sulphate & total sulphur) - to determine buried concrete design class.	UKAS accredited (ELAB)	5 (i2)

5.0 Atterberg Limits and Material Properties (Design Parameters)

Results shall follow within a Revision B of this report. In the interim our Geo-Environmental Risk Assessment report (ref 16-281.01, Rev A, Nov 2016) can be referred to.

6.0 Concrete Classification

Results shall follow within a Revision B of this report. In the interim our Geo-Environmental Risk Assessment report (ref 16-281.01, Rev A, Nov 2016) can be referred to.

7.0 Recommendations

Our report and laboratory results should be passed to the appointed piling contractor to enable pile design in accordance with their proprietary piling technique.

Project designers should also be presented with previous ground investigation reports to enable an improved understanding of ground conditions and any mitigation measures against the effect of overlying CLAY and nearby/removed trees, which may be required within the sub-structure design.

Soil Infiltration rates should be provided to the drainage engineer to complete their surface water drainage design.



We trust that you find the above to be satisfactory, however should you require any further information please do not hesitate to contact the undersigned.

Prepared by

James Burkitt BEng (Hons) CEnv MRICS
Managing Director

Encl. Figure 1
 DRAFT Borehole Log





DRAFT BOREHOLE LOG

Project:			Land at Fairfax close, Caversham, RG4 6DA		Project No.		Borehole:	
					16-281.02		BH1	
Client:			Shanly Homes		Start:		End:	
					12/10/17		12/10/17	
Method/Plant Used:			Co-ordinates:			Ground Level:		
Dando 2000 Cable & Percussion			NT			NT		

Description of Strata	Legend	Depth (m bgl) (thickness)	Sheet Depth (m)	Samples/Tests			SPT Results						Laboratory Test Details
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	N Value	
Brown slightly sandy silty clayey TOPSOIL with roots and rootlets(TOPSOIL)		(0.20)											
Firm becoming stiff brown with light brown mottling silty CLAY. (LANGLEY SILT MEMBER)		0.20 (1.40)		0.50	1	SB							
				1.20	2	SPT/D	3	3	4	4	4	4	16
		1.60		1.70	3	SB							
Structureless CHALK composed of cream, slightly sandy gravelly SILT. Gravel is very weak, white sub angular to sub rounded of chalk and occasional flint. (Grade Dm) (SEAFORD & NEWHAVEN CHALK FORMATION)		(0.40)		2.00	4	SPT/D	3	4	4	4	5	4	17
Weak, white CHALK. Fractures are very closely spaced with occasional sub angular to sub rounded flint gravel. (Grade C) (SEAFORD & NEWHAVEN CHALK FORMATION)		2.00 (5.00)		2.50	5	SB							
				3.00	6	SPT/D	4	5	4	4	5	5	18
				3.50	7	SB							
				4.00	8	SPT/D	3	4	4	5	4	4	17
				4.50	9	SB							
continued...			5.00	5.00	10	SPT/D	4	4	5	4	4	4	17

Casing record			Chiselling records			Water level observations (depths in metres below gl)						
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks	
12/10/2017	200	16.00				12/10/2017	11.70	11.30	-	11.30		
Remarks									By	Date		
Hand service pit to 1.20m bgl. Groundwater encountered at 11.70m bgl. DBSA constructed to 10.50m bgl.									Logged	GR		12/10/2017
									Checked	JB		16/10/2017



DRAFT BOREHOLE LOG

Project: Land at Fairfax close, Caversham, RG4 6DA				Project No. 16-281.02	Borehole: BH1
Client: Shanly Homes			Start: 12/10/17	End: 12/10/17	Sheet: 2 of 4
Method/Plant Used: Dando 2000 Cable & Percussion		Co-ordinates: NT		Ground Level: NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Sheet Depth (m)	Samples/Tests			SPT Results						N' Value	Comments
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	75mm		
....continued Weak, white CHALK. Fractures are very closely spaced with occasional sub angular to sub rounded flint gravel. (Grade C) (SEAFORD & NEWHAVEN CHALK FORMATION)				5.50	11	SB								
				6.00	12	SPT/D	5	4	4	5	5	5	19	
				6.50	13	SB								
		7.00		7.00	14	SPT/D	10	7	11	14	14	11	50	60mm travel on final SPT
Weak, white CHALK. Fractures closely spaced with sub angular to sub rounded flint. Grade B/C (Seaford & Newhaven Chalk Formation)		(13.00)		7.50	15	SB								
				8.00	16	SPT/D	5	4	6	7	6	9	28	
				8.50	17	SB								
				9.00	18	SPT/D	10	7	7	6	5	6	24	
continued...			10.00	10.00	19	SPT/D	5	4	4	5	6	6	21	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
12/10/2017	200	16.00				12/10/2017	11.70	11.30	-	11.30	
Remarks Hand service pit to 1.20m bgl. Groundwater encountered at 11.70m bgl. DBSA constructed to 10.50m bgl.									By	Date	
									Logged	GR	12/10/2017
									Checked	JB	16/10/2017
											Scale 01:25



DRAFT BOREHOLE LOG

Project: Land at Fairfax close, Caversham, RG4 6DA				Project No: 16-281.02	Borehole: BH1
Client: Shanly Homes			Start: 12/10/17	End: 12/10/17	Sheet: 3 of 4
Method/Plant Used: Dando 2000 Cable & Percussion		Co-ordinates: NT		Ground Level: NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Sheet Depth (m)	Samples/Tests			SPT Results						Laboratory Test Details
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	75mm	
.....continued Weak, white CHALK. Fractures closely spaced with sub angular to sub rounded flint. Grade B/C (Seaford & Newhaven Chalk Formation)				11.00	20	SB							
				12.00	21	SPT/D	2	3	6	6	4	4	20
				13.00	22	SB							
				14.00	23	SPT/D	5	8	7	6	9	10	32
continued...			15.00										

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
12/10/2017	200	16.00				12/10/2017	11.70	11.30	-	11.30	
Remarks Hand service pit to 1.20m bgl. Groundwater encountered at 11.70m bgl. DBSA constructed to 10.50m bgl.									By	Date	
									Logged	GR	12/10/2017
									Checked	JB	16/10/2017
										Scale	01:25



DRAFT BOREHOLE LOG

Project:			Land at Fairfax close, Caversham, RG4 6DA		Project No. 16-281.02		Borehole: BH1			
Client:			Shanly Homes		Start: 12/10/17		End: 12/10/17		Sheet: 4 of 4	
Method/Plant Used: Dando 2000 Cable & Percussion			Co-ordinates: NT			Ground Level: NT				

Description of Strata	Legend	Depth (m bgl) (thickness)	Sheet Depth (m)	Samples/Tests			SPT Results						Laboratory Test Details
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	75mm	
.....continued Weak white, CHALK. Fractures closely spaced with sub angular to sub rounded flint. Grade B/C (Seaford & Newhaven Chalk Formation)				16.00	24	SPT/D	4	5	4	4	4	5	17
				18.00	25	SPT/D	6	5	6	7	7	8	28
EOBH		20.00	20.00	20.00	26	SPT/D	5	7	8	9	9	10	36

Casing record			Chiselling records			Water level observations (depths in metres below gl)						
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks	
12/10/2017	200	16.00				12/10/2017	11.70	11.30	-	11.30		
Remarks									By	Date		
Hand service pit to 1.20m bgl. Groundwater encountered at 11.70m bgl. DBSA constructed to 10.50m bgl.									Logged	GR		12/10/2017
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