

Proposed Basement at 7 Green View, Theydon Bois Groundwater Movement Report

MLM Consulting Engineers Ltd North Lodge 25 London Road Ipswich Suffolk IP1 2HF

T: 01473 381980

E: james.calvert@mlm.uk.com

W: www.mlm.uk.com

Project Ref: SJC/613687/JRC Date: 15 October 2010

Revision:

repared: James Calvert

Chartered Engineer)

Checked: Str la S

(Director)

Approved: La Stev (Dire

Civil, Structural and Building Services Engineers

MLM Consulting Engineers Limited Registered Office: 89 High Street, Hadleigh, Suffolk IP7 SEA Registered in England and Wales: 3057104 VAT No: 665 8111 25

Contents

		Page
1	Introduction	1
2	The Water Table in Theydon Bois	2
3	Disruption of Water Table (Groundwater Movement) due to Construction of Basement	3
4	Covering of Garden in Impermeable Material (Concrete)	4
5	Summary	5

Appendix

- MLM letter to Mr Beaumanoir dated 09 September 2010
- Chelmer Site Investigation Report
- Borehole Logs obtained from British Geological Survey (BGS)
- Location map for BGS boreholes

1 Introduction

- 1.1 Further to the Area Planning Subcommittee East meeting of 15 September 2010 and the decision to Defer the decision on whether to grant planning for the development at 7 Green View (planning reference: EPF/1362/10), this report now submits further evidence with regard to the issues raised at the meeting in connection with groundwater.
- 1.2 MLM previously wrote to Mr Beaumanoir on 09 September 2010; see Appendix for a copy of this letter. This letter covered the hydrological concerns raised by the objectors to the proposed development.

In summary, the findings of the letter were:

- The site is underlain by head deposits over London Clay, both are of low permeability.
- The two borehole logs taken on site (see appendix) confirmed the mapped geology and recorded no groundwater presence (whether standing water or seepage).
- 1.3 The letter concluded that the development would therefore not impact on groundwater and that any waterlogged soils at the surface were due to surface water not being able to pass rapidly into the low permeability soils below.
- 1.4 The Area Planning Subcommittee East meeting is available online in the form of a webcast and information relating to the reasons for objecting to the proposed development was obtained by viewing the available footage of the meeting. The main concerns raised are addressed in this report.
- 1.5 In addition Planning Policy Statement 25 (PPS25) was also mentioned and it was suggested by some that a Flood Risk Assessment (FRA) compliant with PPS25 should be undertaken for the development. PPS25 states that an FRA is required when
 - the site is greater than 1 ha,
 - the site is located in flood zone 2 or 3,
 - where the development may be subject to other forms of flooding; and
 - where the Environment Agency (EA), Internal Drainage Board (IDB) or other bodies have indicated there may be drainage problems.
- 1.6 The development does not fall within the first three points listed above and no evidence has been received from the EA or any IDB or the Local Authority Land Drainage Engineer to indicate that there may be drainage problems that would justify a requirement for an FRA. Therefore an FRA is not required to accompany the planning application for the site. The report presented here specifically addresses groundwater.

2 The Water Table in Theydon Bois

- 2.1 As stated in MLM's letter to Mr Beaumanoir (see Appendix), two borehole investigations were undertaken within the site; neither of these boreholes struck water and there was no seepage into the boreholes. This demonstrates that the water table was not struck and so is at least 10m below ground level in this area.
- 2.2 To investigate the surrounding area further and to supplement these borehole records, MLM obtained through the British Geological Survey (BGS) three more borehole records (see Appendix) from locations in the vicinity of the site. These records show that no groundwater was encountered in any of these boreholes including one to a depth of 80' (24.38m) below ground level. These boreholes are consistent with the onsite borehole records and demonstrate that no water table was found to exist within the depths proven by the boreholes that were up to 24.38m or 80' deep.
- 2.3 There is a well in No 3 Green View and it has been alleged that the presence of this well somehow proves that there is a high water table. The presence of a well in the area is not sufficient to demonstrate that the capable of accepting, transmitting and geology releasing groundwater/moisture at a productive rate. As stated previously the geology as indicated on regional mapping and recorded within on and offsite boreholes does not support the assertion that significant groundwater flow (movement of water through connected inter-granular pore spaces) is occurring beneath the site (or in the general area).
- 2.4 We do not have any details of the well but sometimes Head material, which overlies the Clay in this area, can have a locally variable granular content within otherwise low permeability soils. This could act as a localised sump which could potentially trap some surface water, which might explain the presence of a small well nearby, but this does not change the fact that the ground conditions within the site have been proven to be of low permeability.
- 2.5 While most of the excavations that have been undertaken on site have remained dry, there are understood to have been some occasions when one excavation has been left open during or following heavy rainfall, that this excavation has become partially filled with water. When this excavations was pumped out it remained dry. This is entirely consistent with waterlogged permeable near surface soils simply draining into an adjacent open excavation, it is not in itself indicative of a high water table, which has been shown by the borehole to be not present.

3 Disruption of Water Table (Groundwater Movement) due to Construction of Basement

- 3.1 The evidence provided in Section 2 of this report shows that the water table is not intercepted or interfered with by the proposed basement development, therefore there is no noticeable disruption to the flow of groundwater within the water table as a result of construction of the basement.
- 3.2 There is no evidence within the borehole records of a high water table within Theydon Bois. There is the possibility of localised waterlogged or poorly drained permeable soils such as topsoil near surface. This is normal where the underlying soils such as clay are of low permeability such that water cannot infiltrate at any noticeable rate into the ground below.
- 3.3 The on-site borehole records do not indicate the presence of groundwater within the site and therefore there proposed basement could not disrupt the movement of groundwater within the site to any noticeable or measurable extent.
- 3.4 The basement walls will need to be fully waterproofed as is normal with any modern basement. This is to guard against the risk of long term seepage of water which could occur from the permeable surface layers into any backfill surrounding the basement.

Page 3

4 Covering of Garden in Impermeable Material (Concrete)

- 4.1 The development plans show that the top of the concrete cover slab will be approximately 500mm below existing ground levels.
- 4.2 It is also part of the proposals to reinstate the garden to its original level once construction is completed. There will be no increase in run-off rate or volume from the garden post construction as the imported topsoil is likely to be no less permeable than the existing silty Clay, thus retaining any pluvial water no longer than the existing ground would have done. This will not increase overland flow from the development to the watercourse, therefore will not increase flood risk to others downstream of the development.
- 4.3 There is the possibility that land drains may be encountered whilst excavating the basement. If any land drains are uncovered these will be diverted around the basement and reconnected to ensure that there is no disruption to land drainage in the area.

Page 4

5 Summary

- 5.1 An FRA is not required to accompany the planning application as none of the trigger requirements of PPS 25 paragraph E9 are met.
- 5.2 If any land drains are found within the footprint of the basement they will be diverted around the basement so that their operation is not affected.
- 5.3 The proposed development will not materially affect groundwater flow.
- 5.4 The borehole logs found no groundwater within their full depth of 10 m below ground level on the site. Other published borehole logs in the vicinity obtained by MLM did not show any groundwater.

Appendix

- MLM letter to Mr Beaumanoir dated 09 September 2010
- Chelmer Site Investigation Report
- Borehole Logs obtained from British Geological Survey (BGS)
- Location map for BGS boreholes



Our Ref: 002L/JOH

09 September 2010

Mr M Beauminoir 7 Green View The Green Theydon Bois Essex CM16 7SD

Dear Mr Beauminoir

Proposed Basement, 7 Green View, Theydon Bois Hydrological Concerns

We understand that objections relating to a potential impact on groundwater flows have been raised in regard to the proposed development at the above site.

Having reviewed both the regional geological mapping and engineer's logs of the two boreholes we have the following comments/observations.

- Geological mapping shows that the site is underlain by head deposits over London Clay. Both strata are of low permeability.
- The borehole logs provided to us confirm the presence of the mapped geology and record no groundwater presence (either standing water or seepages).
- Any water logged soils in the area will tend to be due to surface water (from rainfall) being unable to pass rapidly into low permeability soils.

The borehole logs show that there is no groundwater to a depth of at least 10 m beneath the site. We would consider that the proposals will not therefore impact on groundwater. We also consider that two boreholes represent an appropriate investigation of groundwater at the site.

Yours sincerely

James Howard **Hydrologist** T: 01223 815570

E: <u>james.howard@mlm.uk.com</u> Please respond to our Cambridge office

Encs: MLM Terms and Conditions Revision 3

Civil, Structural and Building Services Engineers

A

Factual Report

of

Site Investigation undertaken for

Martin Beaumanoir

at

7 Green View The Green Theydon Bois

on

16th January 2009







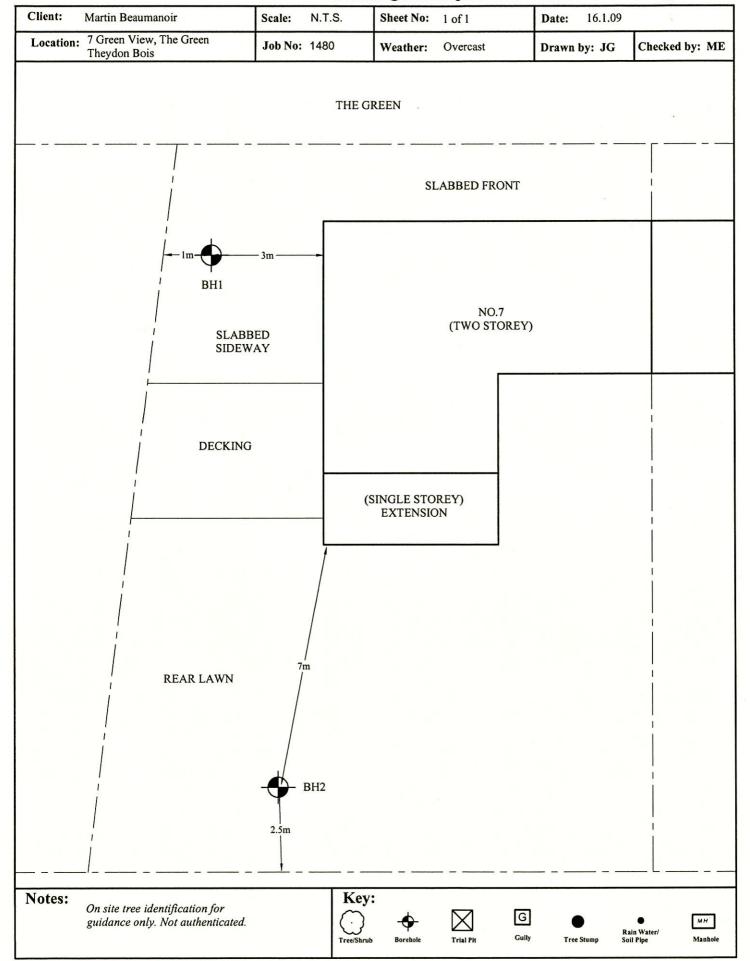
Chelmer Site Investigations

Unit 15 East Hanningfield Industrial Estate

Old Church Road, East Hanningfield, Essex CM3 8AB

Telephone: 01245 400930 Fax: 01245 400933

Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk



Chelmer Site Investigations,

Unit 15, East Hanningfield Industrial Estate, Old Church Road,

East Hanningfield, Essex CM3 8AB



Email: Info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

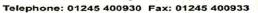
Telephone: 01245 400930 Fax: 01245 400933

Client:	Martin Beamanoir	Scale:	N.T.S.	Sheet	No:	1 of 1	Date:	16.1.09	9
Site:	7 Green View, The Green, Theydon Bois	Job No:	1480	Boreh	ole No:	1	Boring Method:	C.F.A.	11
Weather:	: Overcast			Draw	n by:	JG	Approved by:	MCE	
Depth Mtrs	Description of Strata	Thickness	Legend	Sample	Туре	Test Result	Root Information	Depth of Water	Depth Mtrs
G.L. 0.10	SLABS OVER SAND	0.10				L.A			
0.20	TYPE 1 ROADSTONE	0.10		- 13.			Hair and fibrous roots to 1.	2m	
0.60	MADE GROUND: medium compact dark brown/grey silty clay with gravel and brick fragments.	0.40		D					0.50
	Firm mid brown/orange grey veined silty CLAY with partings of orange and brown	1.00	_ _	D	v	68 72			1.00
1.60	silt and fine sand claystone nodules and crystals.		x—_ _—_ _—_x	D			No roots observed below 1.	2m	1.50
			— _—_ ×—_	D	v	94 100			2.00
	Stiff as above.	1.80	x	D			A.		2.50
			_ _ x	D	V	122 132			3.00
3.40		- 6	_—_ x—_	D					3.50
				D	v	140+ 140+			4.00
	Very stiff mid brown silty CLAY with partings of orange and brown silt and fine sand claystone nodules and crystals.	3.10		D		1401			4.50
		10 TE	x 	D	v	140+ 140+			5.00
6.50			 x 	D	v	140+ 140+	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		6.00
0.50			=_^= x 	D	v	140+ 140+	2		7.00
	Very stiff mid grey silty CLAY with partings of brown silt and fine sand and crystals.	3.50	<u>*</u> —	D	v	140+ 140+			8.00
		2	x— _— _—_	D	V	140+ 140+			9.00
10.00	Borehole ends at 10.0m		<u>x—</u> _	D	V	140+ 140+	2.		10.00
Remarks:	Borehole dry and open on completion.	11,4		B Bu U Un	nall Distu ılk Distur	rbed Sam bed Samp I Sample(ole V	Pilcon Var Mackintos	h Prob

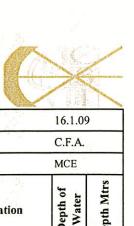
Chelmer Site Investigations,

Unit 15, East Hanningfield Industrial Estate, Old Church Road,

East Hanningfield, Essex CM3 8AB



Email: info@siteInvestigations.co.uk Website: www.siteInvestigations.co.uk



M Mackintosh Probe

N Standard Penetration Test Blow Count

Client:	Martin Beamanoir	Scale:	N.T.S.	Sheet	No:	1 of 1	Date:		16.1.09)
ite:	7 Green View, The Green, Theydon Bois	Job No:	1480	Boreh	ole No:	2	Boring Metl	hod:	C.F.A.	
eather:	Overcast			Drawr	ı by:	JG	Approved b	y:	MCE	
Depth Mtrs	Description of Strata	Thickness	Legend	Sample	Туре	Test Result	Root I	nformation	Depth of Water	Depth Mtrs
G.L. 0.10	Turf over TOPSOIL	0.10	8							
0.70	MADE GROUND: medium compact dark brown/grey silty clay with gravel brick and china fragments.	0.60					Hair and fibr	ous roots to 1.2m	= 12	
-			_ _* _ _—	D						0.50
,	Firm mid brown/orange grey veined silty CLAY with partings of orange and brown	1.60	x—	D	V	68 66	No roots obes	erved below 1.2m		1.00
	silt and fine sand claystone nodules and crystals.	1.00		D			NO FOOLS ODS	erved below 1.2111		1.50
.30			<u>x</u> x	D	V	74 74				2.00
				D			3. B.			2.50
	Stiff as above.	1.40	 x—	D	V	116 120	. 4			3.0
.70			 x	D						3.5
				D	V	140+ 140+				4.0
*	Very stiff mid brown/orange silty CLAY with partings of orange and brown silt and fine sand claystone nodules and crystals.	1.80	x x 	D						4.5
.50			 	D	V	140+ 140+				5.0
70	Very stiff mid to dark brown silty CLAY with partings of orange and brown silt and fine sand claystone nodules and crystals.	1.20	 *_ 	D	V	140+ 140+	\$\$ 			6.0
.70			x— 	D	V	140+ 140+				7.0
7	Very stiff mid grey silty CLAY with partings of brown silty and fine sand and crystals.	3.30	 x— _—	D	V	140+ 140+				8.0
3	2		_—_ x— _—_	D	V	140+ 140+				9.0
).00	Borehole ends at 10.0m Borehole dry and open on completion.		x	D Key:	V	140+ 140+	ense to Drive			10.0

U Undisturbed Sample(U100)

W Water Sample

Chelmer Geotechnical Laboratories

Unit 15 East Hanningfield Industrial Estate Old Church Road East Hanningfield Essex CM3 8AB Tel: 01245 401393 Fax: 01245 400933 Email: info@soillabs.co.uk

Laboratory Testing Results

Contant	Oronio LI	Plastic Plasticity Liquidity Modified Soil Filter Paner Soil Incito	Moisture Soil Liquid	Sample Ref
22.01.09	Complete:		7 Green View The Green Theydon Bois	Site:
20.01.09	Tested:		Martin Beaumanoir CSI Ref: 1480	Client:
16.01.09	Received:		CGL01106	Job No:

Sar	Sample Ref		Moisture	Moisture Soil Lionid	Liquid	Plastic	Plasticity	Liquidity	Modified	Soil	Filter Daner	Soil	T contract		comprene.	Sulphoto Contour		22.01.03
BH	L	Type	Content	Fraction	Limit	Limit	Index	Index	Plasticity		Contact	Sample	Shear Vane	Content	Value	Suipliate Co. (g/1)	(1)	Class
/ Sample No	(m)		[]] (%)	> 0.425mm (%) [2]	(%)[3]	(%)[4]	(%)[5]	[5]	Index (%)[6	[1]	Time (h) [8]	Suction (kPa)	Strength (kPa) [9]	[01](%)	[III]	so ₃ [12]	^{SO} 4 [13]	[14]
1,000,124		۵	36	3,	01	Č			ī	į	1		1					
1/000104	0.1	<u> </u>	cç	?	81	/7	5	0.15	5	<u>ک</u>			70					
1/006165	2.0	D	32	\$	77	56	51	0.11	51	CV			26					
1/006166	3.0	Q	33	۵	80	30	20	90.0	50	C			137					
1/006167	4.0	D	33	۵	81	29	52	90.0	52	CA			> 140					
						4												
															7			
										*								
Test Methods / Notes	/ Notes			y	[9] Values of shear strength were determined in situ by Chelmer Site Investigations using	strength were dete	rmined in situ by C	Chelmer Site Inve	estigations using				-1	Key				
(1) BS 1577 : Part.	(1) BS 1377 : Part 2 : 1990, Test No 3.2	_			a Pilcon hand vane or Geonor vane (GV).	ane or Geonor van	Je (GV).							D 0	Disturbed sample	ple		

110 BS 1377: Part 3: 1990; Test No. 94

[11] BS 1377: Part 3: 1990; Test No. 94

[11] BS 1377: Part 3: 1990; Test No. 96

[12] BS 1377: Part 3: 1990; Test No. 56

[13] SQ, = 1.2 xQ, 2000

[14] BRC Special Digest One (Concrete in Aggressive Ground) 2005

Note that if the SQ, content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m class respectively unless water soluble magnesium testing is undertaken to prove otherwise (2) Estimated if <5%, otherwise measured
(3) BS 1377: Part 2: 1990, Test No 44
(4) BS 1377: Part 2: 1990, Test No 5.3
(5) BS 1377: Part 2: 1990, Test No 5.3
(6) BRE Digest 240: 1993
(7) BS 5930: 1981: Figure 31 - Plasticity Chart for the classification [8] In-house method S9a adapted from BRE IP 4/93

Water sample Essentially Non-Plastic by inspection Underside Foundation U100 (undisturbed sample)

Chelmer Geotechnical Laboratories

Unit 15 East Hanningfield Industrial Estate Old Church Road East Hanningfield Essex CM3 8AB Tel: 01245 401393 Fax: 01245 400933 Email: info@soillabs.co.uk

Laboratory Testing Results

Received:	F	I ested:	Complete:	
CGL01106	Martin Beaumanoir CSI Ref: 1480	Ē	/ Green View The Green Theydon Bois	
 Job No:	Client:		Site:	3 0 1

16.01.09 20.01.09 22.01.09

Sample Ref.	Ref.		Moisture	Soil	Liquid	Plastic	Plasticity	Liquidity	Modified	Soil	Filter Paner	Soil	In eitu	Organio	Пч	Sulphate Content	Г	
ВН	Depth	Type	Content	Fraction	Limit	Limit	Index	-	Plasticity		Contact	Sample	Chear Vana	Contont	nd	Suipilate C	OIIICIII	ō
/ Sample No	(<u>m</u>)		(%)	> 0.425mm	(%) (3)	171 (%)	137 (%)	5	Index	(1)	Time	Suction	Strength	Content	value	503	\sim	Class
			(a)	(7) (0/)	(c1(ov)	(+1(0/)	[c](w)	[c]	9](%)	67	(u) [8]	(kPa)	(kPa) [9]	(%)[10]	[11]	[12]	[13]	[14]
2/006168	1.0	D	40	11	98	28	28	0.20	52	C	3		<i>L</i> 9	1				
2/006169	2.0	D	31	\$	72	27	45	0.10	45	C			74					
2/006170	3.0	D	32	\$	75	28	47	60.0	47	C			118					
2/006171	4.0	D	31	۵.	92	27	49	60.0	49	C			> 140					
											14							
																6		
													d					
	1																	

Test Methods / Notes	foe				(II) Victima of Chase research more districted in the Chine Chine in the Chine													
[1] BS 1377 : Part 2 : 1990, Test No 3.2	90, Test No 3.2			<i>k1</i>	y values of shear strength were determined a Pilcon hand vane or Geonor vane (GV).	rengin were deter ne or Geonor van	c (GV).	nelmer Site Invest	figations using					Key D	Disturbed sample	<u>e</u>		
[3] BS 1377: Part 2: 1990, Test No 4.4	nerwise measured 990, Test No 4.4				[10] BS 1377 : Part 3 : 1990, Test No 4 [11] BS 1377 : Part 2 : 1990. Test No 9	: 1990, Test No	4 0							a ;	Bulk sample			
[4] BS 1377: Part 2: 1990, Test No 5.3	990, Test No 5.3			11	[12] BS 1377: Part 3: 1990, Test No 5.6	: 1990, Test No	5.6							> ≽	U100 (undisturbed sample) Water sample	ed sample)		
(5) BS 1377 : Part 2 : 1990, Test No 5.4	990, Test No 5.4			11	[13] SO ₄ = 1.2 x SO ₃	ç		3000						ENP	Essentially Non-	Essentially Non-Plastic by inspection	tion	
[7] BS 5930: 1981: Figure 31 - Plasticity Chart for the classification	gure 31 - Plasticity C	hart for the c	classification		[14] DAE Special Digest One (Concrete in Aggressive Ground) 2005. Note that if the SO, content falls into the DS-4 or DS-5 class it we	O, content falls in	bace special biggst one (Concrete in Aggressive Ground) 2005. Note that if the SO, content falls into the DS-4 or DS-5 class it would be made at to consider the cample as falling.	ound) 2005 -5 class it would	be prodent to co	neider the can	nole as falling			S/N	Underside Foundation	dation		
of fine soils					into the DS-4m o	r DS-5m class re	into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise	ater soluble magn	esium testing is	undertaken to	prove otherwise							
[8] In-house method S9a adapted from BRE IP 4/93	a adapted from BRE	IP 4/93						1)									

Chelmer Geotechnical Laboratories

Unit 15 East Hanningfield Industrial Estate Old Church Road East Hanningfield Essex CM3 8AB Tel: 01245 401393 Fax: 01245 400933 Email: info@soillabs.co.uk

Moisture Content and Shear Strength Profiles

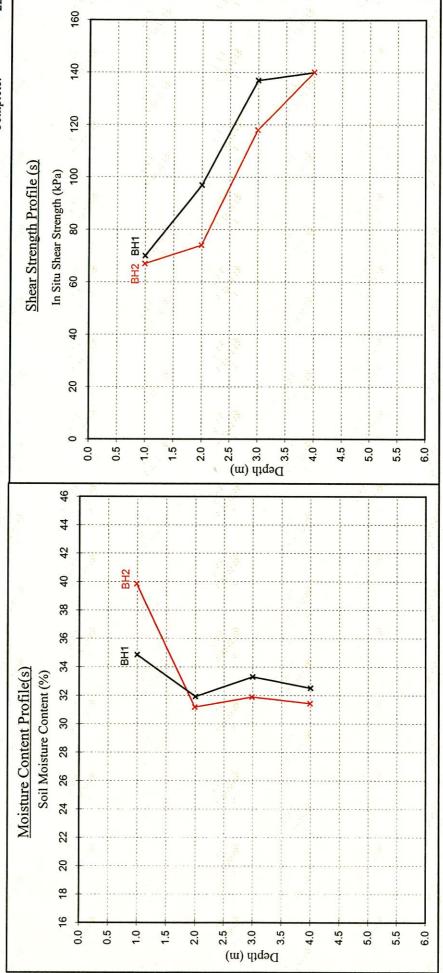
Note: Unless specifically noted the profiles have not been 7 Green View The Green Theydon Bois Martin Beaumanoir CSI Ref: 1480 Client: Site:

22.01.09 20.01.09 Complete: Tested:

Received: Job No:

CGL01106 16.01.09

related to a site datum.



plotted and the alternative profile additionally shown as an appropriately coloured broken line. the remainder (calculated in accordance with BS 1377: Part 2: 1990, cl.3.2.4 note 1) is also 1. If the Soil Fraction > 0.425mm exceeds 5% the Equivalent Moisture Content of

by Chelmer Site Investigations using a Pilcon Hand Vane the calibration of which is limited to Unless otherwise stated, values of Shear Strength were determined in situ

a maximum reading of 140 kPa.

^{2.} If plotted, 0.4 LL and PL+2 (after Driscoll, 1983) should only be applied to London Clay (and similarly overconsolidated clays) at shallow depths.

Unit 15 East Hanningfield Industrial Estate Old Church Road East Hanningfield Essex CM3 8AB Tel: 01245 401393 Fax: 01245 400933 Email: info@soillabs.co.uk

BH 2 BH 1 Key 120 Extremely High Plasticity 110 16.01.09 20.01.09 22.01.09 ME (F) 100 Received: Tested: Complete: 90 × Upper Plasticity Range Very High 80 (N) × ×× 3 × 70 Liquid Limit (per cent) H High (H) MH 20 Intermediate (\overline{\begin{array}{c} \overline{\begin{array}{c} \overline{ [5 40 7 Green View The Green Theydon Bois Martin Beaumanoir CSI Ref: 1480 30 Low M M F 20 CGL01106 10 Job No: Client: Site: 70 80 9 20 Plasticity Index (per cent)

Plasticity Chart for the classification of fine soils and the finer part of coarse soils.

In Compliance with BS 5930: 1981

M and C may be combined as FINE SOIL, F.



REPORT NOTES

Equipment Used

Hand tools, Mechanical Concrete Breaker and Spade, Hand Augers, 100mm/150mm diameter Mechanical Flight Auger Rig, GEO205 Flight Auger Rig, Window Sampling Rig, and Large or Limited Access Shell & Auger Rig upon request and/or access permitting.

On Site Tests

By Pilcon Shear-Vane Tester (Kn/m²) in clay soils, and/or Mackintosh Probe in granular soils or made ground and/or upon request Continuous Dynamic Probe Testing and Standard Penetration Testing.

Note:

Details reported in trial-pits and boreholes relate to positions investigated only as instructed by the client or engineer on the date shown.

We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.

107	49	V	5/	32
u	53	1	98	90

BOREHOLE Nº 306 LOG OF

GROUND LEVEL_ (71:75/235.4. A.O.D. DATE STARTED_____22/7/1966 DATE COMPLETED_____261_71_1966

TYPE OF BORING SHELL AUGER BOREHOLE LINED TO _ 25 1 . O _ins.

Geological Pormation	Legend	Description of Strata	Depth	Samples	Worter Levels
MADE		FRAGMENTS OF LARGE STONES	2·29m		
	<u>* </u>	STONES AND CHALK FRAGMENTS IN A	3.36m		
GLACIAL BOULDER CLAY	~ °	FIRM BROWN SILTY CLAY WITH SCATTERED STONES	5-79m	■ 10	
		FIRM BLUE FISSURED SILTY CLAY WITH SILT PARTINGS	9-14m	1 10	
			30° 0°	1 13	·
_		STIFF BLUE			
CLA		FISSURED		1 14	
N 0 0	5	SILTY CLAY			
LONG				1 12	
•	<u>^</u>			1 12	
				9	
	<u> </u>		36.38¥	1 13	
REMA		GROUNDWATER ENCOUNTERED	KEY:	STANDI	STRUCK ING WATER LEVEL
			(25)	STANDA Nº OF	URBED SAMPLE ARD PENETRATION TEST BLOWS FOR 12" PENETRATION TO CORE



TECHNICAL SERVICES DEPARTMENT W. & C. French Ltd., Buckhuret Hill, Essex BUCkhuret 4444

Location Theyden Bois.

Epping & Ongar R.D.C. Client **Ground Level**

Diameter of Boring

Bin.

T049 NE

147 BORING RECORD

4534 9905

Borehole No. 1, Date 25 th . July . 1966. Depth of Lining Tubes. Not used,

Description	D. Level	Leg- end	Sam- ple	Depth	Thick- ness	S.P. or Vane Test	Depth to Water below ground level
Soft dark brown glightly sitty clay with some brick fragments & roots - Topsoil.		XX	O 1.	0	1'-0"		
Firm brown & grey mottled CLAY with some pockets of fine orange sand,					4'.0"	*	
		X	3, 0 % 0 £	5 -0		* * * * * * * * * * * * * * * * * * *	Borehole dry throughout,
Stiff brown fissured CLAY light blue, becoming light brown in fissures, with some pockets of fine orange sand k some gypsum crystals.		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	4. 7. 8. 9		IS'-O' pane- trated	,	•
		X	0 11.	20'-0"			
							,
Scale: I in. to 4 Pt. Tube St	imple						Water Sample F

S 1511



TECHNICAL SERVICES DEPARTMENT
W. & C. French (Construction) Ltd
01-504 4444

Location Waburn Avenue, Theydon Bois.

Client Epping & Ongar R.D.C.

Ground Level Diameter of Boring

r R.D.C. Diameter of Boring 4in H/A BORING RECORD 452 988

TO49 NE

153

Borehole No. 2
Date 16th Jonuary 1972
Depth of Lining Tubes Not Used

Ground Level	Diamet	er of B	oring	4in	H/A.	Dept	h of Lining Tuber	Not Used
Description	D. Level	Leg- end	Sam- ple	Depth	Thick- ness	S.P. or Vane Test	Depth to below grou	Water nd level
Dark brown sandy organie. CLAY with brick rubble. Firm light grey-brown silty CLAY with pockets red-brown silt. Staff grey CLAY with some gypsum crystals & a few pockets of organie matter. Firm brown & slightly light grey mottled CLAY with a few gypsum crystals.			01 2 3 4 4 5 1 6	0 0.50 1.00 1.50	0.50 0.50			
Stiff brown fissured CLAY, light grey in a few fissures with a few gypsum crystals.		大三块私三	O 9 O 10 I 11 O 12	6.20	3.70 pana- trolled		Borehole dry	throughou
Scale: (:50 Tube 5		M S	tandarı + Vari	l Pene	iration (shear	Test streng	► Water Sample th in to/eq. ft. ki//m¹)	Fig. No.

The Committee Branch

