



BRIEF FACTUAL SITE INVESTIGATION

Site Land West of Mill Lane, Hatfield Heath, Essex

Client City & Country Ltd
Bentfield Place
Stansted
Essex

Job number 16021

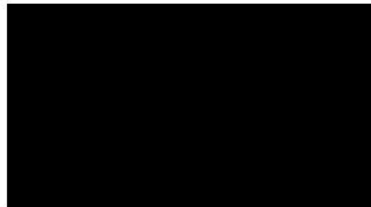
Issue

Site Work

date

April 2016

Signed



.... Michael K Hay IEng AMIStructE
Roberts Hay Partnership Ltd.

Brief

To carry out a brief site investigation, by means of machine dug trial holes, in order to determine the nature of the upper sub soils, all in relation to possible development of the sites. At the time of writing we have not seen any proposals for such development but believe that low rise residential dwelling houses are proposed.

Soakage testing is to be carried out in order to establish the viability of surface water disposal via soakaways.

We have not been asked to carry out any contamination testing or to assess the site for the possibility of chemical contamination or pollution. During our works we do visually assess for the obvious presence of signs of contamination, and will highlight any such indications if encountered, however this should not be considered as an adequate substitute for a full contamination survey that you might consider necessary.

Summary.

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The majority of this area of the site would appear to be suitable for nominal 1.0m deep foundations. Some de-watering of foundation excavations may be required. Where foundations are within the influence zones of new or existing significant vegetation they may need to be deepened and require anti heave protection.

De-watering of excavations may be required.

Ground floors to be of suspended construction.

Previously Developed Land to the South of Land Comprising Greenways Eggs Ltd.

Due to the variability of the soil strata and the density of tree growth we consider that a pile or raft foundation would be the most appropriate founding solution for this area of the site.

Soakage Tests.

The subsoils encountered were being predominantly clays and most of the trial excavations making water we were unable to complete the required soakage testing, however we do not consider that shallow soakaways would be an appropriate solution for the disposal of surface water.

Introduction.

This report has been prepared for the benefit of yourselves and your professional advisers; it may not be passed to any third party without the written consent of the Roberts Hay Partnership Ltd. In any case no liability will extend to any such third party for all or any part of its contents.

The comments and opinions expressed in this report are based upon the conditions encountered on site during the investigation works, any comments can only be specific to that area from which soil was extracted and must only be considered as indicative of the nature of the site as a whole. It is always possible that some special conditions prevailing on site have not been encountered and therefore have not been taken into consideration in the formulation of this report.

All ground water recordings or their absence relate only to short term observations and in particular do not allow for any seasonal variation. Any such readings may therefore not truly reflect the natural groundwater conditions.

This investigation specifically does not extend to matters of chemical contamination or pollution of the site, soils or ground water.

Site Work.

At the time of our visit the weather was overcast but dry.

The site of our investigation comprised a parcel of land to the west of Mill Lane, Hatfield Heath.

The site is bounded by residential dwellings or open farm land.

Trial pits were machine dug and during excavation the soil strata were logged, in-situ soil strength testing as appropriate was carried out, and soil samples extracted and retained for laboratory testing; all as indicated on the trial pit logs. The attached sketch plans show the trial pit locations together with other significant features.

Land Comprising Greenways Eggs Ltd.

Both trial pits 8 & 9 in this area encountered dense gravels at nominal foundation depths underlain by the shrinkable clays. The gravels have sufficient strength to support the anticipated loadings with acceptable settlements. However where the influence zone of existing or proposed significant vegetation exceeds the depth of the gravel layer foundations depths should be designed in accordance with the NHBC guidelines for "Building Near Trees" and may require anti-heave precautions.

Ground floors to be of suspended construction.

Previously Developed Land to the South of Land Comprising Greenways Eggs Ltd.

This area is extensively wooded with many mature and semi mature trees. There are also some water features and ditches crossing the site. The underlying soils mainly comprise of clays although there are also some areas of fill, pockets of sand and some gravels. The variability of the soil strata and the density of tree growth suggests that a pile or raft foundation would be the most appropriate founding solution. As appropriate for a piled foundation the ground floor should be of suspended construction.

Soakage testing. The majority of the subsoils encountered were the slightly silty slightly sandy clays, with poor permeability, that are typical of the local area. In most of the excavations water was encountered at variable depths, and as variable inflows. A single soakage test was carried out in TP3 at 1.3m depth where conditions were more favourable, the clays containing more sand and flint gravels, however the test was abandoned after 20 minutes as the water levels were static.

Laboratory Work.

Results of laboratory analysis are attached. These show the generally silty sandy CLAYs encountered at nominal founding level to be of variable shrinkability (PI 12%-38%), that is showing a variable propensity to a change in volume following a change in their moisture content. Foundations based in these shrinkable soils within the influence zone of existing vegetation will need to be designed in accordance with NHBC Chapter 4.2 'Building Near Trees'.

Site Plan Land to the West of Mill Lane, Hatfield Heath.

Not to Scale For Location Purposes Only



Trial Hole 3

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling				water
					ref	depth (M)	test	value	
0.30	0.30	grass over stiff dark brown-black slightly silty slightly sandy clayey TOPSOIL		rare upto 5mm					
0.60	0.30	very stiff dark orange-brown very sandy CLAY occasional-much medium-large flint gravel		rare upto 1mm					
1.10	1.10	very stiff mid to light orange brown dark orange mottled slightly sandy CLAY with rare fine-medium flint gravels. Coarse sand veining with depth			B1	1.00	MP	100+	
1.70	1.70	rare large flint cobbles		rare upto 2mm	B2	1.7	MP	100+	
2.70	1.00	very stiff mid grey mid orange-brown mottled slightly sandy CLAY rare medium flint gravel & rare fine chalk gravel becoming more silty with depth. Coarse sand veining		rare upto 1mm					
2.70	1.00	becoming more sandy with depth			B3	2.7	MP	100+	slow inflow 2.7m
3.00	0.3	very stiff mid orange-brown damp silty sandy CLAY			B4	3.00	MP	100+	
3.30	0.3	very stiff mid grey orange-brown slightly silty sandy CLAY occasional fine-medium chalk gravels rare medium chalk cobbles							

Hole closed @ 3.30m

B Bulk Sample

W Water Sample

N Standard Penetration

MP Mackintosh Probe

D Disturbed jar sample

U Undisturbed sample U100

V Shear Vane

Trial Hole 4

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling			water
					ref	depth (M)	test	
0.40	0.40	dense orange-brown clayey TOPSOIL FILL rare medium brick fragments		rare upto 5mm				
1.30	0.90	dense mid orange-brown orange mottled slightly silty claybound medium to large flint GRAVEL rare grey veining with depth becoming grey & more silty with depth		rare upto 1mm	B1	1.00	MP	100+
2.10	0.80	very stiff mid -light grey mid orange-brown mottled slightly silty sandy CLAY		rare upto 1mm	B2	1.30	MP	100+
2.80	0.70	very stiff mid orange slightly silty sandy CLAY with rare fine-medium flint gravels grey mottling & more silty with depth		rare upto 1mm	B3	2.1	MP	100+
3.20	0.4 pen	very dense mid orange-brown grey mottled slightly clayey silty damp SAND rare Fine-medium flint gravels			B4	3.00	MP	100+

Hole closed @ 3.20m

B Bulk Sample

W Water Sample

N Standard Penetration

MP Mackintosh Probe

D Disturbed jar sample

U Undisturbed sample U100

V Shear Vane

Trial Hole 5

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling			water	
					ref	depth (M)	test		value
0.30	0.30	stiff dark brown sandy clayey TOPSOIL		rare upto 15mm				rapid inflow 0.3m	
	1.20	brick FILL		rare upto 8mm					
1.50				rare upto 12mm	B1	1.50	MP		28
	0.70	soft dark brown black mottled slightly sandy slightly silty CLAY with rare rotting Vegetation & leaf mould variable composition		rare upto 1mm					
2.20					B2	2.2	MP	100+	
	0.80	vert stiff mid-light grey dark grey mottled slightly silty sandy CLAY rare to occasional Fine-medium chalk & flint gravels rare medium-large chalk cobbles							
3.00					B3	3	MP	100+	

Hole closed @ 3.00m

B Bulk Sample
W Water Sample
N Standard Penetration
MP Mackintosh Probe

D Disturbed jar sample
U Undisturbed sample U100
V Shear Vane

Trial Hole 6

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling				water
					ref	depth (M)	test	value	
0.30	0.30	grass over very stiff dark brown slightly silty sandy clayey TOPSOIL		rare upto 6mm					
0.50	0.20	very stiff dark orange-brown slightly silty sandy CLAY rare medium flint gravels							
1.20	0.70	stiff mid-light grey-brown orange mottled slightly silty slightly sandy CLAY rare to occasional fine-medium chalk & flint gravels Medium-large flint gravels with depth		rare upto 4mm	B1	1.00	MP	100+	
				rare fibrous	B1	1.00	MP	100+	
1.80	0.60	very stiff mid orange light grey mottled slightly silty slightly sandy CLAY rare fine chalk & flint gravels. rare medium large flint cobbles			B1	1.00	MP	100+	fast seepage 1.9m
2.50	0.70	dense mid orange slightly silty very clayey coarse SAND with rare fine-medium flint gravels rare large flint cobbles			B4	2.5	MP	58	
3.00	0.50 pen	Firm-stiff mid grey orange-brown mottled slightly silty sandy CLAY rare fine-medium chalk gravels							

Hole closed @ 3.00m

B Bulk Sample

W Water Sample

N Standard Penetration

MP Mackintosh Probe

D Disturbed jar sample

U Undisturbed sample U100

V Shear Vane

Trial Hole 8

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling			water
					ref	depth (M)	test	
0.40	0.40	stiff dark brown-black clayey TOPSOIL		rare upto 10mm				
0.90	0.50	Stiff-very stiff grey-brown mottled silty CLAY occasional fine-medium flint gravels						
3.00	2.10 pen	very stiff light grey-brown orange-brown mottled slightly silty slightly sandy CLAY rare fine-medium chalk & flint gravels rare black partings more chalk & flint gravels with depth pocket of very dense orange-brown claybound medium-large flint gravel rare large chalk & flint cobbles with depth variable composition rare very large chalk cobbles with depth		rare upto 2mm rare upto 1mm rare fibrous rare inactive rare inactive	B1	1.00	MP	100+
					B2	2.00	MP	100+
					B3	3.00	MP	100+

Hole closed @ 3.00m

- B Bulk Sample
- W Water Sample
- N Standard Penetration
- MP Mackintosh Probe

- D Disturbed jar sample
- U Undisturbed sample U100
- V Shear Vane

Trial Hole 9

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling				water
					ref	depth (M)	test	value	
0.50	0.50	stiff dark brown-black sandy clayey TOPSOIL							
2.20	1.70	<p>dense grey-brown slightly silty slightly sandy claybound fine-medium flint GRAVEL</p> <p>slight collapse below 1.1m</p> <p>orange mottling with depth</p> <p>rare medium flint cobbles & rare medium chalk gravels</p> <p>becoming more sandy with depth</p> <p>rare large chalk & flint cobbles with depth</p>			B1	1.00	MP	100+	slow seepage 1.0m
					B2	2	MP	100+	
					B3	2.2	MP	100+	
2.70	0.50	very stiff mid orange-brown grey-brown mottled slightly silty sandy CLAY rare fine chalk gravels rare medium flint gravels			B4	2.7	V	58	
3.00	0.3	stiff grey-brown orange brown mottled slightly silty slightly sandy CLAY very rare fine chalk fragments.			B5	3	V	86	

Hole closed @ 3.00m

B Bulk Sample

W Water Sample

N Standard Penetration

MP Mackintosh Probe

D Disturbed jar sample

U Undisturbed sample U100

V Shear Vane

Trial Hole 10

depth below ground level (M)	thickness of strata (M)	description of strata	legend	roots	sampling				water
					ref	depth (M)	test	value	
0.20	0.20	stiff dark brown-black slightly sandy clayey TOPSOIL		upto 5mm					
0.70	0.50	Stiff-very stiff mid-dark orange-brown slightly silty slightly sandy CLAY rare medium flint gravels		upto 2mm					
		orange veining with depth							
	2.30 pen	very stiff mid-light orange-brown grey mottled slightly silty sandy CLAY rare-occasional flint gravels		rare upto 1mm	B1	1.00	MP	100+	
		rare medium chalk gravels							
		slight collapse			B2	2	MP	100+	slow seepage 2.0m
		more chalk & flint cobbles with depth							
		variable composition		rare inactive					
		occasional vary large chalk & flint cobbles			B3	3	MP	100+	

Hole closed @ 3.00m

B Bulk Sample

W Water Sample

N Standard Penetration

MP Mackintosh Probe

D Disturbed jar sample

U Undisturbed sample U100

V Shear Vane

Soakage Testing

TRIAL PIT 3			TEST 1		TEST 2		TEST 3	
depth below ground level (M)	description of strata	ref	elapsed time (mins)	water level below datum (mm)	elapsed time (mins)	water level below datum (mm)	elapsed time (mins)	water level below datum (mm)
1.30	<p>very stiff mid to light orange brown dark orange mottled slightly sandy CLAY with rare fine-medium flint gravels. Coarse sand veining with depth</p> <p>rare large flint cobbles</p>	S1	1 2 5 10 20	12 15 15 15 15				

Test abandoned as no further fall in water level after 20 minutes

Laboratory Testing

**Natural Moisture Contents & Atterburg Limits.
Clayton & Jukes Single Point Method using the Cone Penetrometer.**

Sample ref	Sample Depth	Natural Moisture Content	Liquid Limit	Plastic Limit	Retained @ 0.425mm	Retained @ 0.063mm	Passing 0.063mm	Basic Plasticity Index	Modified Plasticity Index	Class.
<u>TP3</u>	1.00	20%	35%	18%	37%	15%	27%	17%	N/A	CI
	1.70	21%	48%	27%	6%	29%	65%	21%	20%	MI
	2.70	25%	40%	23%	9%	14%	77%	17%	15%	CI
	3.00	20%	25%	20%	3%	36%	61%	5%	5%	CL
<u>TP4</u>	1.00	10%	49%	23%	49%	6%	45%	26%	13%	MI
	1.30	19%	41%	19%	1%	41%	58%	22%	22%	CI
	2.10	20%	42%	22%	8%	23%	69%	20%	18%	CI
	3.00	21%	29%	17%	2%	63%	35%	12%	12%	CL
<u>TP5</u>	1.50	65%	100%	62%	3%	7%	90%	38%	37%	ME
	2.20	23%	48%	29%	26%	13%	61%	19%	14%	MI
	3.00	21%	37%	18%	5%	14%	81%	19%	18%	CI
<u>TP6</u>	1.20	22%	52%	22%	4%	22%	74%	30%	29%	CH
	1.80	14%	29%	15%	34%	26%	40%	14%	9%	CL
	2.50	25%	47%	21%	6%	30%	64%	26%	24%	CI

**Natural Moisture Contents & Atterburg Limits.
Clayton & Jukes Single Point Method using the Cone Penetrometer.**

Sample ref	Sample Depth	Natural Moisture Content	Liquid Limit	Plastic Limit	Retained @ 0.425mm	Retained @ 0.063mm	Passing 0.063mm	Basic Plasticity Index	Modified Plasticity Index	Class.
<u>TP8</u>	1.00	26%	73%	25%	7%	12%	81%	48%	45%	CV
	2.00	16%	36%	19%	12%	11%	77%	17%	15%	CI
	3.00	16%	37%	18%	8%	13%	79%	19%	17%	CI
<u>TP9</u>	1.00	18%	0%	0%	54%	13%	33%	0%	N/A	CL
	2.20	27%	49%	26%	5%	18%	77%	23%	22%	CI
	2.70	31%	57%	28%	2%	8%	90%	29%	28%	CH
<u>TP10</u>	1.00	26%	54%	24%	15%	17%	68%	30%	26%	CH
	2.00	17%	35%	18%	11%	14%	75%	17%	15%	CI
	3.00	18%	32%	19%	5%	13%	82%	13%	12%	CI