GROUND ENGINEERING

Geo-Environmental Specialists
01733 866566

Site: 378 FINCHLEY ROAD, LONDON NW3

Date: 06/06/06

Hole Size: 150mm dia to 20.00m

BOREHOLE BH1

Ground Level: 83.34m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
0.20-0.70	B1				MADE GROUND - CONCRETE		0.20	83.14
					MADE GROUND - firm, friable, dark brown/brown/grey mottled slightly gravelly, sandy CLAY with occasional brick, concrete, coal and ash fragments			
1.00-1.50	B2						1.10	82.24
1.15-1.45	S	N12	0.90		Stiff brown/orange brown/light grey mottled CLAY with occasional selenite crystals. Becoming fissured below 2.50m			
1.75	D1							
2.00-2.40	U1	38	1.20 ▼s					
2.03	W1							
2.45	D2				(WEATHERED LONDON CLAY)			
2.75	D3							
3.00-3.40	U2	48	1.20					
3.45	D4							
3.75	D5						3.60	79.74
4.00-4.40	U3	55	1.20		Very stiff, closely fissured to stiff, brown/orange brown CLAY with occasional selenite crystals			
4.45	D6				(WEATHERED LONDON CLAY)			
4.75	D7							
5.00-5.40	U4	55	1.20					
5.45	D8						5.50	77.84
					Stiff, becoming very stiff below 7.00m, closely fissured, dark grey CLAY with occasional silt and fine sand seams			
6.00	D9							
6.50-6.90	U5	60	1.20		(LONDON CLAY)			
6.95	D10							
7.50	D11							
8.00-8.40	U6	62	1.20					
8.45	D12							
9.00	D13							
9.50-9.90	U7	70	1.20					
9.95	D14						10.00	73.34

REMARKS
1. Breaking out concrete from 0.00m to 0.20m for 0.50 hours
2. Excavating a pit from 0.20m to 1.00m for 1 hour
3. Borehole cased to 1.20m depth
4. Fibrous live roots observed to 1.75m depth
5. Standpipe installed to 4.00m depth

Project No 10575
Scale 1:50
Page 1/2

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
S/C - SPT Spoon/Cone
▽ Water Strike
▼ Water Rise
N - SPT Blows for 0.3m
• - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▽c Level on completion
c▽w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes

No	Struck	Rose to	Depth m Rate	Cased	Sealed

Groundwater Observations

Date	Depth m Hole	Depth m Casing	Depth m Water
06/06/06	20.00	1.20	dry
06/06/06	20.00	0.00	dry
20/07/06	4.00	0.00	2.03

GROUND ENGINEERING

Geo-Environmental Specialists
01733 566566

Site: **378 FINCHLEY ROAD, LONDON NW3**

BOREHOLE BH1

Date: 06/06/06

Hole Size: 150mm dia to 20.00m

Ground Level: 83.34m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
					Very stiff, closely fissured to stiff, dark brown/ dark grey CLAY with occasional light brown silt and fine sand seams up to 6mm thick. Rare bivalve shell fragments at 15.00m		10.00	73.34
10.50	D15							
11.00-11.40	U8	78	1.20					
11.45	D16							
12.00	D17							
12.50-12.90	U9	85	1.20					
12.95	D18							
13.50	D19							
14.00-14.40	U10	90	1.20					
14.45	D20							
15.00	D21				(LONDON CLAY)			
15.50-15.90	U11	90	1.20					
15.95	D22							
16.50	D23							
17.00-17.40	U12	95	1.20					
17.45	D24							
18.00	D25							
18.50-18.90	U13	100	1.20					
18.95	D26							
19.55-19.95	U14	100	1.20					
20.00	D27						20.00	63.34

REMARKS: Borehole completed at 20.00m depth

Project No 10575

Scale 1:50 | Page 2/2

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
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S/C - SPT Spoon/Cone
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* - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▽c Level on completion
c.▽w Level casing withdrawn
▽s Standpipe Level

Groundwater Strikes

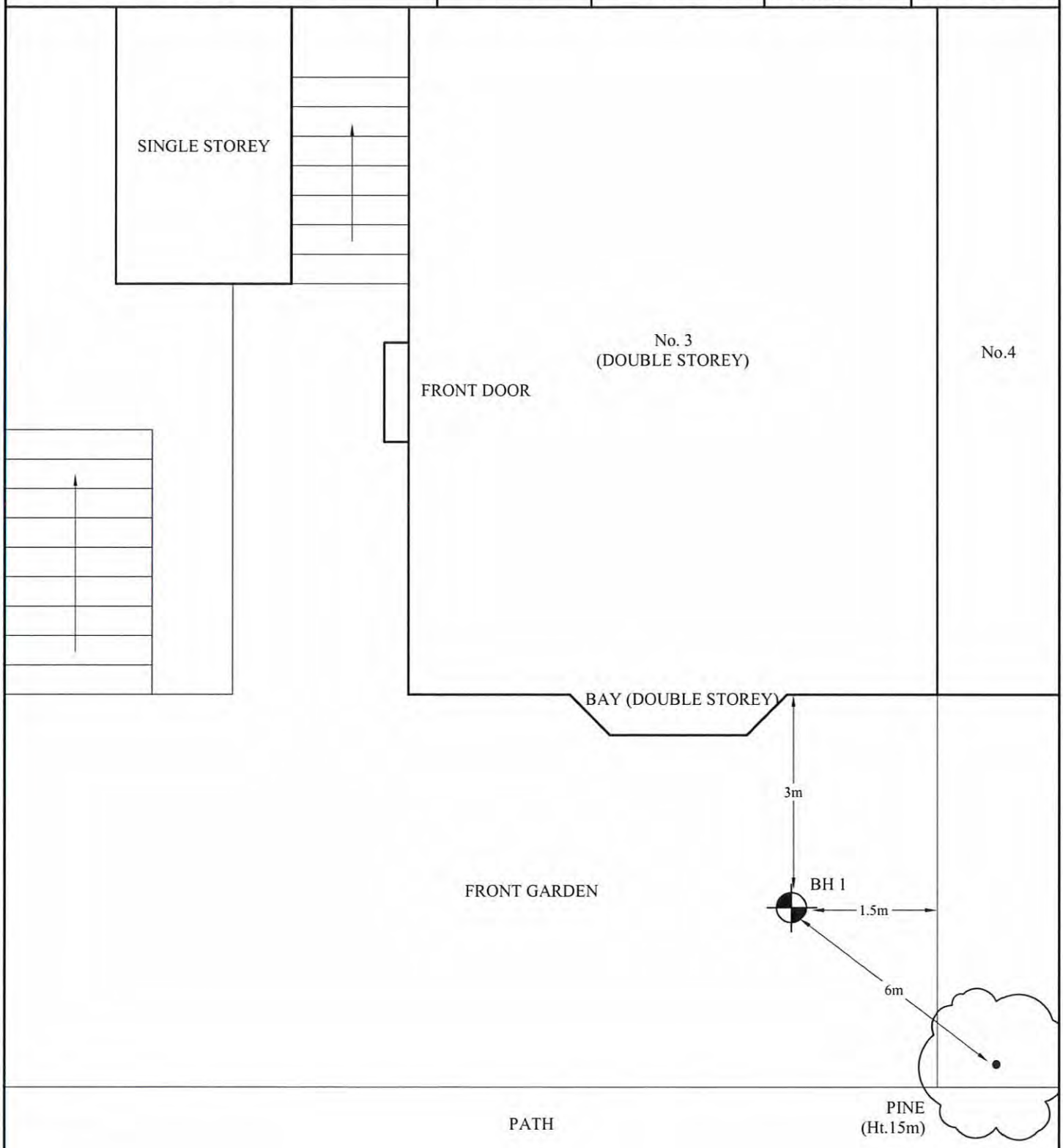
No	Struck	Rose to	Depth m Rate	Cased	Sealed

Groundwater Observations

Date	Depth m Hole	Casing	Water

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

Client: London Basement/Holbase Ltd	**Scale:** N.T.S.	**Sheet:** 1 of 1	**Date:** 18.04.11	
Location: 3 Ranulf Road, London NW 2BT	**Job No:** 2602	**Weather:** Overcast	**Drawn by: JC**	**Checked by: ME**



Notes: *On site tree identification for guidance only. Not authenticated.*

Key:

Tree/Shrub | Borehole | Trial Pit | G Gully | Tree Stump | Rain Water/ Soil Pipe | MH Manhole

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

Client: London Basement/Holbase Ltd	**Scale:** N.T.S.	**Sheet No:** 1 of 1	**Weather:** Overcast	**Date:** 18.04.11
Site: 3 Ranulf Road, London NW2 2BT	**Job No:** 2602	**Borehole No:** 1	**Boring method:** CFA 100mmØ Secondman	

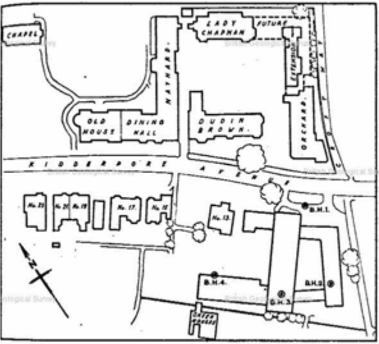
Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Test Result	Root Information	Depth to Water	Depth Mtrs
G.L. 0.050	PATIO SLAB 50mm	0.05							
	MADE GROUND: medium compact dark brown gravelly silty fine sand with numerous brick and concrete fragments.	0.55		D			Roots of live appearance to 2mmØ to 2.0m		0.5
0.6	Firm mid brown/orange sandy silty CLAY with partings of brown and orange silt and fine sand.	1.4		D	V	60 64			1.0
2.0				D					1.5
				D	V	82 86	No roots observed below 2.0m		2.0
				D					2.5
				D	V	100 102			3.0
	Stiff as above.	3.4		D					3.5
				D	V	120 122			4.0
				D					4.5
				D	V	140+ 140+			5.0
								5.3	
5.4				D					5.5
	Very stiff mid brown silty CLAY with partings of brown and orange silt and fine sand and crystals.	0.6							
6.0				D	V	140+ 140+			6.0
	Borehole ends at 6.0m								

Drawn by: JC **Approved by:** ME

Remarks: *Water seepage at 5.3m*
Borehole moist at base and open on completion.

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample J Jar Sample
B Bulk Disturbed Sample V Pilcon Van (kPa)
U Undisturbed Sample (U100) M Mackintosh Probe
W Water Sample N Standard Penetration Test Blow Count

Fig. 6.



SCALE :- 1 : 1000

3119

BOREHOLE	DEPTH FT.	GROUND LEVEL FT.	LONDON CLAY FT.	WATER LEVEL FT.	TRIAXIAL TEST RESULTS		
					SAMPLE DEPTH FT.	SHEAR STRENGTH OF COHESION (C) lb/sq. ft.	ANGLE OF SHEARING RESISTANCE (Ø°)
1	50·5	71·7	32·7	31·3	8 18	(1) 2250 (2) 2500	0
					31 41	(3) 2000 (4) 2598	0
2	35·0	82·0	46·0	37·5	–	–	–
3	50·0	82·3	47·3	55·6	7 16	(1) 750 (2) 1080	0
					26	(3) 1800	0
4	35·0	83·1	51·1	62·9	18 28	(1) 1750 2250	0

NOTE: ALL LEVELS REFERRED TO CLIENT'S DATUM WHICH IS 326·84 ft. ABOVE O.D.

LOC. 3117. WESTFIELD COLLEGE,
HAMPSTEAD N.W.3.
PLAN SHOWING BOREHOLES POSITIONS
ON SITE OF NEW SCIENCE BUILDING.

SOIL MECHANICS LTD.
65, OLD CHURCH STREET,
LONDON, S.W.3

Fig. 1

BOREHOLE LOG

LOCATION NO. 3117 Westfield College, Hampstead, N.W.3.

CARRIED OUT FOR Council of Westfield College.

BOREHOLE NO. 1 DIAMETER : 8 Inch

GROUND LEVEL : 71.7 above Clients arbitrary datum DATE : 14th to 16th March, 1959

Description	Reduced Level	Legend	Sample	Depth	Thickness	%
						%
	+71.7			0'0"		
Rubble, clinker and gravel MADE GROUND	+69.9		1	1'9"	1'9"	
			2			26
Firm mottled grey and brown sandy clayey SILT becoming brown and more sandy below 7 ft. (CLAYGATE BEDS)			3			24
			4			25
			5		12'9"	24
			6			25
	+57.2		7	14'6"		24
Firm becoming stiff light grey-brown sandy clayey silt, more clayey below 17 ft. (Probably Claygate Beds)			8		4'6"	30
	+52.7		9	19'0"		24
Stiff dark grey silty CLAY only slightly fissured and very stiff below 40 ft. Firm gypsum throughout. (LONDON CLAY)			10			29
			11			25
			12			29
			13			27
			14		31'6"	24
			15			25
			16			25
			17			24
			18			25
			19			25
			20			25
			Δ 22			
			21			29
	+21.2			50'6"		
END OF BOREHOLE						

Water Level Observations

Date	Time	Depth of Borehole	Depth of Casing	Depth to Water
14.3.59	0130	14'6"	14'6"	7'4"
17.3.59	0730	50'6"	-	20'6"

Scale: 1 in. = 5 ft. • Disturbed Sample ▮ Core Sample Δ Water Sample

SOIL MECHANICS LTD., 65 OLD CHURCH ST., S.W.3

Fig. 2

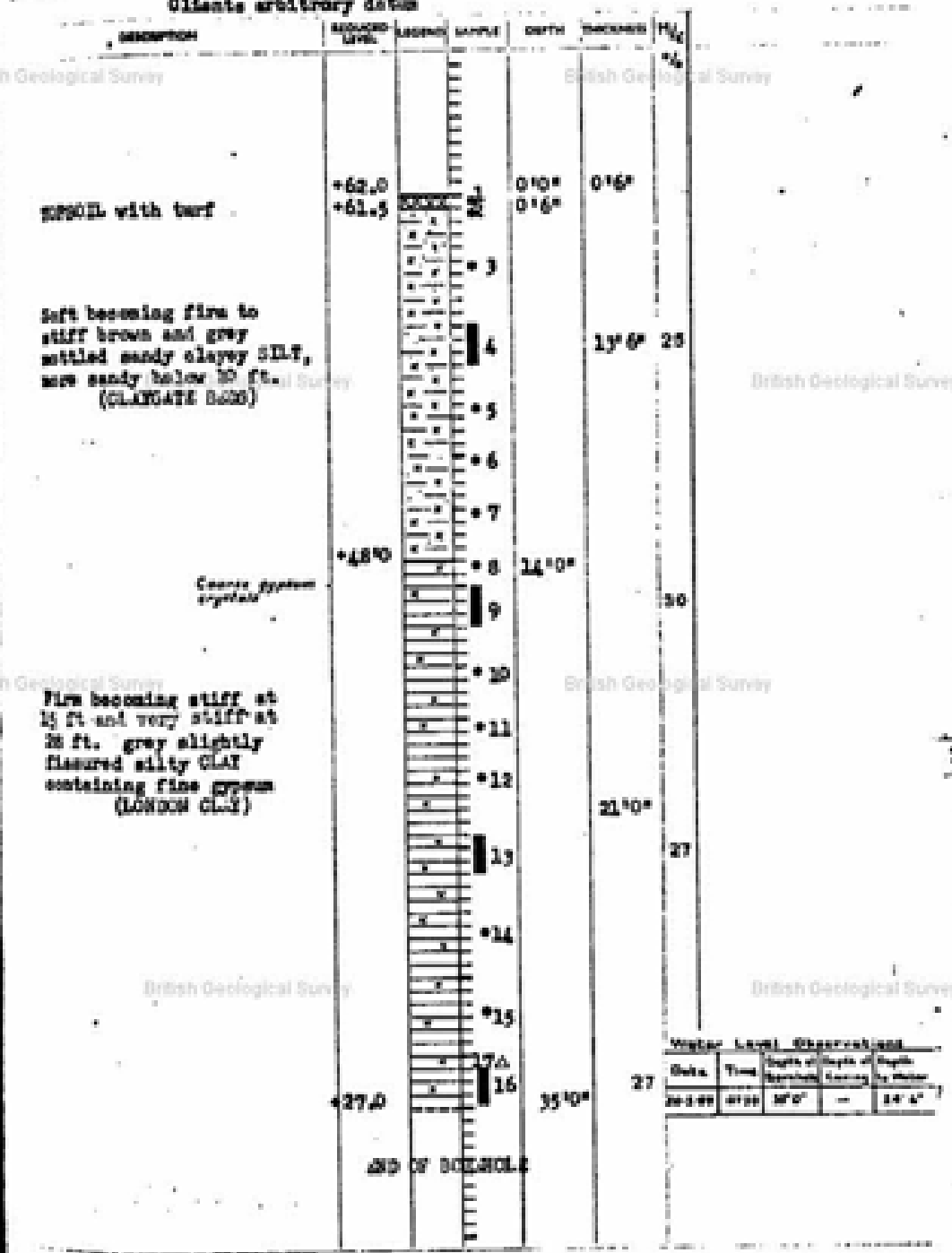
BOREHOLE LOG

LOCATION NO. 3117 Westfield College, Hampstead

CARRIED OUT FOR Council of Westfield College.

BOREHOLE NO. 2 DIAMETER: 8 inches

GROUND LEVEL: 62.0 ft. above DATE: 19th March, 1959
Ollants arbitrary datum



SOIL MECHANICS LTD., 45, OLD CHURCH ST., S.W.3.

Fig. 3

BOREHOLE LOG

LOCATION NO. 3117 Westfield College

CARRIED OUT FOR Council of Westfield College

BOREHOLE NO. 3 DIAMETER : 8 inches

GROUND LEVEL : 62.3 ft. above clients arbitrary datum DATE : 20th and 21st March, 1959

Description	Reduced Level	Legend	Sample	Depth	Thickness	%
				0'0"		
Soil with turf	+62.3		1	1'0"	1'0"	
	+61.3		2	2'0"		
Firm becoming stiff brown and grey mottled sandy silty CLAY. Very sandy at 3 ft. 6 in. (BLACKHEATH BEDS)			3			
			4		14'0"	28
			5			
			6			
	+47.3		7	15'0"		29
			8			
			9			
			10			
Stiff grey slightly fissured silty CLAY with fine gypsum (LONDON CLAY)			11			20
			12			
			13		35'0"	
			14			
			15			
Patch fine gypsum 39 ft. and 1 large septarian nodule.			16			29
			17			
			18			
			19			
			20			
	+12.3		21	50'0"		
				52½		
END OF BOREHOLE						

Water Level Observations

Date	Time	Depth of Borehole	Depth of Casing	Depth to Water
21-3-59	0730	51'0"	20' 0"	4' 4"

3119 3120 3123 3124 3125

Scale: 1 in. = 5 ft. • Disturbed Sample ▮ Core Sample △ Water Sample

SOIL MECHANICS LTD., 65 OLD CHURCH ST., S.W.3.

Fig. 4

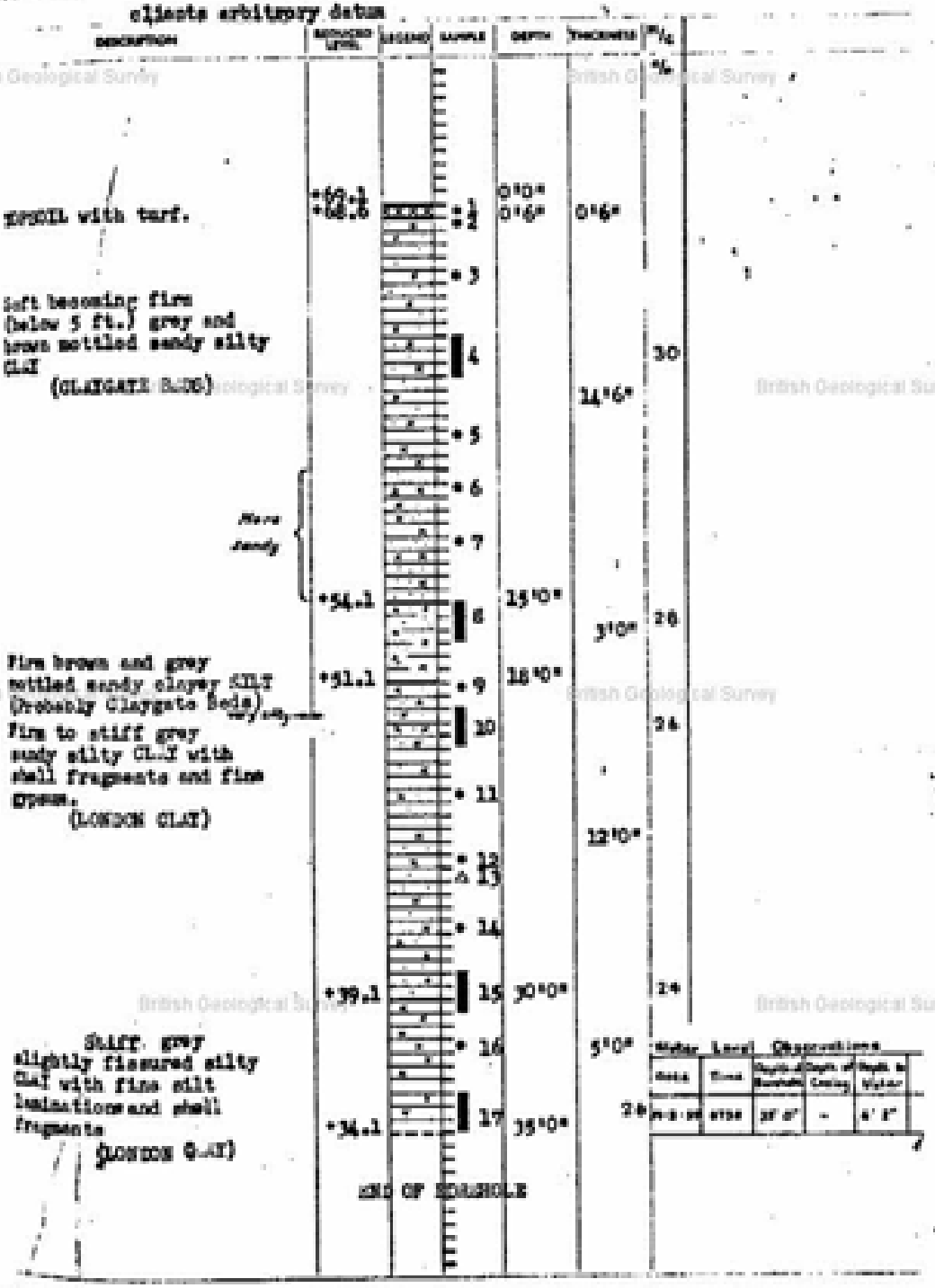
BOREHOLE LOG

LOCATION NO. 3117 Westfield College, Hampstead

CARRIED OUT FOR Council of Westfield College.

BOREHOLE NO. 4 DIAMETER: 6 inches

GROUND LEVEL: 69.1 ft. above clients arbitrary datum DATE: 17th and 18th March, 1959



SOIL MECHANICS LTD., 65, OLD CHURCH ST., S.W.3.

1063 Wt. 22438/0384 10m 7/45 (51) F.&S.

Record of Shaft or Bore for Minerals

(For Survey use only)
1-inch Map Registered No.
TQ28NW/20
2443.8558
256

Name and Number of Shaft or Bore West Hampstead School.

For Messrs. L.C.C. Education Dept.

6-inch Map Registered No. TQ 28 NW/20.

Town or Village

County Six-inch quarter sheet

Exact site

Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made

Level at which shaft bore commenced relative to O.D. State if shaft bore is up, down, horizontal or inclined; in latter cases give angle of inclination and direction

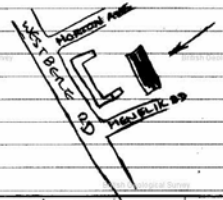
Made by

Information from Date of Sinking 1960

Specimens

Additional Notes in Space Overleaf

For Survey use only) Geological Classification	Nature of Strata	Thickness		Depth	
	no. 1.				
	Topsoil		6		6
	Brown fissured clay LC (W)	23	-	23	6
	Blue fissured clay LC	1	6	25	-
	no. 2A.				
	Topsoil	1	-	1	-
	Brown mottled clay LC (W)	1	-	2	-
	Brown fissured clay LC (W)	21	6	23	6
	Blue fissured clay LC	1	6	25	-
	no. 3.				
	Topsoil		6		6
	Brown mottled clay LC (W)	1	-	1	6
	Brown fissured clay	21	6	23	-
	Blue fissured clay LC	2	-	25	-
	no. 4.				
	Topsoil		6		6
	Brown fissured clay LC (W)	23	-	23	6
	Blue fissured clay LC	16	6	40	-



Continued Overleaf

Geological Survey and Museum, South Kensington, London, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map

Chelmer
Site Investigations
'Groundbreaking Services'

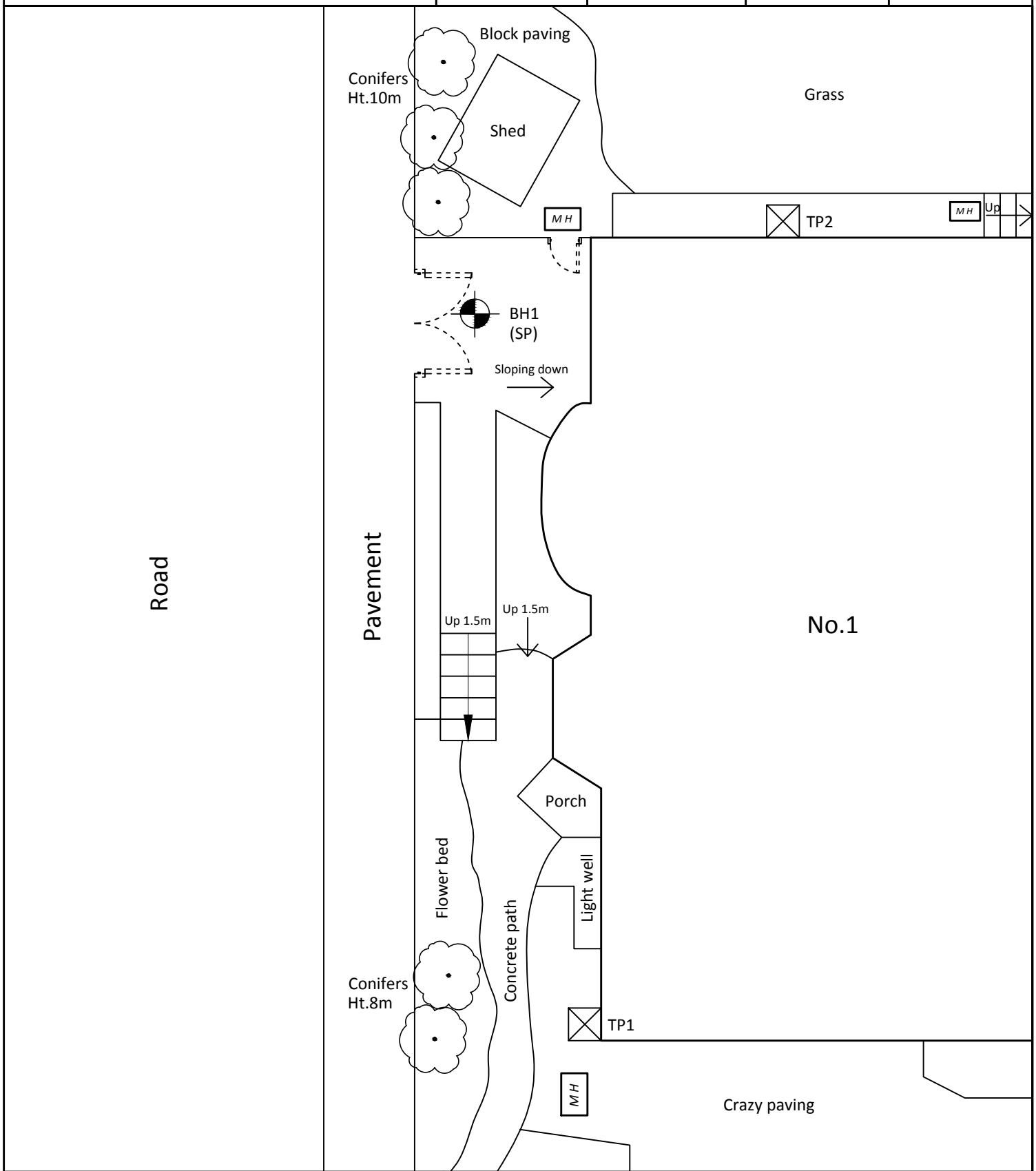
Factual Report

Site	1 Ardwick Road, London, NW2 2BX
Client	Green Structural
Date	01st April 2015
Our Ref	FACT/5217

Chelmer Site Investigation Laboratories Ltd
Unit 15 East Hanningfield Industrial Estate, Old Church Road, East Hanningfield, Essex CM3 8AB
Essex: 01245 400930 | London: 0203 67409136 | info@siteinvestigations.co.uk | www.siteinvestigations.com

Chelmer Site Investigations
'Groundbreaking Services'

Client: Green Structural		**Scale:** N.T.S.	**Sheet:** 1 of 1	**Date:** 01.04.15	
Location: 1 Ardwick Road, London, NW2 2BX		**Job No:** 5217	**Weather:** Fine	**Drawn by:** JP	**Checked by:** ME

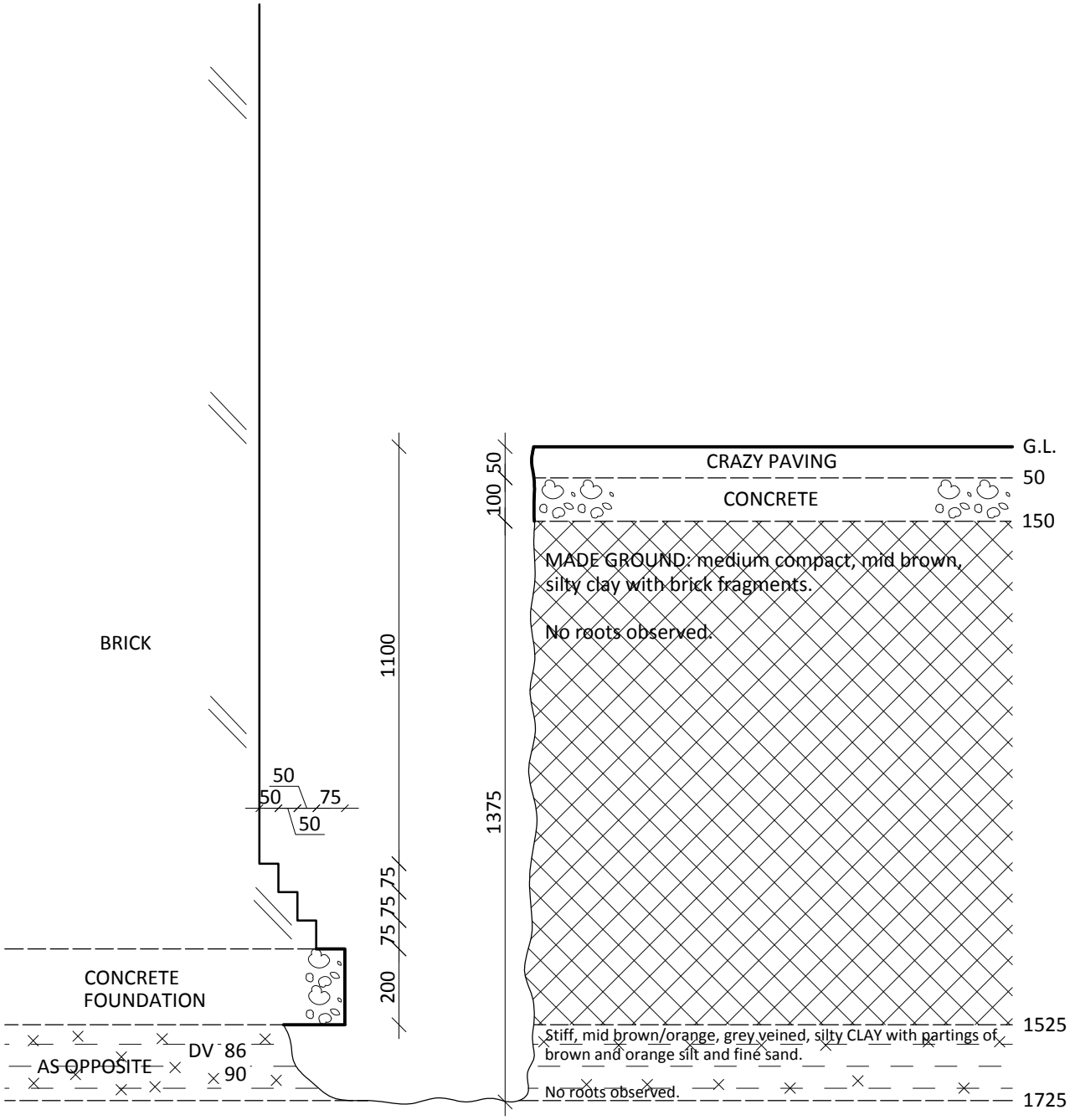


Notes: *On site tree identification for guidance only. Not authenticated.*

Key:

Tree/Shrub | Borehole | Trial Pit | G Gully | Tree Stump | Rain Water/ Soil Pipe | MH Manhole

Client: Green Structural	**Scale:** N.T.S.	**Sheet No:** 1 of 1	**Date:** 01.04.15
Location: 1 Ardwick Road, London, NW2 2BX	**Job No:** 5217	**Trial Pit No:** 1	**Weather:** Overcast
Excavation Method: Hand tools		**Drawn by:** JP	**Checked by:** ME



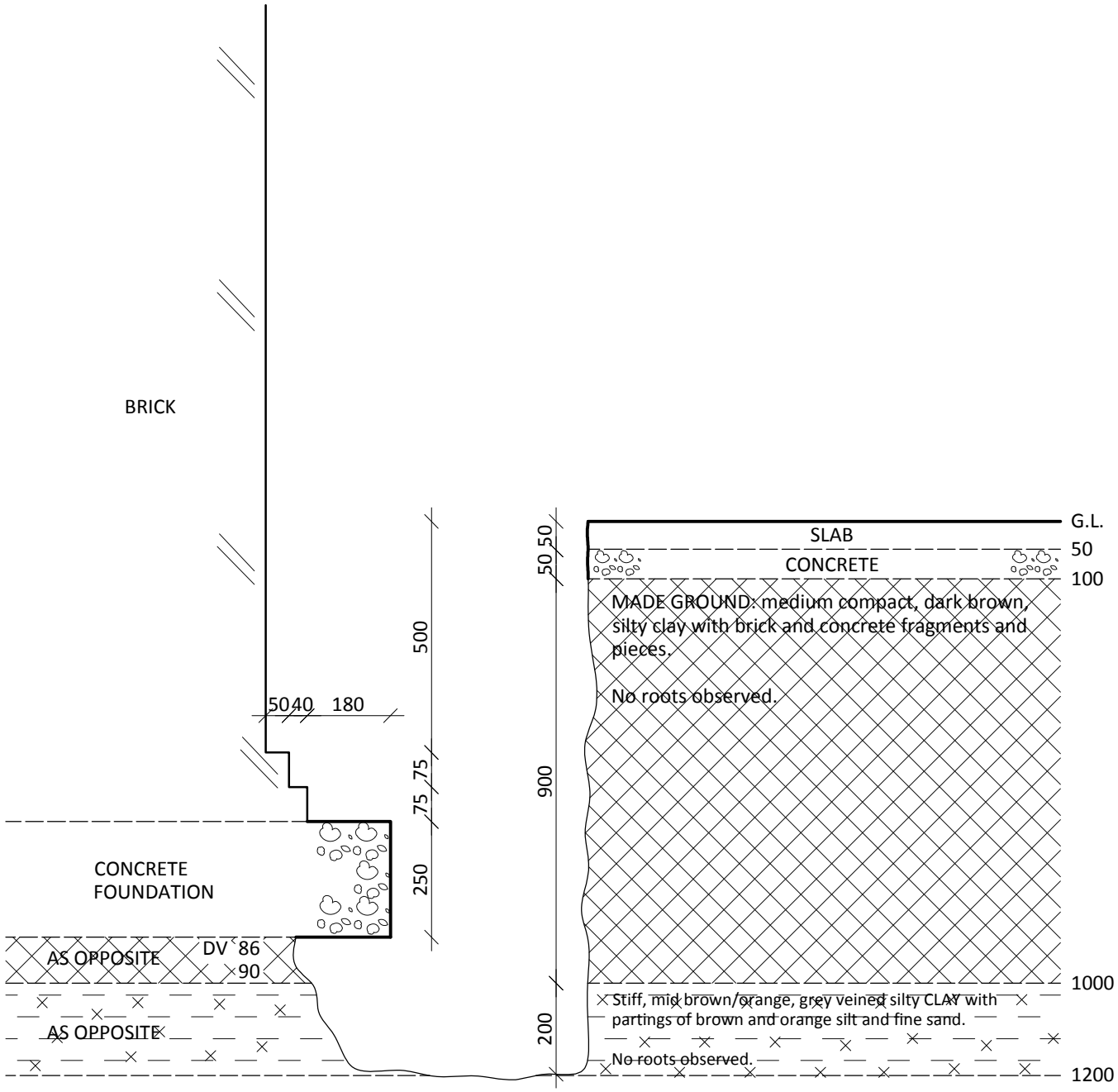
TP1 ENDS AT 1725mm

Remarks:

Key:

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample (U100)
N Standard Penetration Test Blow Count
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh Probe
W Water Sample

Client: Green Structural	**Scale:** N.T.S.	**Sheet No:** 1 of 1	**Date:** 01.04.15
Location: 1 Ardwick Road, London, NW2 2BX	**Job No:** 5217	**Trial Pit No:** 2	**Weather:** Overcast
Excavation Method: Hand tools		**Drawn by:** JP	**Checked by:** ME



TP2 ENDS AT 1200mm

Remarks:

Key:

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample (U100)
N Standard Penetration Test Blow Count
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh Probe
W Water Sample

Chelmer Site Investigations 'Groundbreaking Services'

Client: Green Structural	Scale: N.T.S.	Sheet No: 1 of 1	Weather: Overcast	Date: 01.04.15
Site: 1 Ardwick Road, London, NW2 2BX	Job No: 5217	WS No: 1	Boring method: Archway	

Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Test Result	Root Information	Depth to Water	Depth Mtrs
G.L.	CONCRETE	0.05							G.L.
0.05	MADE GROUND: medium compact, dark brown, gravelly, sandy silt with whole brick, fragments and pieces.	0.75		U			Roots of live appearance to 3mmØ to 2.0m.		
0.8	Stiff, mid brown, grey veined, silty CLAY with partings of brown and orange silt and fine sand.	5.2		U	SPT	N = 15	No roots observed below 2.0m.		1.0
				U	SPT	N = 23			2.0
				U	SPT	N = 24			3.0
				U	SPT	N = 25			4.0
				U	SPT	N = 27			5.0
				U	SPT	N = 31			6.0
6.0	WS ends at 6.0m								

Drawn by: JP **Approved by:** ME

Remarks: *Borehole dry and open on completion. Metal standpipe installed to 6.0m.*

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample J Jar Sample
B Bulk Disturbed Sample V Pilcon Vane (kPa)
U Undisturbed Sample (U100) M Mackintosh Probe
W Water Sample N Standard Penetration Test Blow Count

UKAS TESTING
8284

Chelmer
Geotechnical Laboratories
'Groundbreaking Services'

Laboratory Report

Site	**1 Ardwick Road, London, NW2 2BX**
Client	**Green Structural Engineering Ltd**
Date	**17-Apr-15**
Our Ref	**CSI5217**
CGL Ref	**CGL04828**

Chelmer Site Investigation Laboratories Ltd
Unit 15 East Hanningfield Industrial Estate, Old Church Road, East Hanningfield, Essex CM3 8AB
Essex: 01245 400930 | London: 0203 6409136 |info@siteinvestigations.co.uk | www.siteinvestigations.com

UKAS TESTING
8284

Chelmer Geotechnical Laboratories
'Groundbreaking Services'

Content Summary

This report contains all test results as indicated on the test instruction/summary.

CGL Reference : CGL04828

Client Reference : CSI5217

For the attention of : Green structual Engineering Ltd

This report comprises of the following :

1 Cover Page
1 Inside Cover/Contents Page
2 Pages of Results
1 Moisture/Shear Strength Chart
1 Plasticity Chart
1 Page of Triaxial Results
4 Pages of BRE SD1 Results
1 Limitations of Report

Notes :

General

Please refer to report summary notes for details pertaining to methods undertaken and their subsequent accreditations

Samples were supplied by Chelmer Site Investigations

All tests performed in-house unless otherwise stated

Deviant Samples

Samples were received in suitable containers	Yes
A date and time of sampling was provided	Yes
Arrived damaged and/or denatured	No

Laboratory Testing Results

BS 1377 : 1990

Chelmer Geotechnical Laboratories 'Groundbreaking Services'

Job Number : CGL04828
Client : Green Structural Engineering Ltd
Client Reference : CSI5217
Site Name : 1 Ardwick Road, London, NW2 2BX

Date Received : 10/04/2015
Date Testing Started : 10/04/2015
Date Testing Completed : 17/04/2015
Laboratory Used : Chelmer Geotechnical, CM3 8AB

Sample Ref			Sample Type	*Moisture Content (%) [1]	*Soil Faction > 0.425mm (%) [2]	*Liquid Limit (%) [3]	*Plastic Limit (%) [4]	*Plasticity Index (%) [5]	*Liquidity Index (%) [5]	*Modified Plasticity Index (%) [6]	*Soil Class [7]	Filter Paper Contact Time (h) [8]	*Soil Sample Suction (kPa)	Insitu Shear Vane Strength (kPa) [9]	Organic Content (%) [10]	*pH Value [11]	*Sulphate Content (g/l)		
BH/TP/WS	Depth (m)	UID															SO_3 [12]	SO_4 [13]	Class [14]
TP1	1.5	61962	D		<5											8.0	0.03	0.04	DS-1

Notes :- *UKAS Accredited Tests

[1] BS 1377 : Part 2 : 1990, Test No 3.2
[2] Estimated if <5%, otherwise measured
[3] BS 1377 : Part 2 : 1990, Test No 4.4
[4] BS 1377 : Part 2 : 1990, Test No 5.3
[5] BS 1377 : Part 2 : 1990, Test No 5.4
[6] BRE Digest 240 : 1993
[7] BS 5930 : 1981 : Figure 31 - Plasticity Chart for the classification of fine soils
[8] In-house method S9a adapted from BRE IP 4/93
[9] Values of shear strength were determined in situ by Chelmer Site Investigations using a Pilcon hand vane or Geonor vane (GV).
[10] BS 1377 : Part 3 : 1990, Test No 4
[11] BS 1377 : Part 2 : 1990, Test No 9
[12] BS 1377 : Part 3 : 1990, Test No 5.6
[13] $SO_4 = 1.2 \times SO_3$
[14] BRE Special Digest One (Concrete in Aggressive Ground) 2005

Note that if the SO_4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise

Key

D - Disturbed sample
B - Bulk sample
U - U100 (undisturbed sample)
W - Water sample
ENP - Essentially Non-Plastic
U/S - Underside Foundation

UKAS TESTING 8284

Comments :-

Technician :- MT/HS
Checked By :- MC
Date Checked :- 16-Apr-15

Laboratory Testing Results

BS 1377 : 1990

Chelmer Geotechnical Laboratories 'Groundbreaking Services'

Job Number : CGL04828
Client : Green Structural Engineering Ltd
Client Reference : CSI5217
Site Name : 1 Ardwick Road, London, NW2 2BX

Date Received : 10/04/2015
Date Testing Started : 10/04/2015
Date Testing Completed : 17/04/2015
Laboratory Used : Chelmer Geotechnical, CM3 8AB

Sample Ref			Sample Type	*Moisture Content (%) [1]	*Soil Faction > 0.425mm (%) [2]	*Liquid Limit (%) [3]	*Plastic Limit (%) [4]	*Plasticity Index (%) [5]	*Liquidity Index (%) [5]	*Modified Plasticity Index (%) [6]	*Soil Class [7]	Filter Paper Contact Time (h) [8]	*Soil Sample Suction (kPa)	Insitu Shear Vane Strength (kPa) [9]	Organic Content (%) [10]	*pH Value [11]	*Sulphate Content (g/l)		
BH/TP/WS	Depth (m)	UID															SO_3 [12]	SO_4 [13]	Class [14]
BH1	1.0	61965	D	25	<5	64	21	43	0.08	43	CH					8.0	0.48	0.58	DS-1
BH1	1.5	61966	D	26	<5														
BH1	2.0	61967	D	31	<5	56	21	35	0.29	35	CH								
BH1	3.0	61968	D	24	<5	48	18	29	0.20	29	CI								
BH1	3.5	61969	D	24	<5														
BH1	4.0	61970	D	27	<5	52	21	31	0.19	31	CH								
BH1	4.5	61971	D	26	<5														
BH1	5.5	61972	D	24	<5														

Notes :- *UKAS Accredited Tests

[1] BS 1377 : Part 2 : 1990, Test No 3.2
[2] Estimated if <5%, otherwise measured
[3] BS 1377 : Part 2 : 1990, Test No 4.4
[4] BS 1377 : Part 2 : 1990, Test No 5.3
[5] BS 1377 : Part 2 : 1990, Test No 5.4
[6] BRE Digest 240 : 1993
[7] BS 5930 : 1981 : Figure 31 - Plasticity Chart for the classification of fine soils
[8] In-house method S9a adapted from BRE IP 4/93
[9] Values of shear strength were determined in situ by Chelmer Site Investigations using a Pilcon hand vane or Geonor vane (GV).
[10] BS 1377 : Part 3 : 1990, Test No 4
[11] BS 1377 : Part 2 : 1990, Test No 9
[12] BS 1377 : Part 3 : 1990, Test No 5.6
[13] $SO_4 = 1.2 \times SO_3$
[14] BRE Special Digest One (Concrete in Aggressive Ground) 2005

Note that if the SO_4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise

Key

D - Disturbed sample
B - Bulk sample
U - U100 (undisturbed sample)
W - Water sample
ENP - Essentially Non-Plastic
U/S - Underside Foundation

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Comments :-

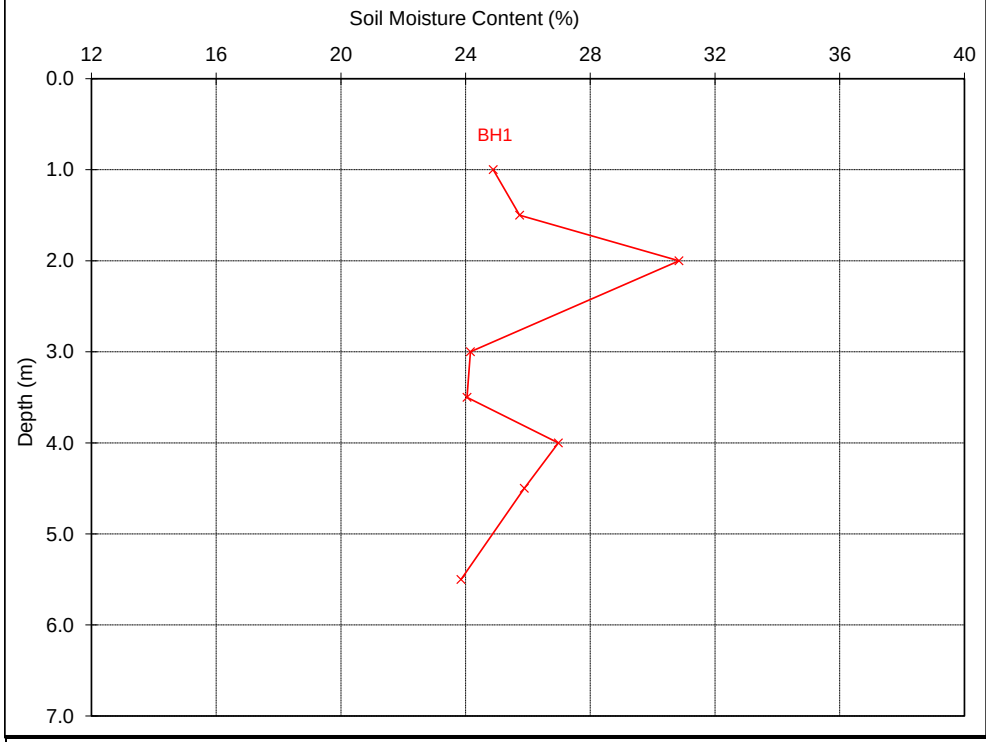
Technician :- MT/HS
Checked By :- MC
Date Checked :- 16-Apr-15

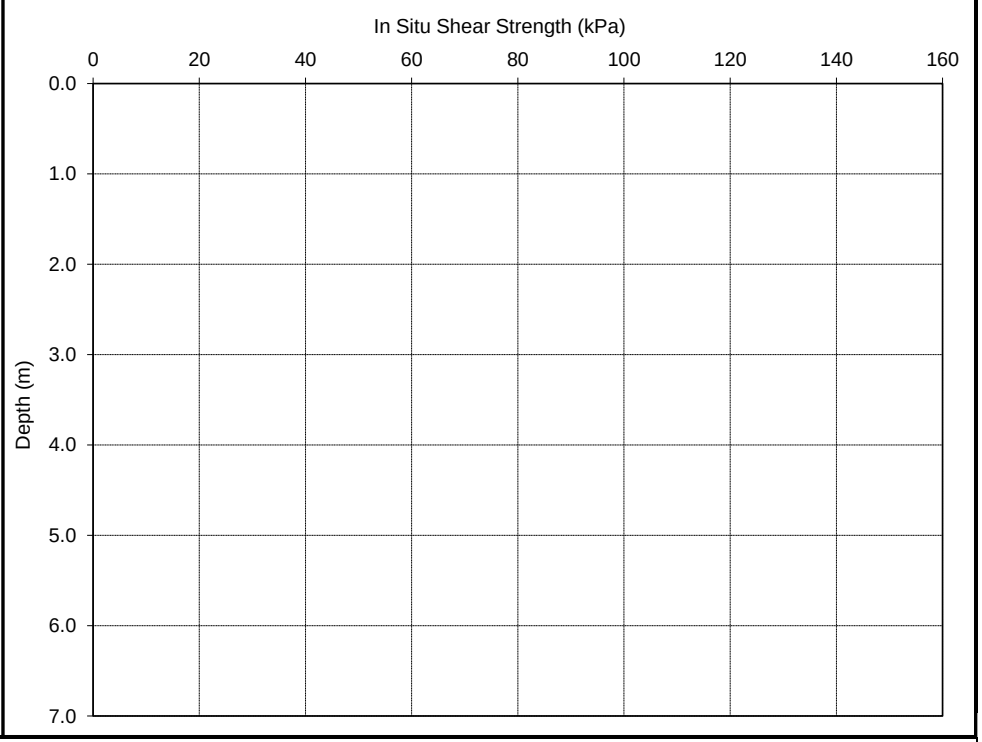
Laboratory Testing Results

Moisture Content/Shear Strength Profile

Chelmer Geotechnical Laboratories 'Groundbreaking Services'

Job Number :	CGL04828	Date Received :	10/04/2015
Client :	Green Structural Engineering Ltd	Date Testing Started :	10/04/2015
Client Reference :	CSI5217	Date Testing Completed :	17/04/2015
Site Name :	1 Ardwick Road, London, NW2 2BX	Laboratory :	Chelmer Geotechnical Laboratories, CM3 8AB





Notes :-

1. If the Soil Fraction > 0.425mm exceeds 5% the Equivalent Moisture Content of the remainder (calculated in accordance with BS 1377: Part 2 : 1990, cl.3.2.4 note 1) is also plotted and the alternative profile additionally shown as an appropriately coloured broken line.
2. If plotted, 0.4 LL and PL+2 (after Driscoll, 1983) should only be applied to London Clay (and similarly over consolidated clays) at shallow depths.

Unless otherwise stated, values of Shear Strength were determined in situ by Chelmer Site Investigations using a Pilcon Hand Vane the calibration of which is limited to a maximum reading of 140 kPa. (Not UKAS accredited)

UKAS TESTING 8284

Comments :-

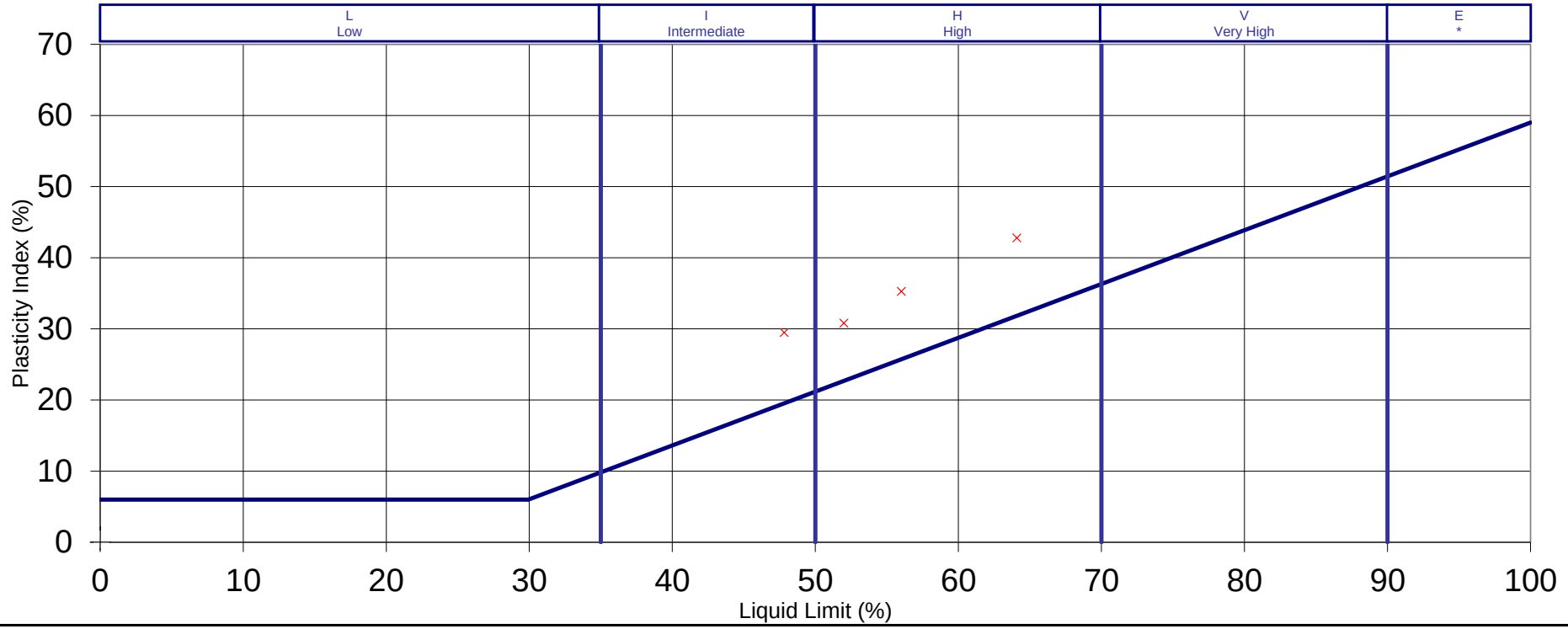
Checked By :- MC Date Checked :- 16-Apr-15

Laboratory Testing Results

Plasticity Chart for the classification of fine soils and the finer part of coarse soils
In Compliance with BS5930 : 1999

Chelmer Geotechnical Laboratories 'Groundbreaking Services'

Job Number :	CGL04828	Date Received :	10/04/2015
Client :	Green Structural Engineering Ltd	Date Testing Started :	10/04/2015
Client Reference :	CSI5217	Date Testing Completed :	17/04/2015
Site Name :	1 Ardwick Road, London, NW2 2BX	Laboratory :	Chelmer Geotechnical Laboratories, CM3 8AB



Notes :-

SILT (M-SOIL), M, plots below A-Line
CLAY, C, plots above A-Line }M and C may be combined as FINE SOIL, F.

Key :- BH1

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Comments :-

Checked By :- Date Checked :-

Chelmer
Geotechnical Laboratories
'Groundbreaking Services'

TRIAXIAL COMPRESSION TEST RESULTS

BOREHOLE NO.	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	LATERAL PRESSURE (kN/m^2)	COMPRESSIVE STRENGTH (kN/m^2)	COHESION (kN/m^2)	SHEAR VANE TEST RESULTS
BH 1 2.00 - 3.00m	24.2	1.96	70	93	48	vane test 78 kN/m2
			210	96		
			350	98		
BH 1 5.00 - 6.00m	23.9	1.95	70	173	95	vane test 124 kN/m2
			210	185		
			350	209		

Comments:-

SITE:	1 Ardwick Road, London				JOB NO:	CGL04828
DATE:	05/05/2015	TESTED BY:	MS	CHECKED:	MC	

TESTS CARRIED OUT UNDER UNDRAINED CONDITIONS UNLESS SPECIFIED

Mark Collyer
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QTS Environmental Report No: 15-30611

Site Reference:	1 Ardwick Road, London, NW2 2BX
Project / Job Ref:	CSI5217 CGL04828
Order No:	PO/4173/5217/MC
Sample Receipt Date:	15/04/2015
Sample Scheduled Date:	15/04/2015
Report Issue Number:	1
Reporting Date:	20/04/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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Tel : 01622 850410

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Soil Analysis Certificate							
QTS Environmental Report No: 15-30611	Date Sampled	01/04/15	01/04/15	01/04/15		
Chelmer Site Investigation Laboratories Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 1 Ardwick Road, London, NW2 2BX	TP / BH No	61963	61964	61970		
Project / Job Ref: CSI5217 CGL04828	Additional Refs	TP2	BH1	BH1		
Order No: PO/4173/5217/MC	Depth (m)	0.90	0.50	4.00		
Reporting Date: 20/04/2015	QTSE Sample No	144831	144832	144833		

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	7.3	8.2	7.6		
Total Sulphate as SO_4	mg/kg	< 200	NONE	239	3682	< 200		
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	MCERTS	0.10	0.34	0.06		
Total Sulphur	mg/kg	< 200	NONE	< 200	1322	< 200		
Ammonium as NH_4	mg/kg	< 0.5	NONE	< 0.5	< 0.5	< 0.5		
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	25	50	42		
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS	13	170	11		
W/S Magnesium	g/l	< 0.0001	NONE	0.0064	0.0022	0.0134		

Analytical results are expressed on a dry weight basis where samples are dried at less than $30^{O}C$

Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis $^{(S)}$

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-30611	
Chelmer Site Investigation Laboratories Ltd	
Site Reference: 1 Ardwick Road, London, NW2 2BX	
Project / Job Ref: CSI5217 CGL04828	
Order No: PO/4173/5217/MC	
Reporting Date: 20/04/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 144831	61963	TP2	0.90	20	Light brown clay
$ 144832	61964	BH1	0.50	14.5	Red sand with rubble
$ 144833	61970	BH1	4.00	17.9	Grey clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

$ samples exceeded recommended holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-30611
Chelmer Site Investigation Laboratories Ltd
Site Reference: 1 Ardwick Road, London, NW2 2BX
Project / Job Ref: CSI5217 CGL04828
Order No: PO/4173/5217/MC
Reporting Date: 20/04/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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Chelmer Geotechnical Laboratories
'Groundbreaking Services'

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This report shall not be reproduced, except in full, without the written approval of Chelmer Site Investigations Laboratories Ltd.

Where our involvement consists exclusively of testing samples, the results and comments (if provided) relate only to the samples tested.

Any samples that are deemed to be subject to deviation will be recorded as such within the test summary.

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QTS Environmental Report No: 15-30508

Site Reference:	1 Ardwick Road
Project / Job Ref:	CSI5217-CGL04820
Order No:	PO/4154/CGL/5217/SP
Sample Receipt Date:	13/04/2015
Sample Scheduled Date:	13/04/2015
Report Issue Number:	1
Reporting Date:	17/04/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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4480

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

QTS Environmental Report No: 15-30508		**Date Sampled**	01/04/15			**Landfill Waste Acceptance Criteria Limits**		
Chelmer Site Investigation Laboratories Ltd		**Time Sampled**	None Supplied			**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Site Reference: 1 Ardwick Road		**TP / BH No**	61884					
Project / Job Ref: CSI5217-CGL04820		**Additional Refs**	BH1					
Order No: PO/4154/CGL/5217/SP		**Depth (m)**	0.30 - 0.70					
Reporting Date: 17/04/2015		**QTSE Sample No**	144239					
Determinand	**Unit**	**MDL**						
TOC[MU]	%	< 0.1	0.4			3%	5%	6%
Loss on Ignition	%	< 0.01	3.70			--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05			6	--	--
Sum of PCBs	mg/kg	< 0.7	< 0.7			1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10			500	--	--
Total PAH[MU]	mg/kg	< 1.7	< 1.7			100	--	--
pH[MU]	pH Units	N/a	8.2			--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.3			--	To be evaluated	To be evaluated
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**		**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**	
Arsenic[U]			< 0.01	< 0.01		< 0.2	0.5	2	25
Barium[U]			0.06	< 0.02		0.2	20	100	300
Cadmium[U]			< 0.0005	< 0.0005		< 0.02	0.04	1	5
Chromium[U]			0.005	< 0.005		< 0.20	0.5	10	70
Copper[U]			< 0.01	< 0.01		< 0.5	2	50	100
Mercury[U]			< 0.005	< 0.005		< 0.01	0.01	0.2	2
Molybdenum[U]			0.012	0.005		< 0.1	0.5	10	30
Nickel[U]			< 0.007	< 0.007		< 0.2	0.4	10	40
Lead[U]			< 0.005	< 0.005		< 0.2	0.5	10	50
Antimony[U]			< 0.005	< 0.005		< 0.06	0.06	0.7	5
Selenium[U]			< 0.005	< 0.005		< 0.1	0.1	0.5	7
Zinc[U]			< 0.005	< 0.005		< 0.2	4	50	200
Chloride[U]			8	2		28	800	15000	25000
Fluoride[U]			0.8	< 0.5		< 1	10	150	500
Sulphate[U]			100	22		316	1000	20000	50000
TDS			211	80		970	4000	60000	100000
Phenol Index			< 0.01	< 0.01		< 0.5	1	-	-
DOC			9.9	4.6		52.9	500	800	1000
Leach Test Information									
Sample Mass (kg)			0.20						
Dry Matter (%)			89						
Moisture (%)			12.4						
Stage 1									
Volume Eluate L2 (litres)			0.33						
Filtered Eluate VE1 (litres)			0.23						

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-30508	
Chelmer Site Investigation Laboratories Ltd	
Site Reference: 1 Ardwick Road	
Project / Job Ref: CSI5217-CGL04820	
Order No: PO/4154/CGL/5217/SP	
Reporting Date: 17/04/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 144239	61884	BH1	0.30 - 0.70	11.7	Light brown sand with concrete

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

$ samples exceeded recommended holding times

QTS Environmental Ltd
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Lenham Heath
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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-30508
Chelmer Site Investigation Laboratories Ltd
Site Reference: 1 Ardwick Road
Project / Job Ref: CSI5217-CGL04820
Order No: PO/4154/CGL/5217/SP
Reporting Date: 17/04/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Mark Collyer
Chelmer Site Investigation Laboratories Ltd
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CM3 8AB

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Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-30611

Site Reference:	1 Ardwick Road, London, NW2 2BX
Project / Job Ref:	CSI5217 CGL04828
Order No:	PO/4173/5217/MC
Sample Receipt Date:	15/04/2015
Sample Scheduled Date:	15/04/2015
Report Issue Number:	1
Reporting Date:	20/04/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate							
QTS Environmental Report No: 15-30611	Date Sampled	01/04/15	01/04/15	01/04/15		
Chelmer Site Investigation Laboratories Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 1 Ardwick Road, London, NW2 2BX	TP / BH No	61963	61964	61970		
Project / Job Ref: CSI5217 CGL04828	Additional Refs	TP2	BH1	BH1		
Order No: PO/4173/5217/MC	Depth (m)	0.90	0.50	4.00		
Reporting Date: 20/04/2015	QTSE Sample No	144831	144832	144833		

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	7.3	8.2	7.6		
Total Sulphate as SO_4	mg/kg	< 200	NONE	239	3682	< 200		
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	MCERTS	0.10	0.34	0.06		
Total Sulphur	mg/kg	< 200	NONE	< 200	1322	< 200		
Ammonium as NH_4	mg/kg	< 0.5	NONE	< 0.5	< 0.5	< 0.5		
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	25	50	42		
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS	13	170	11		
W/S Magnesium	g/l	< 0.0001	NONE	0.0064	0.0022	0.0134		

Analytical results are expressed on a dry weight basis where samples are dried at less than $30^{O}C$

Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis $^{(S)}$

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-30611	
Chelmer Site Investigation Laboratories Ltd	
Site Reference: 1 Ardwick Road, London, NW2 2BX	
Project / Job Ref: CSI5217 CGL04828	
Order No: PO/4173/5217/MC	
Reporting Date: 20/04/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 144831	61963	TP2	0.90	20	Light brown clay
$ 144832	61964	BH1	0.50	14.5	Red sand with rubble
$ 144833	61970	BH1	4.00	17.9	Grey clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

$ samples exceeded recommended holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-30611
Chelmer Site Investigation Laboratories Ltd
Site Reference: 1 Ardwick Road, London, NW2 2BX
Project / Job Ref: CSI5217 CGL04828
Order No: PO/4173/5217/MC
Reporting Date: 20/04/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

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Landborne Gas Assessment

Site Ref: 5217
Site Name: 1 Ardwick Road, NW2 2BX

Well	Date	Methane Peak	Methane Steady	Methane GSV	Carbon Dioxide Peak	Carbon Dioxide Steady	Carbon Dioxide GSV	Oxygen	Atmos.	Flow	Response Zone	Depth to Water	CO	H2S
		%v/v	%v/v	l/hr	%v/v	%v/v	l/hr	%v/v	mbar	l/hr	m bgl	m bgl	ppm	ppm
BH1	09.04.15	0.4	0.4	0.0004	**0.9**	**0.9**	0.0009	19.5	1007	0.1	1.00-6.00	1.67	11	0
	14.04.15	0.4	0.4	0.0004	**0.8**	**0.8**	0.0008	19.6	1010	0.1		1.69	9	0

Notes

NR = Not recorded
Values in Bold exceed the CO_2 Building Regulations threshold (>1.5%)
Values in Red exceed the Buildings Regulations Action Level (CO_2 >5.0% and CH_4 >1.5%)

Chelmer
Site Investigations
'Groundbreaking Services'

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/m^2) 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.

Groundsure
LOCATION INTELLIGENCE

Gabriel GeoConsulting Ltd

HIGHFIELD HOUSE, ROLVENDEN ROAD,
CRANBROOK/BENENDEN, TN17 4EH

Groundsure Reference:	GS-2057433
Your Reference:	16452
Report Date	5 May 2015
Report Delivery Method:	Email - pdf

Groundsure Geoinsight

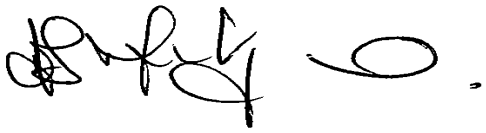
Address: THE WHITE HOUSE, 1, ARDWICK ROAD, LONDON, NW2 2BX

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geoinsight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geoinsight

Groundsure Geoinsight

Address:	**THE WHITE HOUSE, 1, ARDWICK ROAD, LONDON, NW2 2BX**
Date:	**5 May 2015**
Reference:	**GS-2057433**
Client:	**Gabriel GeoConsulting Ltd**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	20-Apr-2013
Grid Reference:	525146,185811
Site Size:	0.05ha

Contents Page

Overview of Findings

The Groundsure Geoinsight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1:Geology		
1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?	No
	1.2.2 Are there any records relating to permeability of superficial geology within the study site boundary?	No
	1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	1.2.4 Are there any records relating to permeability of landslips within the study site boundary?	No
1.3 Bedrock, Solid Geology & Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records relating to permeability of bedrock within the study site boundary?	Yes
	1.3.3 Are there any records of faults within 500m of the study site boundary?	No
1.4 Radon data	1.4.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level
	1.4.2 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

Section 2:Ground Workings	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	0	2	17	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	0	0	0	0	0

Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining	0	0	0	0	0
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Moderate-High
4.2 Landslides	Low
4.3 Ground Dissolution of Soluble Rocks	Negligible
4.4 Compressible Deposits	Negligible
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Very Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	0	0	1

Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	2	0	6

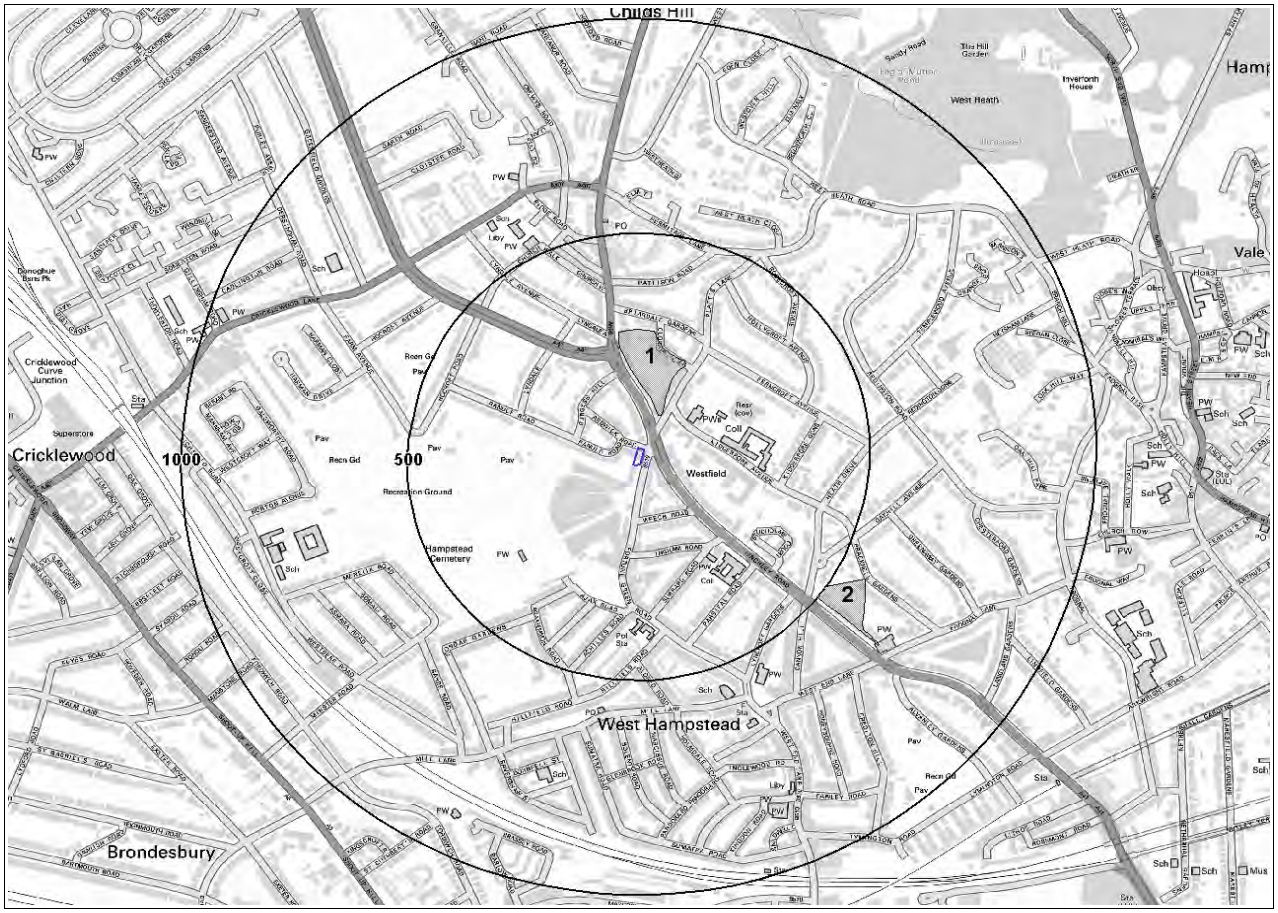
Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.1 Tunnels	0	0	0	Not Searched
7.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
7.3 Historical Railways	0	0	0	Not Searched
7.4 Active Railways	0	0	0	Not Searched

Section 7:Railways and Tunnels	On-site	0-50m	51-250	251-500
7.5 Railway Projects	0	0	0	0

1 Geology

1.1 Artificial Ground Map

NW N NE



W E

SW S SE

Artificial Ground Legend

Mapping sourced from Ordnance Survey®

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1 Geology

1.1 Artificial Ground

1.1.1 Artificial/ Made Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:256

Are there any records of Artificial/Made Ground within 500m of the study site boundary? Yes

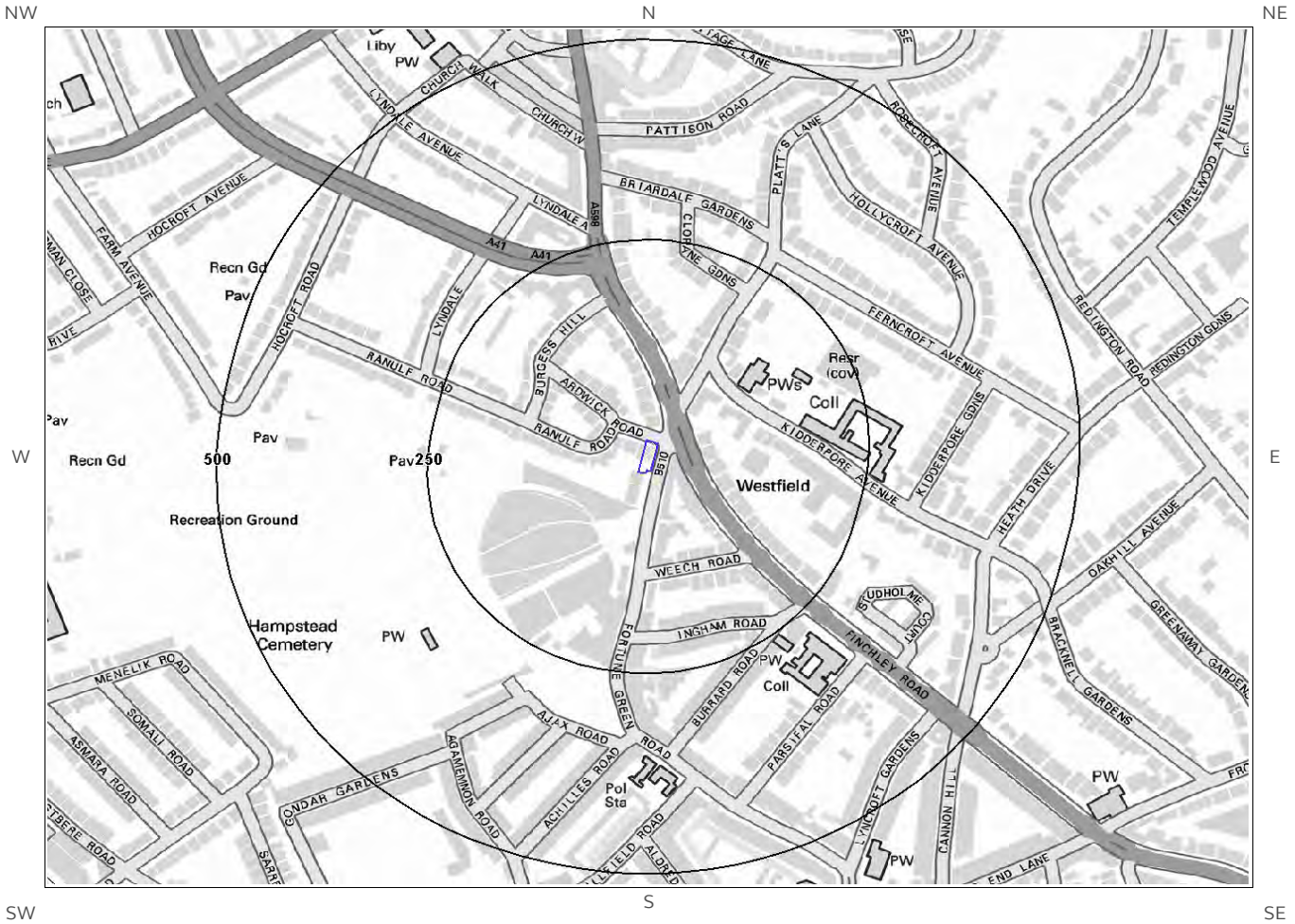
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	87.0	N	WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID
2	498.0	SE	WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID

1.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips Map



Superficial Deposits and Landslips Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? No

Database searched and no data found.

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? No

Database searched and no data found.

1.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.2.4 Landslip Permeability

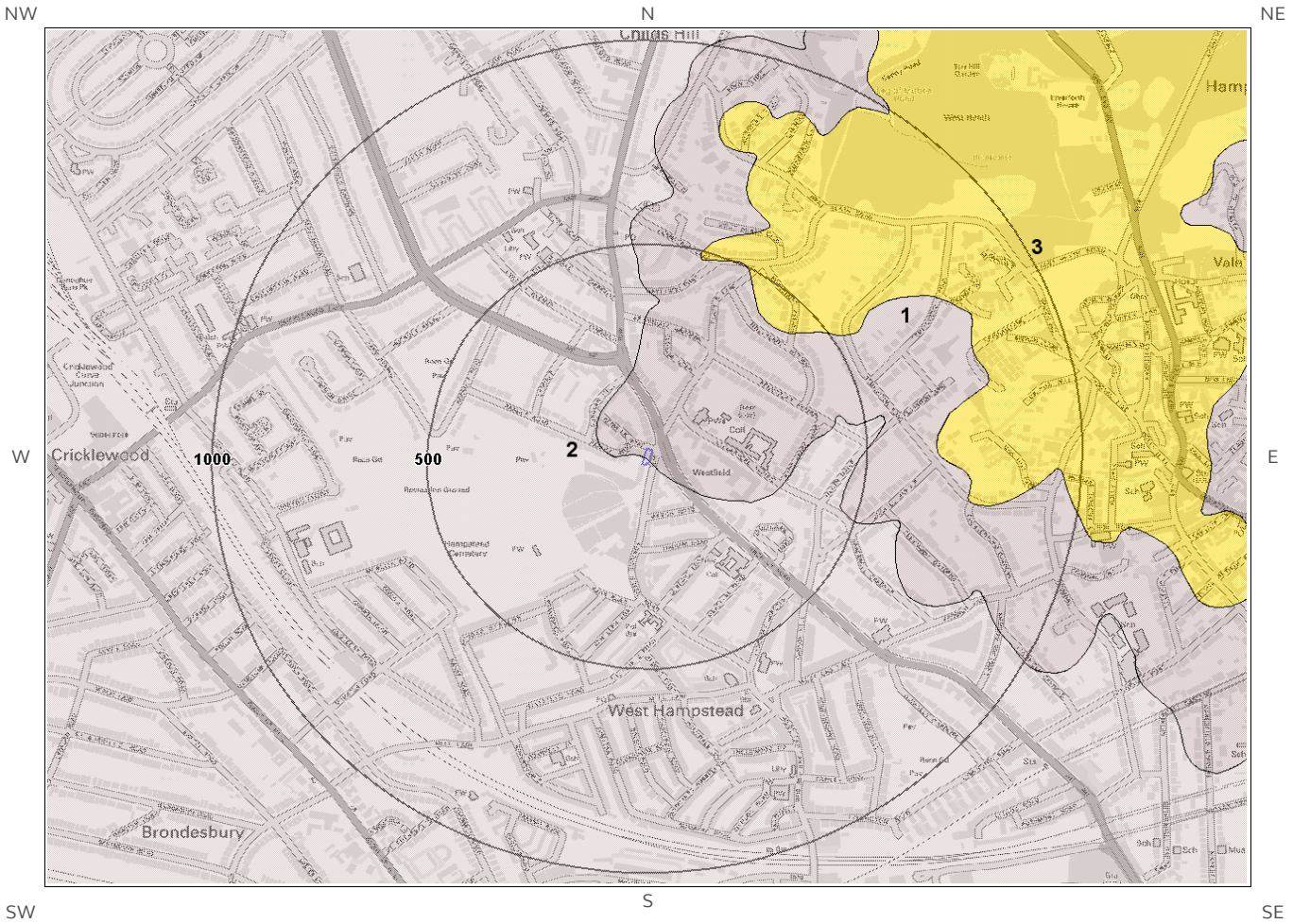
Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

---

* This includes an automatically generated 50m buffer zone around the site

1.3 Bedrock and Faults Map



Bedrock and Faults Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:256

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/ Solid Geology within 500m of the study site boundary:

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	CLGB-CLSISA	Claygate Member - Clay, Silt And Sand	No Details
2	0.0	On Site	LC-CLSISA	London Clay Formation - Clay, Silt And Sand	No Details
3	412.0	NE	BGS-SANDU	Bagshot Formation - Sand	No Details

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Very Low
0.0	On Site	Mixed	Moderate	Very Low

1.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

* This includes an automatically generated 50m buffer zone around the site