Cunningham Lindsey

Subs Scanning Cntr, Woodhead House, Centre 27 Business Park, Woodhead Rd Birstall WF17 9TD
Telephone 01489 567700 Facsimile 01489 565816

Policyholder: [redacted]

Subject Property Address:

97, Greencroft Gardens

LONDON

NW6 3PG

INSURANCE CLAIM

CONCERNING SUBSIDENCE DAMAGE

ENGINEERING APPRAISAL REPORT

This report is prepared on behalf of [redacted] for the purpose of investigating a claim for subsidence. It is not intended to cover any other aspect of structural inadequacy or building defect that may otherwise have been in existence at the time of inspection.

Date: 23/07/2012

Cunningham Lindsey Ref: SOHPC/KLN/4291445

INTRODUCTION

This report has been prepared by our Chartered Engineer, Raymond Borrow BSc, CEng, MICE, and is being investigated in accordance with our Project Managed Service.

Unless stated otherwise all directions are referred to as looking towards the front door from the outside the property.

DESCRIPTION OF BUILDING

The subject property is a semi detached property converted into 9 flats in a residential estate location on a plot that is level.

The overall layout is recorded on our site plan.

There are trees within influencing distance of the property located to both the front and rear of the property shown on our site plan dated 9th February 2012.The drainage system is a combined system which is shown on the attached plan.

CIRCUMSTANCES OF DISCOVERY OF DAMAGE

The policyholder and homeowner, [redacted], discovered the damage recurrence in Summer 2011.

A previous subsidence claim for the same area of damage was progressed in 2006.

The damage recurrence appeared suddenly.

The policyholder then advised insurers.

NATURE AND EXTENT OF DAMAGE

Sketches showing the layout of the site and the damage are attached.

Description and Mechanism

The principal damage takes the form of tapering diagonal cracks in the region of 1 - 3 mm in widh

Internal damage takes the form of cracking to internal walls in the area of the communal hall, stairs and landing , Second Floor Flat 5 , hall and rear right bedroom, Ground Floor Flat 2 front right lounge , Rear Addition Flat 9 lounge, kitchen and hall
There is current cracking evident to the exterior walls

The indicated mechanism of movement is both downwards movement to rear addition and rotation from the rear of the main building together with downwards movement to the rear right of the property and downwards movement to front right corner of the main building

Significance

The level of damage is slight, and is classified as category 2 in accordance with BRE Digest 251 - Assessment of damage in low-rise buildings

Onset and Progression

[redacted] advised that damage recurrence first commenced in Summer 2011.

We consider that the crack damage has occurred recently, but that distortions are historic.

It is likely that movement will be of a cyclical nature with cracks opening in the summer and closing in the winter.

SITE INVESTIGATIONS

The ground investigation was carried out by CET Safehouse Ltd on 16th May 2012for details of the trial pit and borehole locations, together with test results, please refer to the attached CET factual report dated 30th May 2012.

Trial Pit 1/Borehole 1
This was located at the front right of the building.

The underside of the foundation is at 1600 mm below ground level with the foundation comprising a brick corbel on a brick foundation. The soil beneath the property foundations has been identified as stiff, mid brown, grey veined silty clay with partings of orange and brown silt and fine sand, occasional gravel and stone nodules.

Samples of root taken from beneath the foundations have been analysed and originate from an Tilia spp. i.e. lime tree.

There are Lime trees located to the front right of the property which is in the ownership of the adjoining property at 99, Greencroft Gardens.

Trial Pit 2/Borehole 2
This was located at the rear right of the building.

The underside of the foundation is at 2175 mm below ground level with the foundation comprising a brick foundation. The soil beneath the property foundations has been identified as made ground soft, moist, mid brown, very silty clay with occasional gravel and brick, concrete and clinker fragments to a depth of 2600 mm below ground level with a firm, mid brown, grey veined silty clay beneath.

Samples of root taken from beneath the foundations have been analysed and originate from an Acer spp. are maples, including sycamore, Norway maple, and Japanese maples.

There is a Sycamore tree located to the front left of the property which is in the ownership of FFF Estates Ltd / Lawnpond Ltd.

Trial Pit 3/Borehole 3
This was located at the rear of the rear right extension.

The underside of the foundation is at 800 mm below ground level with the foundation comprising a concrete foundation. The soil beneath the property foundations has been identified as made ground : medium to compact, mid brown, silty clay with occasional gravel and brick, concrete and clinker fragments to a depth of 1100 mm below ground level with a firm, mid brown, grey veined silty clay beneath.

Samples of root taken from beneath the foundations have been analysed and originate from an Tilia spp. i.e. lime Tree.

There are Lime trees located to the rear of the property which is in the ownership of [redacted]

Trial Pit 4/Borehole 4
This was located at the rear left of the rear right extension.

The underside of the foundation is at 700 mm below ground level with the foundation comprising a brick corbel on a concrete foundation. The soil beneath the property foundations has been identified as made ground : medium to compact, mid brown, silty clay with occasional gravel and brick, concrete and clinker fragments to a depth of 1800 mm below ground level with a firm, mid brown, grey veined silty clay beneath.

Samples of root taken from beneath the foundations have been analysed and originate from an Tilia spp. i.e. lime Tree.

There are Lime trees located to the rear of the property which is in the ownership of [redacted].

The site investigation results confirm that sub soil beneath the building foundations at the various locations around the property is desiccated due to the effects of the nearby trees.

No drainage Investigations have been undertaken as the drainage system has been previously repaired.

MONITORING

Level monitoring has been underway since 24th May 2012 and we await the first set of readings.

CAUSE OF DAMAGE

Taking an overview of all the site investigation referred to above, it is our opinion thatthe cause of damage results from clay shrinkage subsidence brought about by the action of roots from the Sycamore and Lime trees located in both the risk premises and the adjoining property at 99, Greencroft Gardens

We base this view on the fact that the foundations of the property in the area of damage have been built at a relatively shallow depth, bearing onto shrinkable clay subsoil. The soil is susceptible to movement as a result of changes in volume of the clay with variations in moisture content and analysis of the site investigation results indicates that the soil has been affected by shrinkage.

Sycamore and Limetree roots are present in the clay subsoil beneath the foundations.

In this case, were are satisfied that the damage has therefore been caused by clay shrinkage subsidence following moisture extraction by the Sycamore and Lime trees.

We are also satisfied that there is no factor, other than the Sycamore and Lime, that is causing the damage.

RECOMMENDATIONS

We await further arboricultural advice from OCA UK Limited concerning the Sycamore and Lime trees outlined in the report above.

For Cunningham Lindsey

Raymond Borrow BSc, CEng, MICE
Project Manager
Keeley Yeatman
Senior Customer Support
Direct dial: 01923 230209
E-mail: keeley.yeatman@cl-uk.com

FACTUAL REPORT

OF

INVESTIGATION

AT:-		97, Greencroft Gardens LONDON
ON:-		16 May 2012
FOR:-		
	c/o	Cunningham Lindsey - Solent
REF:-		4291445-
JOB NO:-		123879
REPORT ISSUED:-		30/05/2012

SPECIALIST CONTRACTING DIVISION

CET SAFEHOUSE LIMITED

Lawness Barns, Mountnessing Road, Billericay, Essex CM12 0TS

WWW.CETSAFEHOUSE.COM

Tel: 01277 655377 Fax: 01277 655977

Investigation Layout Plan

Sheet: 1 of 1

Job No: 123879E

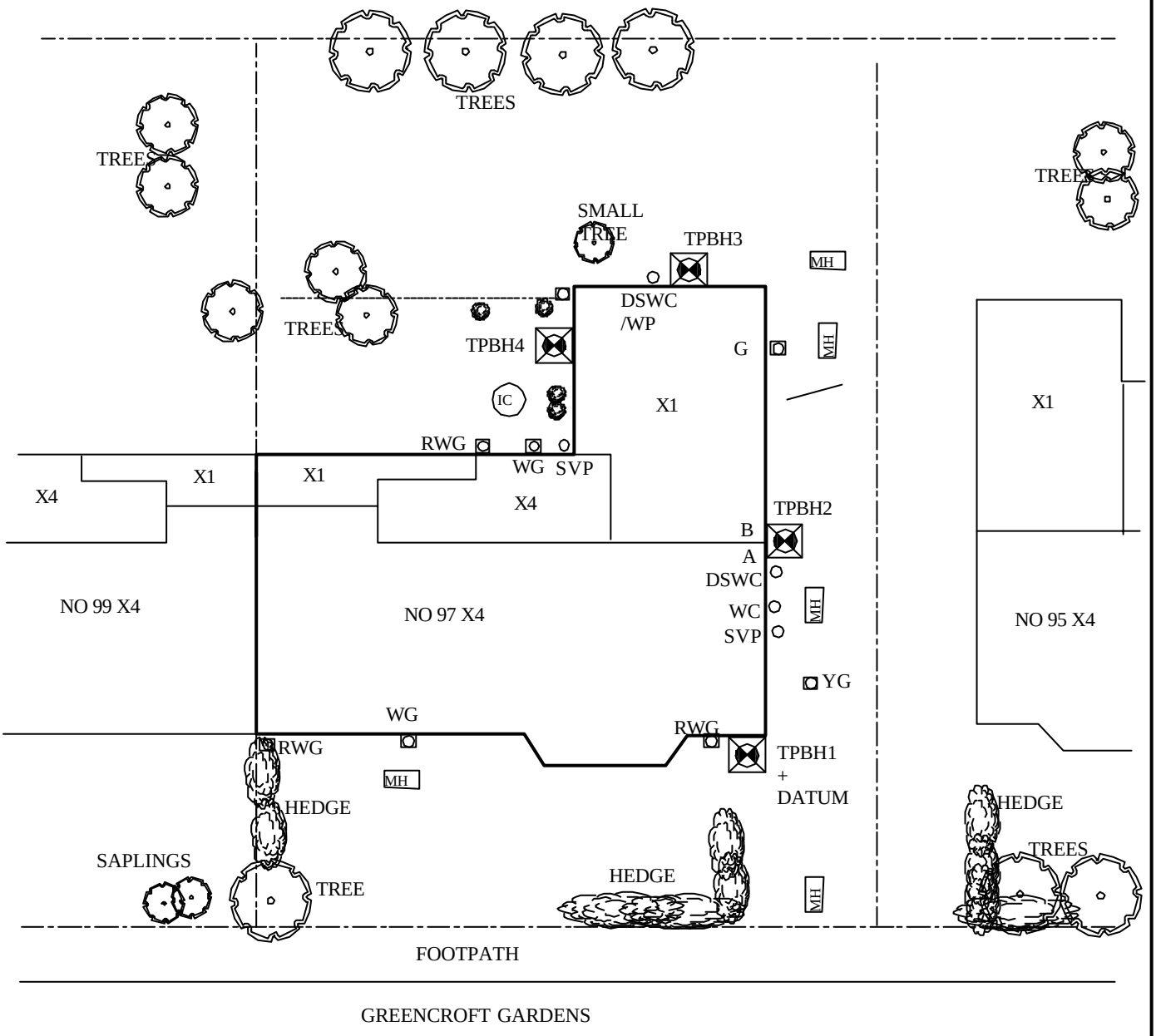
Date: 16/05/12 &17/05/12

Site: 97, Greencroft Gardens, NW6

Work carried out for: Cunningham Lindsey

MH (SI) | PS (Checked) | Jo F (Drawn)

Weather: Dry



ON SITE TREE IDENTIFICATION FOR GUIDANCE ONLY. NOT AUTHENTICATED.

Remarks:

Coal shute / basement in area of TP2 Sec A

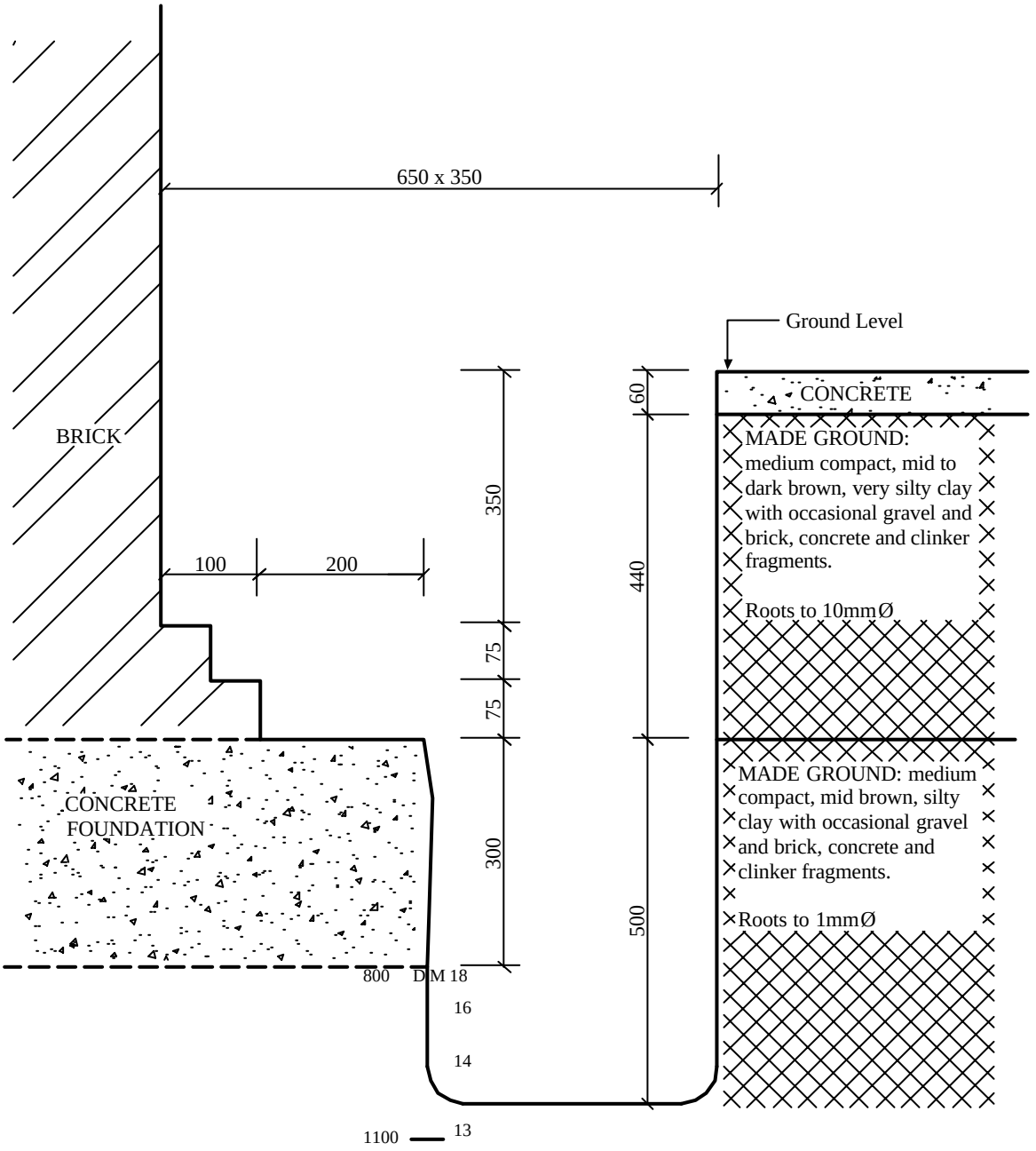
Scale: N.T.S.

Key:

Combined Gulley	RWWG	Surface Water Drain	
Manhole	MH	Foul Water Drain	
Rain Water Pipe	RWP	Tree / Bush (approx. ht in m)	
Rain Water Gulley	RWG		
Soil Vent Pipe	SVP	Trial Pit	
Waste Gulley	WG	Borehole	
Waste Pipe	WP		

Trial Pit No: 3

Sheet:	1 of 1
Job No:	123879E
Date:	16/5/12
Site:	97, Greencroft Gardens, NW6
Excavation Method:	Hand Tools
Drawn by:	Jo F
Work carried out for:	Cunningham Lindsey
Weather:	Dry
Ground Level mOD:	



FOR STRATA BELOW 1000mm SEE BH LOG 3

Remarks: All measurements in millimetres.
Mass concrete at back of TP3 us suspected drain surround

Key:

D	Small disturbed sample	J	Jar sample
B	Bulk disturbed sample	V	Pilcon Vane (kPa)
W	Water sample	M	Mackintosh probe
TDTD	Too dense to drive		

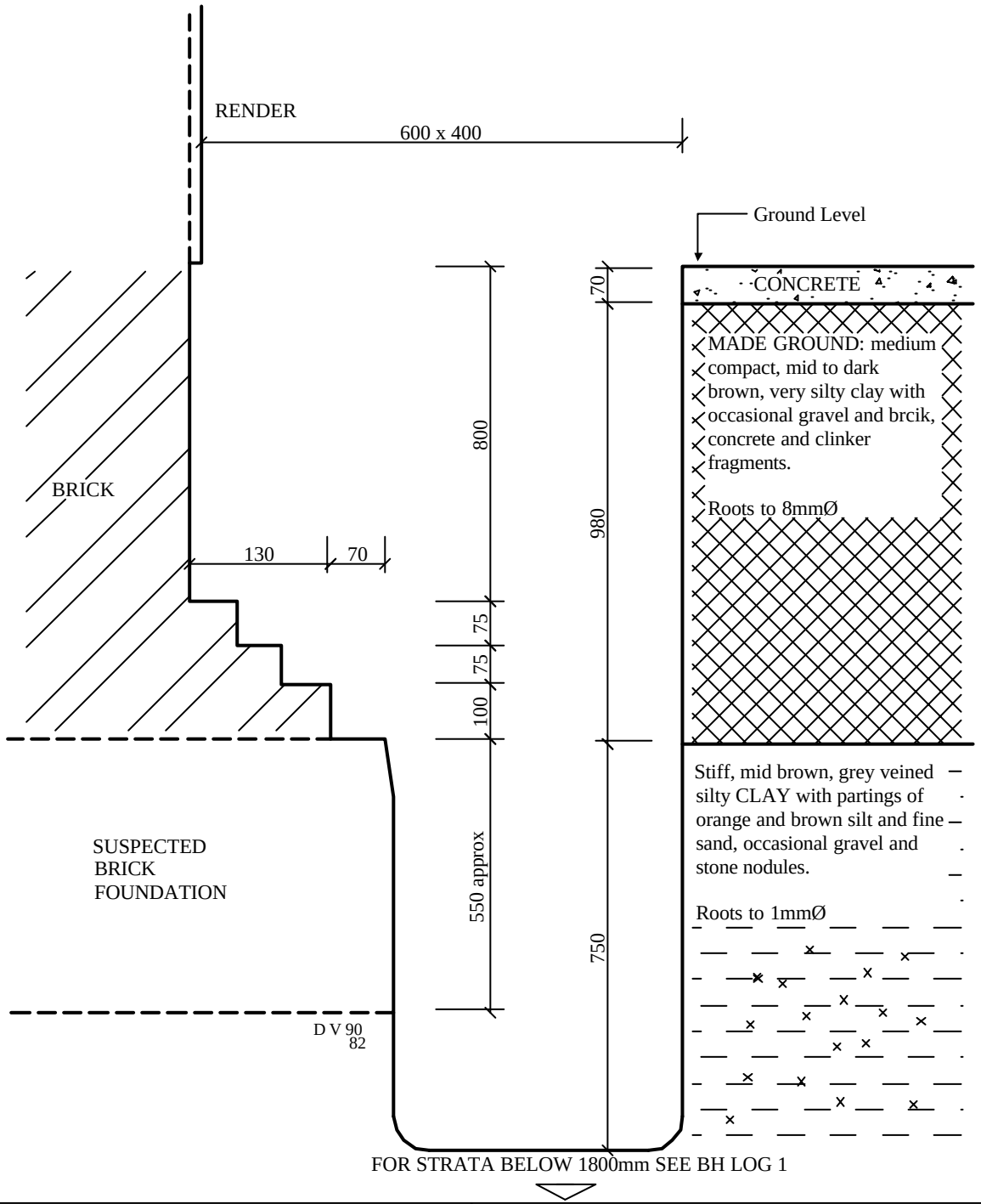
Logged:	Checked:	Approved:	Scale:
MH	PS		N.T.S.

Trial Pit No: 1

Sheet: 1 of 1
Job No: 123879E
Date: 16/05/12

Site: 97, Greencroft Gardens, NW6
Work carried out for: Cunningham Lindsey

Excavation Method: Hand Tools
Weather: Dry
Drawn by: Jo F
Ground Level mOD:



FOR STRATA BELOW 1800mm SEE BH LOG 1

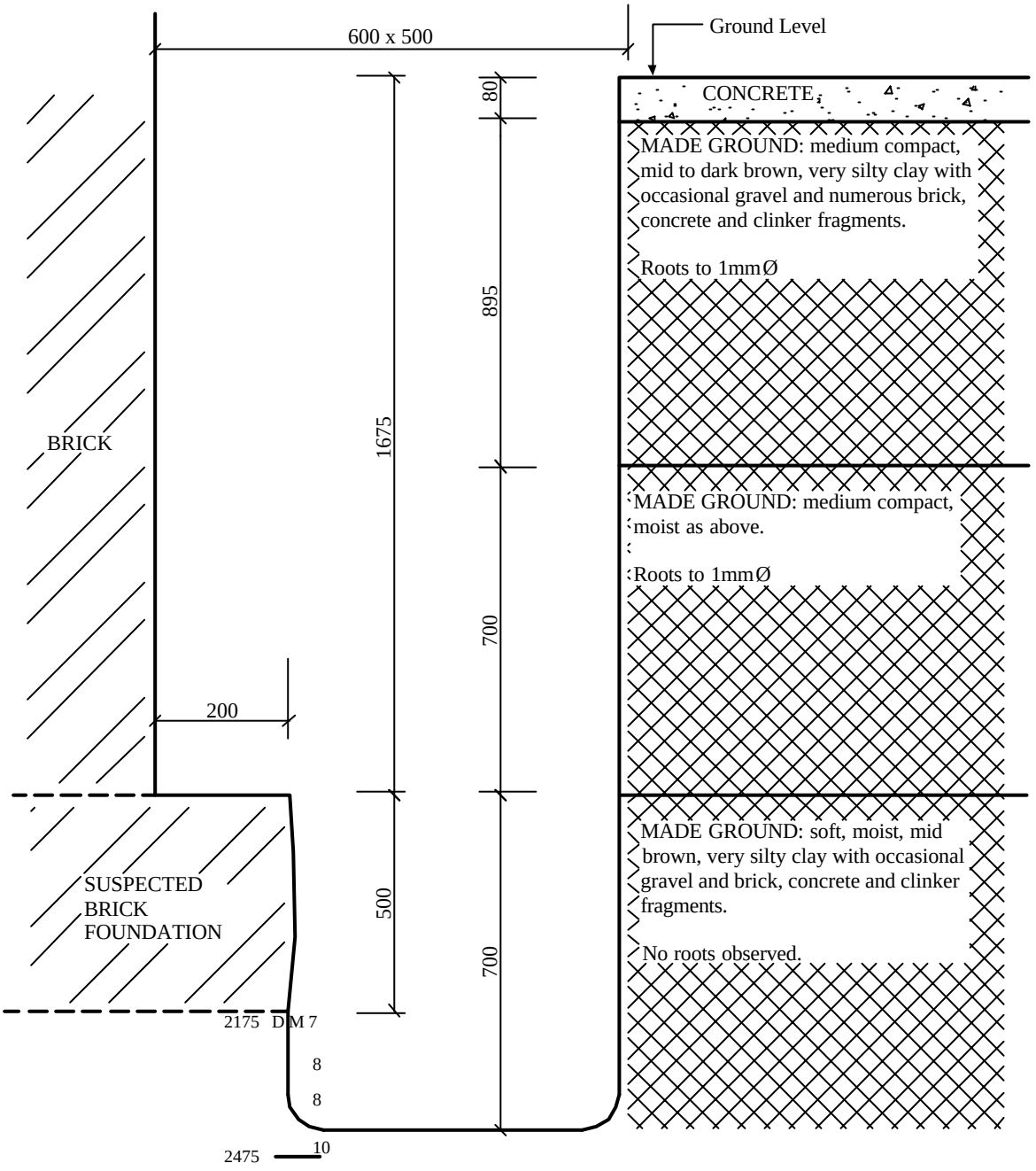
Remarks: All measurements in millimetres.

Key:
D Small disturbed sample
B Bulk disturbed sample
W Water sample
TDTD Too dense to drive
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh probe

Logged: MH | Checked: PS | Approved: | Scale: N.T.S.

Trial Pit No: 2A

Sheet: 1 of 2			
Job No: 123879E			
Date: 17/05/12		Site:	97, Greencroft Gardens, NW6
Excavation Method: Hand Tools	Drawn by: Jo F	Work carried out for:	Cunningham Lindsey
Weather: Dry	Ground Level mOD:		



FOR STRATA BELOW 2375mm SEE BH LOG 2

Remarks: All measurements in millimetres.

Key:

D	Small disturbed sample	J	Jar sample
B	Bulk disturbed sample	V	Pilcon Vane (kPa)
W	Water sample	M	Mackintosh probe
TDTD	Too dense to drive		

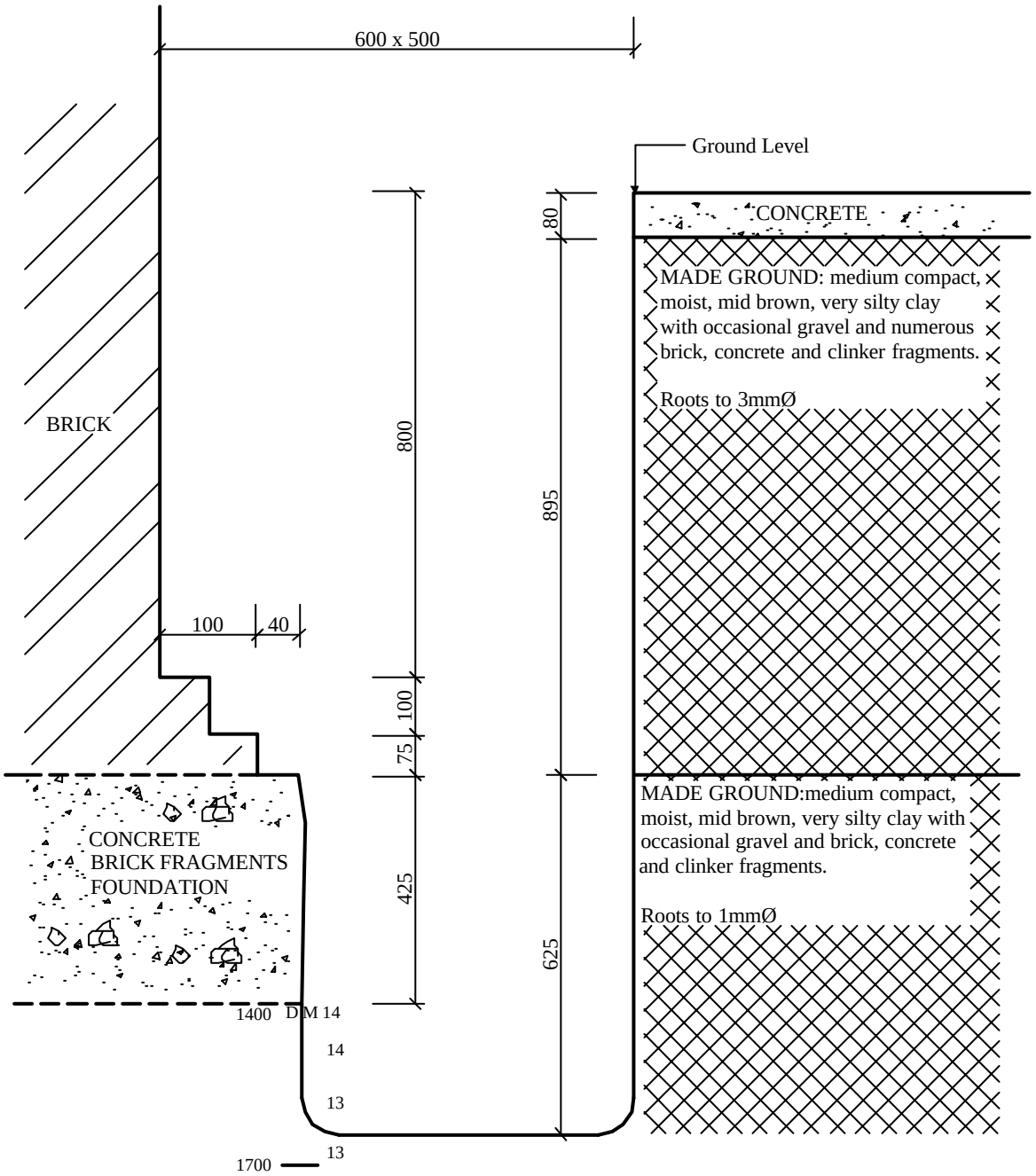
Logged:	Checked:	Approved:	Scale:
MH	PS		N.T.S.

Trial Pit No: 2 Sec B

Sheet: 2 of 2
Job No: 123879E
Date: 17/5/12

Site: 97, Greencroft Gardens, NW6
Work carried out for: Cunningham Lindsey

Excavation Method: Hand Tools
Drawn by: Jo F
Weather: Dry
Ground Level mOD:



FOR STRATA BELOW 1600mm SEE TP2 sheet 1 of 2 Sec A

Remarks: All measurements in millimetres.

Key:
D Small disturbed sample
B Bulk disturbed sample
W Water sample
TDTD Too dense to drive
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh probe

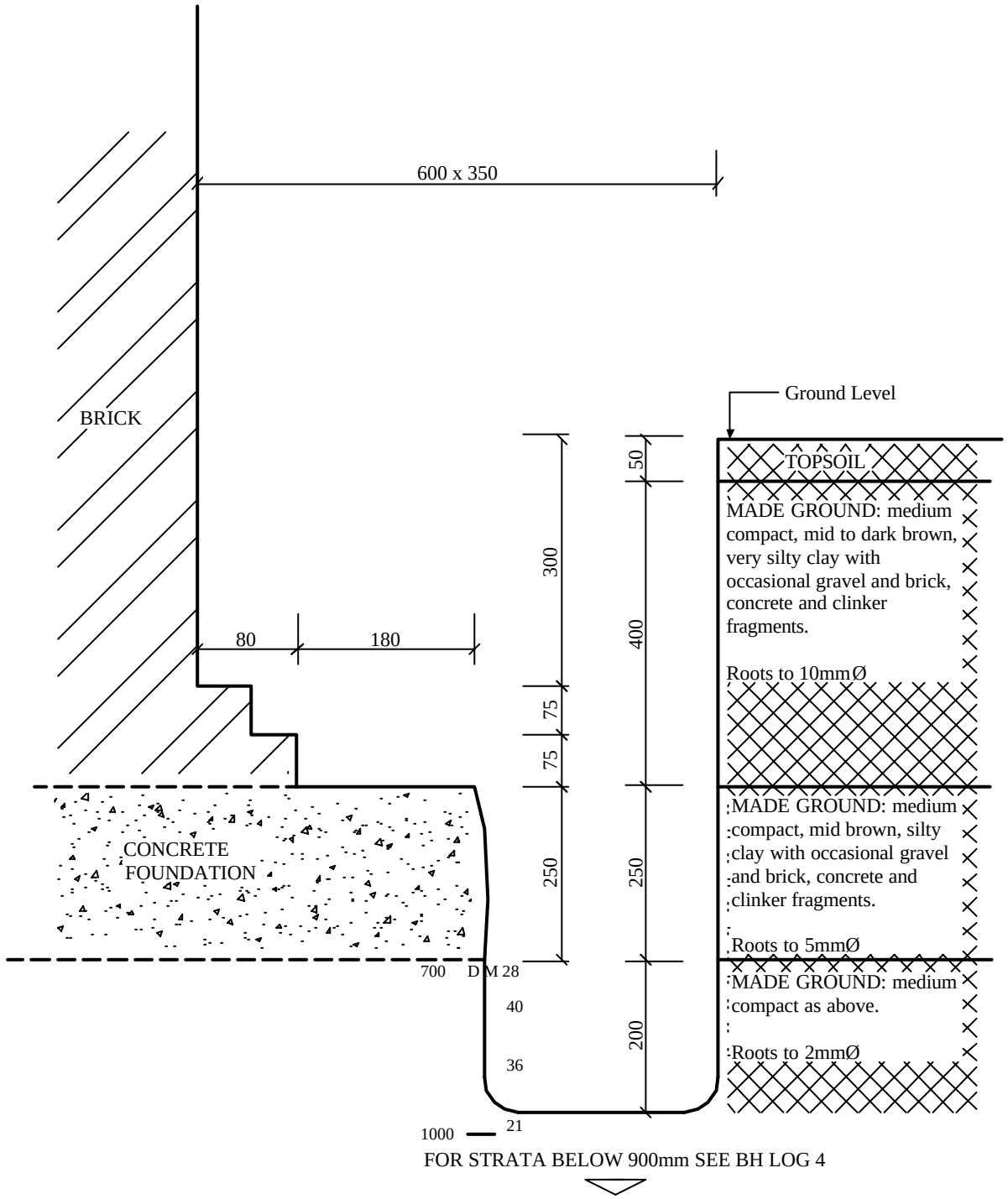
Logged: MH | Checked: PS | Approved: | Scale: N.T.S.

Trial Pit No: 4

Sheet: 1 of 1
Job No: 123879E
Date: 16/05/12

Site: 97, Greencroft Gardens, NW6
Work carried out for: Cunningham Lindsey

Excavation Method: Hand Tools
Weather: Dry
Drawn by: Jo F
Ground Level mOD:



FOR STRATA BELOW 900mm SEE BH LOG 4

Remarks: All measurements in millimetres.

Key:
D Small disturbed sample
B Bulk disturbed sample
W Water sample
TDTD Too dense to drive
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh probe

Logged: MH | Checked: PS | Approved: | Scale: N.T.S.

Borehole No: 1 & Datum	Sheet: 1 of 2	Site: 97, Greencroft Gardens, NW6
Boring Method: C.F.A	Job No: 123879E Date: 16/05/2012	
Diameter: 100mm Coordinates:	Ground Level mOD:	Work Carried out for: Cunningham Lindsey

Depth (m)	Description of Strata	Thick-ness (m)	Legend	Sample	Test Type	Test Result	Depth (m)	Field Records/Comments	Depth to water (m)
	As trial pit 1	1.80							
1.80	Stiff, mid brown, grey veined silty CLAY with partings of orange and brown silt and fine sand, occasional claystone nodules and crystals	1.70	__.x __ __ __ __ __ x __ __ __ __ __ __ __x. __ __ __ __x__ __ __ __ __ __ __ __	D D D D	V	98 104 112 114	5.00 2.50 5.00 3.50	Hair and fibrous roots to 3.0m with dead and decomposing root fragments to 5.0m	
3.50	Very stiff, mid brown, grey veined silty CLAY with partings of orange and brown silt and fine sand, occasional claystone nodules and crystals	4.50	__.x __ __ __ __ __ x __ __ __ __ __ __ __x. __ __ __	D D	V	150+ 150+	5.00 4.50		

Remarks:

Key: T.D.T.D. Too Dense to Drive

D	Small disturbed sample	J	Jar sample
B	Bulk disturbed sample	V	Pilcon Vane (kPa)
W	Water sample	M	Mackintosh Probe

Logged: MH	Checked: PS	Drawn By Jo F	Scale: NTS	Weather: Dry

Borehole No: 1 & Datum			Sheet: 2 of 2			Site: 97, Greencroft Gardens, NW6			
Boring Method: C.F.A			Job No: 123879E						
Diameter: 100mm	Coordinates:		Date: 16/05/2012			Work Carried out for: Cunningham Lindsey			
			Ground Level mOD:						

Depth (m)	Description of Strata	Thick-ness (m)	Legend	Sample	Test Type	Test Result	Depth (m)	Field Records/Comments	Depth to water (m)
	Very stiff, mid brown, grey veined silty CLAY with partings of orange and brown silt and fine sand, occasional claystone nodules and crystals			D	V	150+ 150+	5.00		
8.00	Borehole ends at 8.0m								

Remarks:
Borehole dry and open on completion
Datum installed at 8.0m. No soil samples taken or insitu strength tests carried out below 5.0m

Key: T.D.T.D. Too Dense to Drive
D Small disturbed sample
B Bulk disturbed sample
W Water sample
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh Probe

Logged: MH	Checked: PS	Drawn by Jo F	Scale: NTS	Weather: Dry

Borehole No: 2

Sheet: 1 of 1

Job No: 123879E

Site: 97, Greencroft Gardens, NW6

Boring Method: Hand Auger

Date: 17/05/2012

Diameter: 75mm

Coordinates:

Ground Level mOD:

Work Carried out for: Cunningham Lindsey

Depth (m)	Description of Strata	Thick-ness (m)	Legend	Sample	Test Type	Test Result	Depth (m)	Field Records/Comments	Depth to water (m)
	As trial pit 2	2.375							
2.375								Dead and decomposing root fragments to 5.0m	
	MADE GROUND: soft, moist, mid brown very silty clay with occasional gravel and brick, concrete and clinker fragments	0.225		D	M	10 34	2.50		
2.60									
	Stiff, mid brown, grey veined, silty CLAY with partings of orange and brown silt and fine sand, occasional claystone nodules and crystals	1.20		D	V	34 36 118 110	3.00		
				D	V	128 132	3.50		
3.80									
	Very stiff as above	1.20		D	V	150+ 150+	4.00		
				D	V	150+ 150+	4.50		
5.00				D	V	150+ 150+	5.00		
	Borehole ends at 5.0m								

Remarks:
Borehole dry 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 Vane (kPa)
W Water sample
M Mackintosh Probe

Logged: MH Checked: PS Drawn By Jo F

Scale: NTS

Weather: Dry

Borehole No: 3

Sheet: 1 of 1

Job No: 123879E

Site: 97, Greencroft Gardens, NW6

Boring Method: Hand Auger

Date: 16/05/2012

Diameter: 75mm

Coordinates:

Ground Level mOD:

Work Carried out for: Cunningham Lindsey

Depth (m)	Description of Strata	Thick-ness (m)	Legend	Sample	Test Type	Test Result	Depth (m)	Field Records/Comments	Depth to water (m)
	As trial pit 3	1.00							
1.00	MADE GROUND: medium compact, mid brown, silty clay with occasional gravel and brick, concrete and clinker fragments	0.10		D	M	12 14	1.00	Roots to 1mm diameter to 2.1m with dead and decomposing root fragments to 5.0m	
1.10	Firm, mid brown, grey veined silty CLAY with partings of orange and brown silt and fine sand, occasional gravel and stone nodules	0.70		D	V	16 15 56 60	1.50		
1.80	Stiff, mid brown, grey veined silty CLAY with partings of orange and brown silt and fine sand, occasional claystone nodules and crystals	1.70		D D D D	V V V	84 94 100 100 118 126 150	2.00 2.50 3.00 3.50		
3.50	Very stiff as above	1.50		D D D	V V V	150+ 150+ 150+ 150+ 150+ 150+	4.00 4.50 5.00		
5.00	Borehole ends at 5.0m								

Remarks:
Borehole dry and open on completion

Key: T.D.T.D. Too Dense to Drive
D Small disturbed sample
B Bulk disturbed sample
W Water sample
J Jar sample
V Pilcon Vane (kPa)
M Mackintosh Probe

Logged: MH Checked: PS Drawn By Jo F

Scale: NTS

Weather: Dry

Borehole No: 4

Sheet: 1 of 1

Job No: 123879E

Site: 97, Greencroft Gardens, NW6

Boring Method: Hand Auger

Date: 16/05/2012

Diameter: 75mm

Coordinates:

Ground Level mOD:

Work Carried out for: Cunningham Lindsey

Depth (m)	Description of Strata	Thick-ness (m)	Legend	Sample	Test Type	Test Result	Depth (m)	Field Records/Comments	Depth to water (m)
	As trial pit 4	1.00							
1.00				D	V	60	1.00	Roots to 1mm diameter to 2.0m with dead and decomposing root fragments to 5.0m	
	Firm, mid brown / orange, grey veined silty , gravelly CLAY with partings of orange and brown silt and fine sand and occasional stone nodules	0.20	__.x __ o __ __ __ __			60			
1.20	Firm, mid brown, grey veined silty CLAY with partings of orange and brownh silt and fine sand and occasional claystone nodules	0.30	__.x __ __ __ __ __	D	V	84	1.50		
	Stiff as above	0.30	__.x __ __ __			94			
1.80				D	V	98	2.00		
	Stiff, mid brown, grey veined silty CLAY with partings of orange and brown silt and fine sand, occasional claystone nodules and crystals	1.20	__.x __ __ __ __ __ x __ __ __ __ __ __ __	D	V	104	2.50		
3.00				D	V	102	3.00		
	Very stiff as above	2.00	__x. __ __ __ __ __ x __ __ __ __ __ __ __	D	V	92	3.50		
				D	V	150+	4.00		
				D	V	150+	4.50		
5.00				D	V	150+	5.00		
	Borehole ends at 5.0m					150+			

Remarks:
Borehole dry 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 Vane (kPa)
W Water sample
M Mackintosh Probe

Logged: MH | Checked: PS | Drawn By Jo F | Scale: NTS | Weather: Dry

Our Ref : 123879

Laboratory Testing Results

Date Sampled: 16+17/05/2012

Location : 97, Greencroft Gardens

Work carried out for: Cunningham Lindsey - Solent

Date Received : 18/05/2012

Date Tested : 18/05/2012

Date of Report : 29/05/2012

Sample Ref		Type	Moisture Content	Soil Fraction	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Modified Plasticity Index	Soil Class	Filter Paper Contact Time	Soil Sample Suction	In situ Shear Vane Strength	Organic Content	pH Value	Sulphate Content (g / l)		Class
TP/BH No	Depth (m)		(%) *[1]*	> 0.425mm (%) *[2]*	(%) *[3]*	(%) *[4]*	(%) *[5]*	*[5]*	(%) [6]	*[7]*	(h) *[8]*	(kPa)	(kPa) *[9]*	(%)*[10]*	*[11]*	SO_3 *[12]*	SO_4 *[13]*	*[14]*
1	1.60(U/S)	D	29	<5	77	23	53	0.11	53	CV	168	99	86					
	2.0	D	27	<5	75	22	53	0.11	53	CV	168	140	101					
	2.5	D	27	<5														
	3.0	D	29	<5	66	24	43	0.12	43	CH	168	155	113					
	3.5	D	31	<5														
	4.0	D	31	<5							168	183	> 150					
	4.5	D	30	<5														
	5.0	D	32	<5							168	208	> 150					

Test Methods / Notes

[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 CET Safehouse using a Pilcon hand vane or Geonor vane (GV).

[10] BS 1377 : Part 3 : 1990, Test No 4

[11] BS 1377 : Part 3 : 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 (small)
B	Disturbed sample (bulk)
U	Undisturbed sample
W	Groundwater sample
ENP	Essentially Non-Plastic by inspection
U/S	Underside of Foundation

Our Ref : 123879

Laboratory Testing Results

Date Sampled : 16+17/05/2012

Location : 97, Greencroft Gardens

Work carried out for: Cunningham Lindsey - Solent

Date Received : 18/05/2012

Date Tested : 18/05/2012

Date of Report : 29/05/2012

Sample Ref.		Type	Moisture Content	Soil Fraction	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Modified Plasticity Index	Soil Class	Filter Paper Contact Time	Soil Sample Suction	In situ Shear Vane Strength	Organic Content	pH Value	Sulphate Content (g / l)		Class
TP/BH No.	Depth (m)		(%) *[1]*	> 0.425mm (%) *[2]*	(%) *[3]*	(%) *[4]*	(%) *[5]*	*[5]*	(%) [6]	*[7]*	(h) *[8]*	(kPa)	(kPa) *[9]*	(%)*[10]*	*[11]*	SO_3 *[12]*	SO_4 *[13]*	*[14]*
2	1.40(U/S)	D	39	<5	66	24	42	0.36	42	CH	168							
	2.18(U/S)	D	38	<5	63	23	40	0.37	40	CH	168							
	2.5	D	37	10														
	3.0	D	30	<5	72	26	47	0.10	47	CV	168	112	114					
	3.5	D	32	<5									130					
	4.0	D	32	<5							168	127	> 150					
	4.5	D	33	<5									> 150					
	5.0	D	31	<5							168	170	> 150					

Test Methods / Notes

[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 CET Safehouse using a Pilcon hand vane or Geonor vane (GV).

[10] BS 1377 : Part 3 : 1990, Test No 4

[11] BS 1377 : Part 3 : 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 (small)
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U/S	Underside of Foundation

Our Ref : 123879

Laboratory Testing Results

Date Sampled : 16+17/05/2012

Location : 97, Greencroft Gardens

Work carried out for: Cunningham Lindsey - Solent

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Date Tested : 18/05/2012

Date of Report : 29/05/2012

Sample Ref. TP/BH No.	Depth (m)	Type	Moisture Content (%) *[1]*	Soil Fraction > 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)	In situ Shear Vane Strength (kPa) *[9]*	Organic Content (%)*[10]*	pH Value *[11]*	Sulphate Content (g / l) SO_3 *[12]*	Sulphate Content (g / l) SO_4 *[13]*	Class *[14]*
3	0.80(U/S)	D	32	6	66	25	41	0.16	39	CH								
	1.0	D	31	14														
	1.5	D	32	<5							168	86	58					
	2.0	D	29	<5	71	24	47	0.11	47	CV	168	166	89					
	2.5	D	31	<5									100					
	3.0	D	32	<5	72	25	47	0.15	47	CV	168	161	122					
	3.5	D	33	<5									> 150					
	4.0	D	32	<5							168	217	> 150					
	4.5	D	32	<5									> 150					
	5.0	D	32	<5							168	258	> 150					

Test Methods / Notes

[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 CET Safehouse using a Pilcon hand vane or Geonor vane (GV).

[10] BS 1377 : Part 3 : 1990, Test No 4

[11] BS 1377 : Part 3 : 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 (small)
B	Disturbed sample (bulk)
U	Undisturbed sample
W	Groundwater sample
ENP	Essentially Non-Plastic by inspection
U/S	Underside of Foundation

Laboratory Testing Results

Our Ref : 123879

Location : 97, Greencroft Gardens

Work carried out for: Cunningham Lindsey - Solent

Date Sampled : 16+17/05/2012

Date Received : 18/05/2012

Date Tested : 18/05/2012

Date of Report : 29/05/2012

Sample Ref. TP/BH No.	Depth (m)	Type	Moisture Content (%) [1]	Soil Fraction > 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)	In situ Shear Vane Strength (kPa) [9]	Organic Content (%) [10]	pH Value [11]	Sulphate Content (g / l) SO_3 [12]	Sulphate Content (g / l) SO_4 [13]	Class [14]
4	0.70(U/S)	D	27	11	63	23	41	0.09	36	CH								
	1.0	D	25	26	61	23	38	0.05	28	CH	168	83	60					
	1.5	D	29	<5									89					
	2.0	D	29	<5	64	21	43	0.18	43	CH	168	204	101					
	2.5	D	32	<5									97					
	3.0	D	32	<5	72	26	47	0.12	47	CV	168	157	> 150					
	3.5	D	32	<5									> 150					
	4.0	D	31	<5							168	232	> 150					
	4.5	D	33	<5									> 150					
	5.0	D	32	<5							168	237	> 150					

Test Methods / Notes

[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 CET Safehouse using a Pilcon hand vane or Geonor vane (GV).

[10] BS 1377 : Part 3 : 1990, Test No 4

[11] BS 1377 : Part 3 : 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

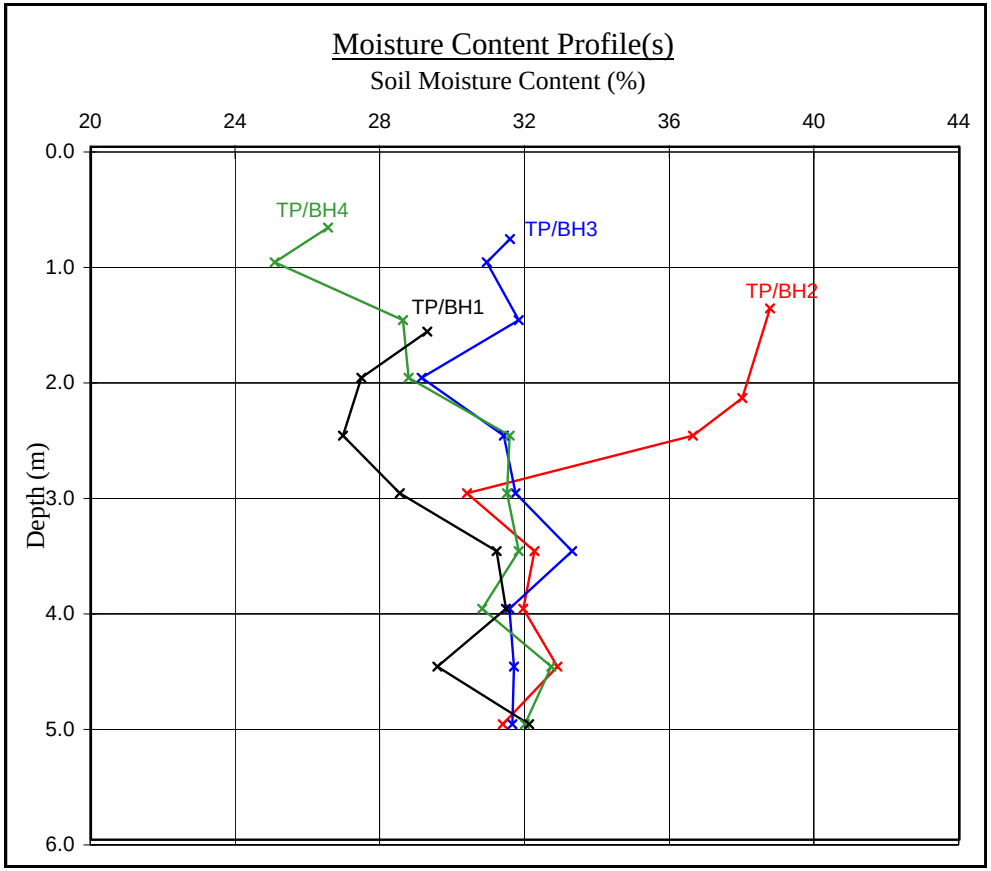
Note that if the SO_4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise

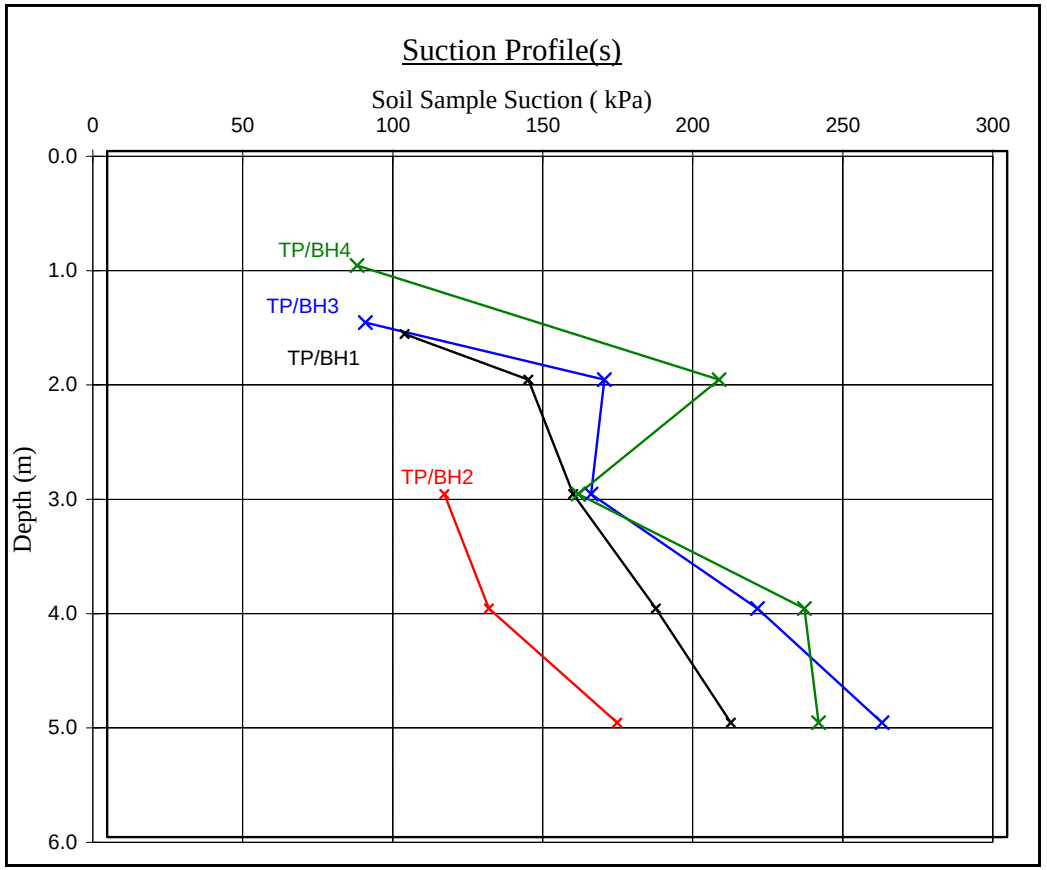
Key

D	Disturbed sample (small)
B	Disturbed sample (bulk)
U	Undisturbed sample
W	Groundwater sample
ENP	Essentially Non-Plastic by inspection
U/S	Underside of Foundation

Moisture Content and Suction Profiles

Our Ref :	123879		Date Sampled : 16+17/05/2012
Location :	97, Greencroft Gardens		Date Received : 18/05/2012
Work carried out for:	Cunningham Lindsey - Solent	Note : Unless specifically noted the profiles have not been related to a site datum.	Date Tested : 18/05/2012
			Date of Report : 29/05/2012





Note

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.

Note

When shown, the theoretical equilibrium suction profiles are based on conventional assumptions associated with London Clay (and similarly overconsolidated clays) at shallow depths. Note that the sample disturbance component is dependant on the method of sampling and any subsequent recompaction. The above plots show this to be 100kPa which is the value suggested by the BRE on the basis of their limited number of tests on recompacted samples. This may or may not be appropriate in this instance and judgement should be exercised.

Moisture Content and Shear Strength Profiles

Our Ref : 123879

Location : 97, Greencroft Gardens

Work carried out for: Cunningham Lindsey - Solent

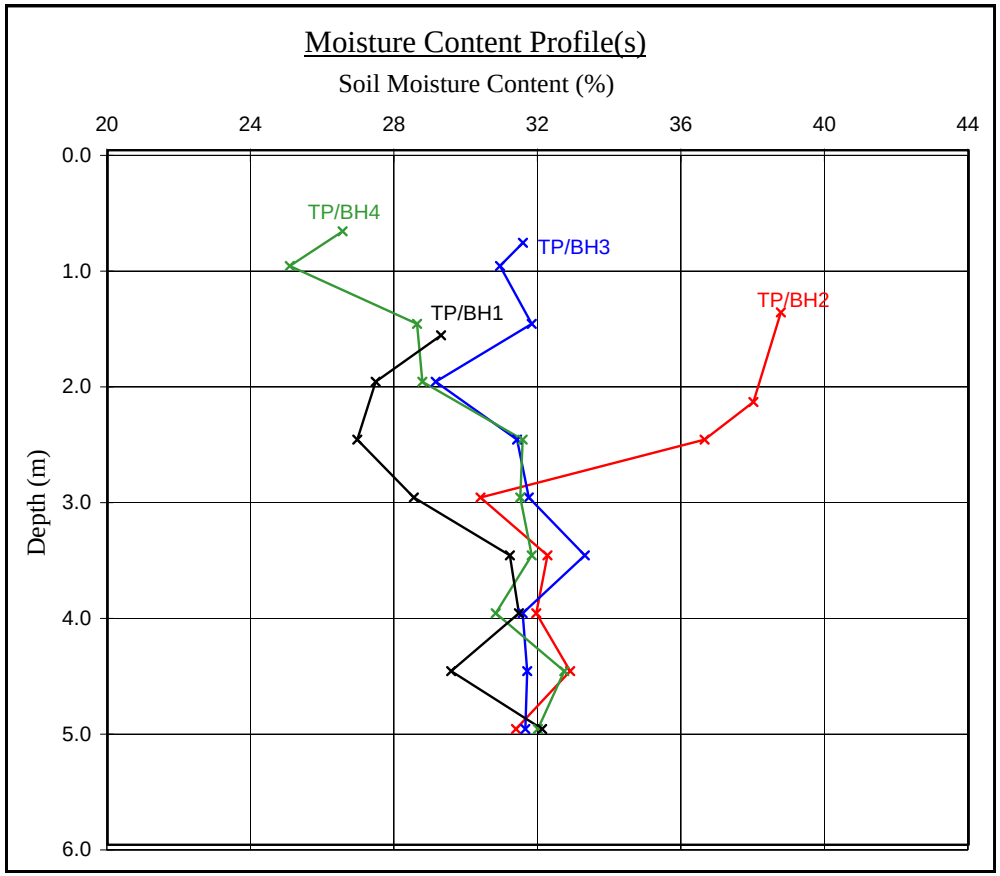
Note : Unless specifically noted the profiles have not been related to a site datum.

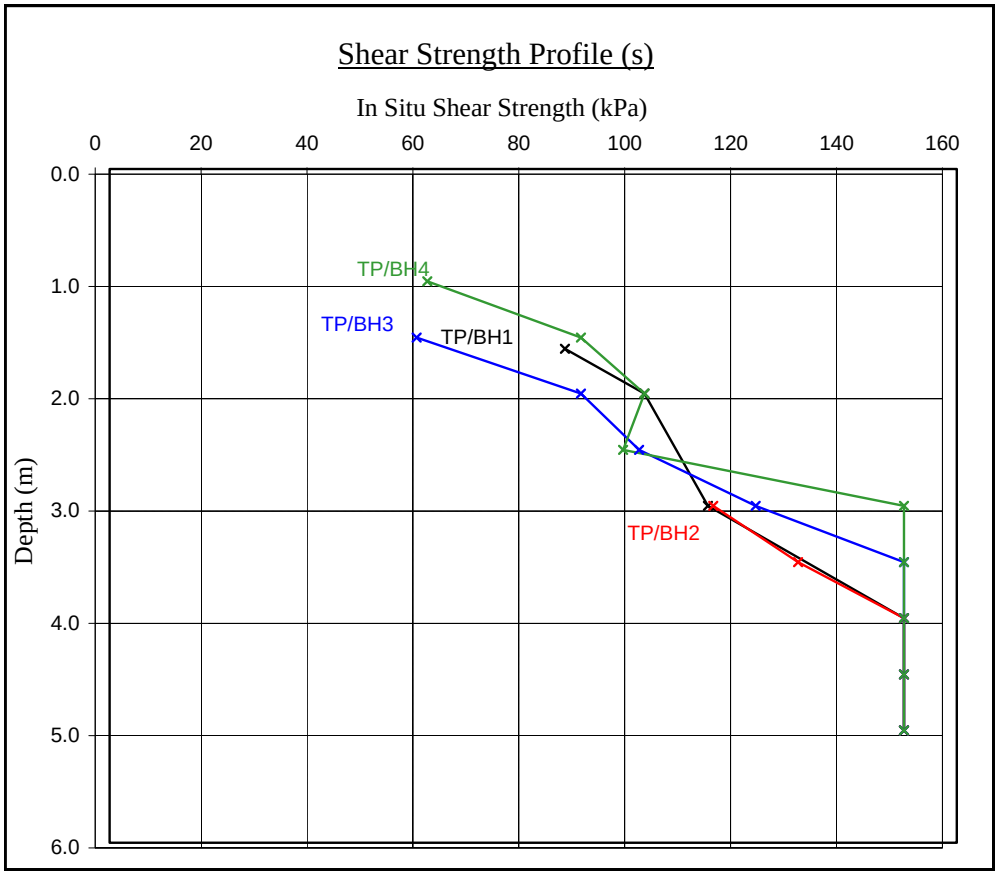
Date Sampled : 16+17/05/2012

Date Received : 18/05/2012

Date Tested : 18/05/2012

Date of Report : 29/05/2012





Note

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.

Note

Unless otherwise stated, values of Shear Strength were determined in situ by CET Safehouse using a Pilcon Hand Vane the calibration of which is limited to a maximum reading of 150 kPa.

EPSL ***European Plant Science Laboratory***	Sheet: 1 of 1 Job No: **123879** Date: **22/05/2012** Order No: **401524** EPSL Ref: **220512114412**	Site: **97 Greencroft Gardens, London** Work carried out for: **Cunningham Lindsey**

Certificate of Analysis

The following work was commissioned by CET Safehouse Limited on behalf of their client. Root samples were obtained in sealed packets from the above site with no reference given as to the types of tree or shrub from which they may have originated.
The results were as follows -

Trial pit/ Borehole number	Root diameter (mm)	Tree, shrub or climber from which root originates	Result of starch test
TP1 (U/S)	1.5	Tilia spp. (3 roots)	Negative
BH1 (to 3m)	<1	broadleaved species, too juvenile for positive identification * (2 roots)	Negative
TP2 (U/S)	<1	Acer spp. ** (2 roots)	Positive
TP3 (U/S)	1	Tilia spp.	Positive
TP3 (U/S)	<1	broadleaved species, too juvenile for positive identification (2 roots)	Negative
BH3 (to 2.1m)	<1	probably Tilia spp. (2 roots)	Negative
TP4 (U/S)	1.5	Rosa spp. (3 roots)	Positive
BH4 (to 2m)	1.5	Tilia spp. (2 roots)	Positive

* Also in a state of decay.

** Both rather juvenile.

Tilia spp. are limes.

Acer spp. are maples, including sycamore, Norway maple, and Japanese maples.

Rosa spp. are roses.

Address for correspondence: EPSL , Intec, Parc Menai, Bangor, Gwynedd, North Wales, LL57 4FG
Telephone: 01248 672 652
e-mail: lab@marishalthompson.co.uk
Head of laboratory Services : M D Mitchell B.Sc., M.Phil.
Plant Anatomist : Dr G S Turner B.Sc., M.Sc., Ph.D
Plant Anatomist : Dr F M Cardias Williams B.Sc., M.Sc., Ph.D.
Consultant: Dr M P Denne B.Sc., M.Sc., Ph.D
Registered in England. No 295427, Registered Office: Bank Chambers, 29 High Street, Ewell, Epsom, Surrey, KT17 1SB

CET SAFEHOUSE

Level Monitoring - Relative Movement Over Time

Our Ref: **00/27297** **Date of Issue** **18/01/13**

Provider Details

Name: **CET Safehouse**

Monitoring Details

Instruction Date:	
First Reading Date:	**24/05/12**
Maximum No Visits:	**5**
Anticipated Expiry Date:	**Mar-13**
Monitoring Int (Wks):	**8**

Client Details

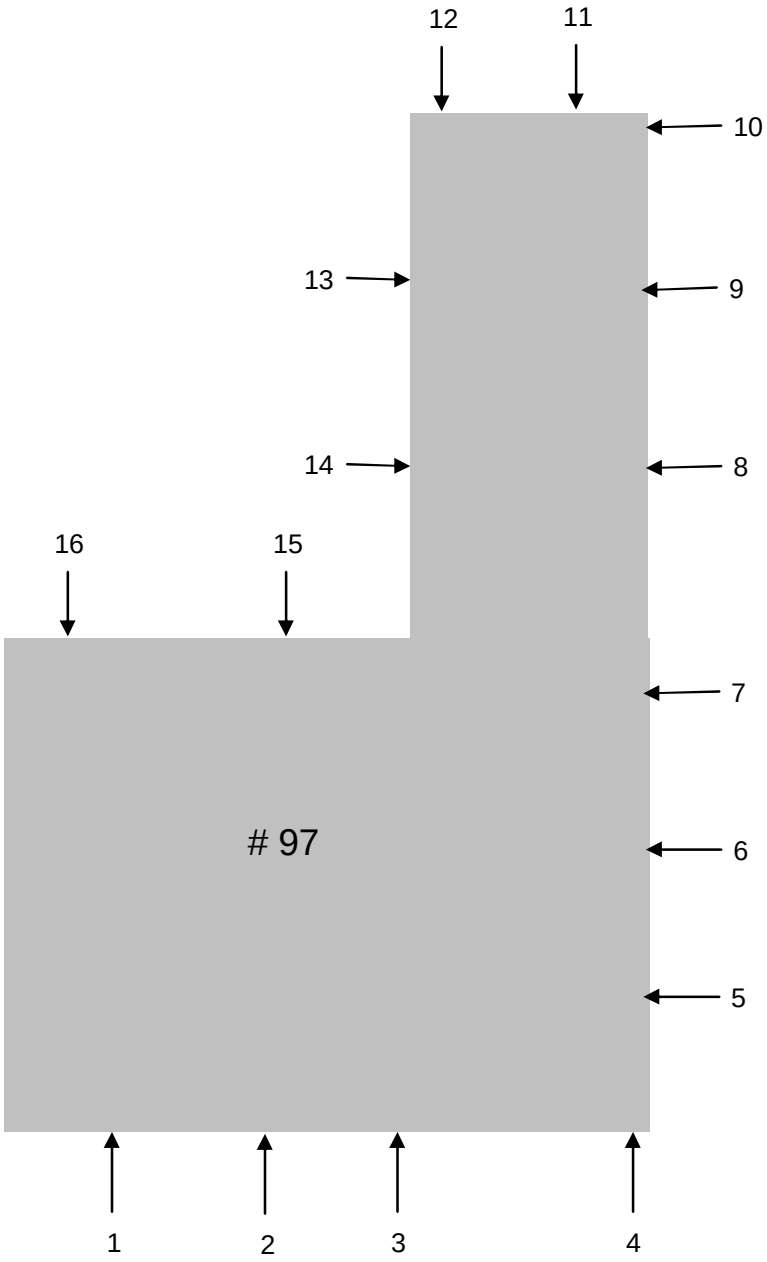
Insurance Co.:	
Client Name:	**Cunningham Lindsey**
Technical Mgr:	**Raymond Borrow**
Email:	
Client Ref:	**4291445**
Address:	
Tel	
Other Email:	

Risk Address

Occupier:	
Address:	**97 Greencroft Gardens**
Address:	
Town:	**London**
County:	
Post Code:	**NW6 3PG**
Tel Day:	
Tel Eve:	
Mobile:	
Other:	
Other:	

Level Monitoring - Site Sketch

Our Ref: 00/27297 **Date of Issue 18/01/13**



Level Monitoring - Comments

Our Ref: **00/27297** **Date of Issue** **18/01/13**

Using deep datum at front of property.

CET SAFEHOUSE

Level Monitoring - Reduced Levels

Our Ref: 00/27297 **Date of Issue 18/01/13**

Reading Date	24/05/12	26/07/12	19/09/12	12/11/12	10/01/13							
Point / Reading	1	2	3	4	5	6	7	8	9	10	11	12
1	11.220	11.219	11.217	11.219	11.221							
2	11.295	11.293	11.290	11.293	11.295							
3	11.278	11.276	11.271	11.274	11.277							
4	11.308	11.307	11.302	11.305	11.308							
5	10.607	10.606	10.602	10.603	10.607							
6	10.645	10.645	10.642	10.643	10.646							
7	10.679	10.679	10.678	10.677	10.680							
8	10.524	10.524	10.523	10.522	10.525							
9	10.507	10.507	10.507	10.505	10.508							
10	10.179	10.180	10.179	10.178	10.181							
11	10.311	10.310	10.310	10.308	10.311							
12	10.283	10.282	10.279	10.278	10.283							
13	10.079	10.079	10.076	10.075	10.080							
14	10.252	10.252	10.248	10.246	10.251							
15	10.749	10.749	10.749	10.746	10.749							
16	10.761	10.761	10.761	10.759	10.761							

Highest reduced level is displayed green, lowest reduced level is displayed red

CET SAFEHOUSE

Level Monitoring - Relative Movement Over Time

Our Ref: 00/27297 **Date of Issue 18/01/13**

Reading Date	24/05/12	26/07/12	19/09/12	12/11/12	10/01/13							
Point / Reading	1	2	3	4	5	6	7	8	9	10	11	12
1	0	-1	-3	-2	1							
2	0	-2	-5	-2	0							
3	0	-2	-7	-3	0							
4	0	-2	-6	-4	0							
5	0	-1	-6	-4	-1							
6	0	-1	-3	-3	0							
7	0	0	-1	-2	1							
8	0	0	-1	-2	1							
9	0	0	0	-1	2							
10	0	1	0	-1	2							
11	0	-1	-1	-3	1							
12	0	-1	-4	-5	0							
13	0	0	-3	-4	0							
14	0	-1	-4	-6	-2							
15	0	0	0	-3	0							
16	0	0	0	-2	0							

CET SAFEHOUSE

Level Monitoring - Movement relative to datum against Date

Our Ref: 00/27297 **Issue Date:** 18/01/13