GROUND ENGINEERING LIMITED

Newark Road
Peterborough
PE1 5UA
Tel: 01733 566566
Fax: 01733 315280

FACTUAL GROUND INVESTIGATION REPORT

11 WADHAM GARDENS
CAMDEN
LONDON NW3

Report Reference No. C12520a

On behalf of:-

Mr. M. Steinberg
11 Wadham Gardens
Camden
London
NW3 3DN

November 2011

CONTENTS

MR. M. STEINBERG

JAMPEL DAVISON & BELL LIMITED

CONSULTING ENGINEERS

GROUND INVESTIGATION REPORT

AT

11 WADHAM GARDENS

CAMDEN

LONDON NW3

Report Reference No. C12520fac **November 2011**

INTRODUCTION

Mr. M. Steinberg proposes to construct a new basement under the footprint of the existing three-storey house at 11 Wadham Gardens, London NW3. It is proposed to extend this basement beneath the rear garden where it will house a swimming pool. It is envisaged that the swimming pool excavation would extend to approximately 7.00m depth and the remaining basement beneath the house will be taken to about 4.50m below existing ground level.

A site investigation was undertaken by Ground Engineering Limited on behalf of Mr. M Steinberg, following instructions from Consulting Engineers, Jampel Davison & Bell and to the requirements of Geotechnical Consulting Group. The Ground Engineering Limited Desk Study report referenced C12520 was issued in November 2011 and should be consulted for full details of the site.

This report provides factual information from the intrusive ground investigation which was required to provide information on the underlying ground conditions. A summary of the desk study report is included within this report, together with a preliminary conceptual model.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

Number 11 Wadham Gardens is a detached three-storey house, located on the north side of Wadham Gardens, Camden, London NW3. The property is centred at National Grid Reference TQ 2715 8405, approximately 500m north-west of Primrose Hill and 700m east of South Hampstead railway station.

The extended red-brick house was sited towards the southern end of the 48m by 18m plot, with a front drive and small garden fronting the north side of Wadham Gardens. The front garden was flanked by a hedge and a mature London Plane tree grew within the adjacent pavement to the south-east of the property.

A narrow gated path provided access along the eastern flank of the house to the rear garden which was largely laid to lawn and surrounded by hedges, shrubs and trees including Lilac, Palm and Pyracantha. A 6m high *Acer* tree stood close to the location of the proposed basement structure. Within the neighbouring properties to the west and north, stood a 10m high Maple, some 6m distant; a 12m high Poplar, approximately 20m distant; and an 11m high Oak about 25m distant.

The property was flanked to the east and west by existing adjacent extended residential properties and their gardens.

The Primrose Hill (fast lines) Tunnel is routed east-west beneath the northern part of the site, with an associated air shaft about 12m to the east of the site within the adjacent rear garden of No.13 Wadham Gardens.

The property stands on a relatively level plot at an elevation of about 47.5mOD on land gently sloping down to the south within a subdued valley between Primrose Hill and Ordnance Hill. The subdued valley between Primrose Hill and Ordnance Hill delineates the former course of the southward flowing ‘Tyburn’ or ‘Aye Brook’.

The surrounding ground rose towards Primrose Hill about 450m to the south-east; Haverstock Hill about 900m to the north-east; Ordnance Hill about 500m to the south-west; and

the more elevated Hampstead Heath (134mOD) about 2.5km to the north. Wadham Gardens rises slightly to the west to about 48.5mOD at its junction with Harley Road.

The geological maps, sheet 256 (2006) at 1:50,000 scale, and London Sheet IV.NE (1936) at 1:10,560 scale, show the site to be underlain directly by the solid geology of the London Clay Formation. Well records from the district indicate the London Clay to be in the order of 44m to 78m thick. The more recent map indicates a propensity for Head Deposits around the flanks of Primrose Hill within 200m of the site. The Head Deposit was formed by the downslope movement of saturated soils under periglacial climatic conditions.

SUMMARY OF DESK STUDY REPORT (C12520)

Summary of Historical Background

The site area was originally part of the Chalcots Estate, owned by Eton College, which was gradually sold off from around 1830 and the surrounding land developed for residential properties. The Primrose Hill (fast lines) Tunnel, opened in 1879, was routed beneath the former Eton & Middlesex Cricket Ground and extended beneath the northern part of the site, with an air shaft about 12m to the east of the site. Wadham Gardens including No.11, was constructed between 1896 and 1915, with the air shaft incorporated within the adjacent rear garden of No.13. Number 11 Wadham Gardens was subsequently extended to its rear on several occasions.

The tunnel drawings indicate the crown of the tunnel to be at approximately 7.00m depth beneath the site. The tunnel has an internal height of approximately 7.50m, an internal maximum width of approximately 7.00m, and a lining thickness in the order of 0.90m. Overhead electrification was added to the tunnel in 1959. The tunnel was inclined at 1:1056 towards the eastern Euston portal. Drainage within the tunnel is recorded via an earthernware pipe approximately 1m below rail level, draining to this eastern portal.

Summary of Surface Drainage

The historical surface water drainage follows the topography to the south between Primrose Hill and Ordnance Hill. The Camden River Restoration History Report 'The History of Lost Rivers in Camden' (March 2010) notes this eastern source of the Tyburn as a spring behind Hampstead Town Hall on Haverstock Hill, and notes this stream to flow along Belsize Avenue, across Adelaide Road and Avenue Road to the intersection of Norfolk Road and Woronzow Road, where it joined another tributary from the north-west.

A combined sewer (914mm x 635mm) is routed beneath the centre of Wadham Gardens, immediately south of the site, draining to the south-west to the front of the site. This

has an invert level of about 3.00m beneath the road to the front of No.11. This sewer may intercept water from older surface water drainage features.

Summary of Environmental Database Searches

There are records of five (5) potentially contaminative sites within 250m of the site. Four entries are for electricity sub-stations, the closest of which is 22m to the south. The remaining entry is for 'Piano Advisory Service' at 181 Adelaide Road, 146m to the north.

The site is not recorded as being underlain by any made ground, superficial or drift deposits. The site is underlain by the solid geology of the London Clay Formation, classified as Unproductive strata.

The site lies within a Zone 2 (Outer Catchment) Source Protection Zone.

There is one (1) Detailed River Network entry within 250m of the site. This entry is for an 'Extended Culvert' extending north-south and passing the site 8m to the east. This is believed to be erroneous, since the data is derived partly from OS Master Map features, which may have used the adjacent air shaft as a node for the plotted culvert. This is named as St. Agnes's Well (which is located within Hyde Park and was part of the Westbourne river system) and extends south for over 5km from a pond at Parliament Hill, towards Paddington Station, before heading south-west.

Preliminary Conceptual Model

Assessment of the potential linkage between ground contamination sources, human and environmental receptors have been assessed based on the desk study research documented in the preceding sections of this report. A generalised preliminary conceptual model relative to the construction phase and completed development is presented overleaf in Table 1.

Table 1: Preliminary Conceptual Model Relative to Construction & Use of Future Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage & Tunnel	**Soil Beneath Site**	**Soil Gas**	**Ground Contamination Outside Site Boundary**
Human Health – ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low likelihood	Low likelihood	Low likelihood	Low likelihood
Human Health – users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low likelihood	Low likelihood	Unlikely	Unlikely
Water Environment	Migration through ground into surface water or groundwater	Low likelihood	Low likelihood	Unlikely	Low likelihood
Flora	Vegetation on site growing on contaminated soil	Unlikely	Low likelihood	Unlikely	Unlikely
Building Materials	Contact with contaminated soil	Low likelihood	Low likelihood	N/A	Unlikely

Key to Table 1 **Estimated Potential for Linkage with Contaminant Source**	**Definition**
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.
N/A	Not Applicable

SITE WORK

The site work consisted of a cable percussive borehole (BH1) located in the front garden and a window sampled borehole (WS2) sunk within the rear garden. The site work was conducted on 18th and 19th October 2011 at the positions shown on the borehole location plan to the rear of this report.

The borehole records give the descriptions and depths of the various strata encountered, details of all samples taken, installation details and the groundwater conditions observed during boring, excavation, on completion and within the standpipe and piezometer installations.

Ground levels at each exploratory position have been interpolated from arbitrary datum spot heights provided on a plan (Drawing No. 6048/01/A) provided by the engineer.

Public utility service drawings were sourced and consulted prior to determining the exploratory hole positions. Copies of these records were included in report C12520. Prior to excavation, a service scan was made at each position using a CAT (Cable Avoidance Tool) to check for the absence of detectable buried services that may otherwise have been damaged by the investigation. An inspection pit was hand excavated to 1.20m at both borehole positions in order to confirm the absence of any buried services.

Cable Percussive Borehole

A dismantleable cable percussive boring rig was used on 18th and 19th October 2011, to sink a borehole within the front lawn. The rig was assembled on plastic sheeting and boards to protect the garden. The borehole was then advanced through the base of the inspection pit using weighted claycutter boring tools suspended from a light winch cable to 22.00m depth and working within 150mm diameter steel casing inserted to 2.20m depth.

Representative small disturbed and bulk samples of soil were taken from the boring tools at regular intervals throughout the depth of the borehole.

Undisturbed samples 100mm in diameter were taken in clay at regular intervals within aluminium tubes. The ends of the samples were sealed to maintain them in as representative condition as possible during transit to the laboratory.

Standard penetration tests were undertaken in clay between the undisturbed samples in order to give an indication of the in-situ strength of the material. The test was made by driving a split spoon sampler, 50mm diameter into the soil at the base of the borehole by means of an automatic trip hammer weighing 63.50kg falling freely through 760mm. The penetration resistance was determined as the number of blows required to drive the tool the final 300mm of a total penetration of 450mm into the soil ahead of the borehole. The results have been tabulated following the borehole records and the SPT 'N' values are presented on the borehole record and have been plotted against depth in Figure 1.

On completion of BH1, a de-aired ceramic piezometer tip was installed within a pea gravel surround at 7.30m depth. The borehole was backfilled with arisings from the base of the hole to 9.00m where a bentonite seal was placed to 7.50m depth. The gravel pack surrounding the piezometer extended from 7.50m to 6.50m depth, above which a 1.00m thick bentonite seal was placed. The 19mm plain piezometer pipe extended from the porous tip to ground level, where another 1.00m bentonite seal was installed, below which the annulus was backfilled with arisings. A gas tap was fitted to the top of the pipe and a protective stopcock cover was concreted in place at ground level above the installation.

Window Sample Borehole

Borehole WS2, sunk to a depth of 10.45m by a dismantleable window sampling rig capable of accessing the rear garden using the narrow side pathway and gates.

The borehole was formed by a hydraulically operated super heavy dynamic probing rig. The window sampling equipment consisted of drive-in sample tubes of specially constructed and strengthened steel, lined with a plastic core-liner. The barrels were initially of 87mm internal diameter and were reduced in diameter with successive barrels with increasing depth. Upon extraction, a continuous 'undisturbed' profile of the soil was obtained within the

plastic liners. The plastic liners were subsequently split by a geotechnical engineer who sub-sampled them, conducted hand shear vane or pocket penetrometer tests, with the remaining samples re-sealed within the plastic liners.

Standard penetration tests (SPT) were undertaken between liners at approximately 1.00m intervals in order to give an indication of the in-situ strength of the material. The test was made by driving a 50mm diameter split spoon sampler attachment into the soil at the base of the borehole by means of an automatic trip hammer weighing 63.50kg falling freely through 750mm. The penetration resistance was determined as the distance driven for 50 blows into the soil ahead of the borehole.

On completion of borehole WS2 a 50mm diameter gas and groundwater monitoring standpipe was installed to 5.00m depth, where a 1.00m thick bentonite seal had been placed to 6.00m. The pipe was perforated to within 1.00m of ground level and the annulus backfilled with pea gravel. A bentonite seal was placed from ground surface to 1.00m depth and a gas tap fitted. A protective stopcock cover was concreted in place at ground level above the installation.

Return Monitoring Visits

Return visits were made to monitor the gas and groundwater levels within the installations on 27th October and 24th November 2011. The results are provided following the borehole records. The gas concentrations were measured using a Gaslog GFM430 instrument.

During the first visit a groundwater sample was taken from the installation in WS2 and sealed in glassware. Groundwater was not extracted from the small diameter installation in BH1.

LABORATORY WORK

The samples were inspected in the laboratory and assessments of the soil characteristics have been taken into account during preparation of the borehole records. The soil descriptions have been made in accordance with BS5930:1999 including amendment No.2 (2010). Geotechnical laboratory testing was scheduled, approved by Geotechnical Consulting Group, and tested in accordance with BS1377:1990.

The moisture contents of selected soil samples were determined. The results have been plotted against depth in Figure 2.

The particle density of selected samples was determined using a pynknometer.

The index properties of selected soil samples were determined as a guide to soil classification and behaviour. The liquid limit was determined by a cone penetrometer.

Test specimens were prepared at full diameter from selected undisturbed samples. Immediate undrained triaxial compression tests were undertaken on the samples under a single confining cell pressure. The moisture content and bulk density of each specimen was also determined. The values of apparent shear strength have been plotted together with the hand shear vane test results from WS2, against depth in Figure 3.

Selected samples of soil and groundwater were analysed to determine the concentration of soluble sulphates. The pH values were also determined. The acid soluble sulphate content and total sulphur concentrations of selected samples of clay were determined. The chloride and nitrate contents of a sample of groundwater were also determined.

An indication of the settlement characteristics of selected undisturbed samples of London Clay was obtained from the consolidation apparatus or oedometer. Each test was performed on a 75mm diameter specimen, approximately 19mm thick, contained in a steel ring. The specimen was saturated and the swelling pressure balanced prior to applying a constant load with drainage at both ends. When primary compression was complete, the load was increased and this repeated for three increments of load. The sample was then unloaded. The rate and total amount of consolidation were continually monitored using a computer controlled E.L.E.

Datasystem 7 Unit. The result was plotted and analysed by the computer for each increment of load to obtain the coefficients of compressibility (m_v), and of consolidation (c_v), which govern the amount and rate of settlement, respectively.

Chemical analysis of three soil samples recovered from the exploratory holes was undertaken, by an independent laboratory, primarily for characterisation purposes. The samples were tested for a suite encompassing a wide range of potential contaminants outlined by the Environment Agency (EA) and National House Building Council (NHBC) document R&D 66; 2008 'Guidance for the Safe Development of Housing on Land Affected by Contamination'. In addition, the percentage Soil Organic Matter (SOM) and hexavalent chromium content of the samples was also determined.

A sample of made ground was tested for the full Waste Acceptance Criteria (WAC) CEN leachate tests.

GROUND ENGINEERING LIMITED

C. M. J. EBELING
M.Sc.(Eng.), M.A.E.G.,
C.Geol., F.G.S.,
Director

S. J. FLEMING
M.Sc., M.C.S.M.,
C.Geol., F.G.S.
Director

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: 11 WADHAM GARDENS, LONDON NW3

BOREHOLE
BH1

Date: 18/10/11 to 19/10/11

Hole Size: 150mm dia to 22.00m

Ground Level: 49.40m. S.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	S.D. Level m
Depth m	Type	Blows						
0.10	D1				MADE GROUND - Firm, friable, dark brown/grey slightly gravelly, sandy CLAY. Gravel consisting of angular to sub-angular flint, concrete, brick and ash fragments.		0.20	49.20
0.20-0.50	B1							
0.50-1.00	B2				MADE GROUND - Firm, brown, slightly sandy, slightly gravelly CLAY. Gravel consisting of angular to sub-rounded flint, concrete, brick, coal and ash fragments.		1.00	48.40
1.20	D2				Firm, medium strength, orange brown/light grey mottled slightly gravelly, silty CLAY. Gravel consisting of fine and medium, angular to rounded flint.			
1.20-1.65	U1	25						
1.60	D3							
1.65-2.05	B3							
1.80-2.10	S	N8			(HEAD DEPOSIT)			
2.05	D4		1.50 ▼s					
2.10-2.55	U2	28						
2.55-3.00	B4							
2.55	D5		2.20				2.80	46.60
2.70-3.00	S	N13						
3.00	D6		2.20		Stiff, fissured, medium strength, brown/orange brown/grey mottled CLAY with occasional decayed root traces to 5.00m. Occasional fine gravel size selenite below 4.00m.			
3.00-3.45	U3	35						
3.45-4.00	B5							
3.45	D7		2.20					
3.60-3.90	S	N12						
3.90	D8		2.20					
4.00-4.45	U4	38						
4.45-5.00	B6							
4.45	D9		2.20					
4.60-4.90	S	N15						
4.90	D10		2.20		...Becoming high strength below 5.00m depth.			
5.00-5.45	U5	38	▼s					
5.45	D11							
5.60-5.90	S	N16	2.20					
5.90	D12		2.20		(WEATHERED LONDON CLAY)			
6.00-6.45	U6	42						
6.45	D13							
6.60-6.90	S	N17	2.20					
6.90	D14		1 ▼				7.00	42.40
7.10	D15		2.20 ▽		Weak, light brown calcareous SILTSTONE. (WEATHERED LONDON CLAY)		7.10	42.30
7.10-7.55	U7	35						
7.55	D16				Stiff, very closely fissured, high strength, brown CLAY with occasional fine and medium gravel size selenite. Occasional orange brown stained fissures and orange brown silt partings below 8.50m. (WEATHERED LONDON CLAY)			
7.70-8.00	S	N16	2.00					
8.00	D17		2.20					
8.00-8.45	U8	40						
8.45-9.00	B7							
8.45	D18		2.20					
8.60-8.90	S	N16						
9.10-9.55	U9	40	2.20	BENEATH INSTALLATION			9.50	39.90
9.55-10.00	B8			BENEATH INSTALLATION	Stiff, closely fissured, high strength, dark brown/ dark grey CLAY with rare fine gravel size shell fragments. (LONDON CLAY)			
9.55	D19		2.20					
9.70-10.00	S	N17					10.00	39.40

REMARKS
1. Excavating a pit from 0.00m to 1.20m for 1 hour
2. Fibrous live roots observed to 1.60m depth
3. Borehole cased to 2.20m depth
4. Piezometer installed at 7.30m depth

Project No 12520

Scale 1:50 | Page 1/3

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	Depth m Struck	Rose to	Rate	Cased	Sealed
1	7.10	7.00	slow	2.20	not

Groundwater Observations

Date	Depth m Hole	Casing	Water
18/10/11	10.00	2.20	dry
19/10/11	10.00	2.20	10.00
19/10/11	22.00	2.20	dry
19/10/11	22.00	0.00	dry
27/10/11	7.30	7.00	5.11

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: 11 WADHAM GARDENS, LONDON NW3

BOREHOLE
BH1

Date: 18/10/11 to 19/10/11

Hole Size: 150mm dia to 22.00m

Ground Level: 49.40m. S.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	S.D. Level m
Depth m	Type	Blows						
				BENEATH INSTALLATION	Stiff, closely fissured, high strength, dark brown/ dark grey CLAY with rare fine gravel size shell fragments. Rare light grey silt partings at 11.80m.		10.00	39.40
10.70-11.15	U10	45	2.20	BENEATH INSTALLATION				
11.15	D20			BENEATH INSTALLATION				
11.65-11.95	S	N20	2.20	BENEATH INSTALLATION				
11.95	D21			BENEATH INSTALLATION				
12.50-12.95	U11	43	2.20	BENEATH INSTALLATION				
12.95	D22			BENEATH INSTALLATION				
13.65-13.95	S	N21	2.20	BENEATH INSTALLATION				
13.95	D23			BENEATH INSTALLATION				
14.50-14.95	U12	47	2.20	BENEATH INSTALLATION				
14.95	D24			BENEATH INSTALLATION	...Becoming very stiff, closely fissured and high strength below 15.00m.			
15.65-15.95	S	N25	2.20	BENEATH INSTALLATION				
15.95	D25			BENEATH INSTALLATION	(LONDON CLAY)			
16.50-16.95	U13	58	2.20	BENEATH INSTALLATION				
16.95	D26			BENEATH INSTALLATION			17.50	31.90
17.65-17.95	S	N29	2.20	BENEATH INSTALLATION	Very stiff, very closely fissured, high strength, dark brown/dark grey CLAY with occasional grey silt partings up to 2mm thick. Rare finely comminuted shell fragments.			
17.95	D27			BENEATH INSTALLATION				
18.50-18.95	U14	60	2.20	BENEATH INSTALLATION				
18.95	D28			BENEATH INSTALLATION	(LONDON CLAY)			
19.65-19.95	S	N31	2.20	BENEATH INSTALLATION				
19.95	D29			BENEATH INSTALLATION			20.00	29.40

REMARKS

Project No 12520

Scale 1:50 | Page 2/3

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	Depth m Rose to	Rate	Cased	Sealed

Groundwater Observations

Date	Depth m Hole	Casing	Water
24/11/11	7.30	7.00	2.20

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: 11 WADHAM GARDENS, LONDON NW3

Date: 18/10/11 to 19/10/11

Hole Size: 150mm dia to 22.00m

BOREHOLE BH1

Ground Level: 49.40m. S.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	S.D. Level m
Depth m	Type	Blows						
				BENEATH INSTALLATION	Very stiff, very closely fissured, high strength, dark brown/dark grey CLAY with occasional grey silt partings up to 4mm thick.		20.00	29.40
20.50-20.95	U15	62	2.20	BENEATH INSTALLATION				
20.95	D30			BENEATH INSTALLATION	(LONDON CLAY)			
21.65-21.95	S	N38	2.20	BENEATH INSTALLATION				
22.00	D31				Borehole completed at 22.00m depth		22.00	27.40

REMARKS

Project No 12520

Scale 1:50 | Page 3/3

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						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: **11 WADHAM GARDENS, LONDON NW3**

WINDOW SAMPLE WS2

Date: 19/10/11

Hole Size: 87mm dia to 3.00m
77mm dia to 5.00m
57mm dia to 10.45m

Ground Level: 49.90m. S.D.

Samples and in-situ Tests			(Date) Water	Inst.	Description of Strata	Legend	Depth m	S.D. Level m
Depth m	Type	Result						
0.20	D1				MADE GROUND - Soft, dark brown, slightly gravelly, silty CLAY. Gravel consisting of sub-angular to rounded flint, brick, coal, glass, slate and ash fragments.			
0.34	W1		▼s				0.40	49.50
0.40	D2		▼s		MADE GROUND - Soft brown/orange brown/grey mottled slightly gravelly CLAY. Gravel consisting of sub-angular to sub-rounded flint, brick, concrete, charcoal and ash fragments.			
0.60	D3						0.70	49.20
0.90	D4							
1.20	D5		▼1		Soft, becoming firm below 1.50m, low becoming medium strength, brown/orange brown mottled CLAY with rare fine sub-angular flint gravel and calcareous concretions. (HEAD DEPOSIT)			
1.20-2.00	U1							
1.25	V1	(34)						
1.35-1.65	S	N6						
1.30	D6							
1.70	V2	(58)					1.80	48.10
1.90	D7							
2.00-3.00	U2				Firm, medium strength, brown/orange brown CLAY with occasional sand size selenite. (WEATHERED LONDON CLAY)			
2.00	D8		1.00					
2.15-2.45	S	N7						
2.25	V3	(58)						
2.90	D9						3.00	46.90
2.90	V4	(60)			Firm, fissured, medium strength, brown/orange brown/ grey mottled CLAY with occasional fine gravel size selenite. Black decayed root traces to 3.50m.			
3.00-4.00	U3		1.00					
3.00	D10							
3.15-3.45	S	N9						
3.50	V5	(72)			...Becoming stiff and high strength below 3.80m depth.			
3.90	D11							
3.90	V6	(81)			(WEATHERED LONDON CLAY)			
4.00-5.00	U4		1.00				4.30	45.60
4.00	D12							
4.15-4.45	S	N12			Stiff, closely fissured, high strength, brown CLAY with occasional light brown silt partings and fine and medium gravel size selenite.			
4.90	D13							
4.90	V7	(96)						
5.00-6.00	U5		1.00					
5.00	D14							
5.15-5.45	S	N14						
5.60	V8	(101)						
6.00	D15			BENEATH INSTALLATION				
6.00-7.00	U6							
6.15-6.45	S	N16	1.00					
6.70	D16							
6.70	V9	(98)						
7.00	D17				Orange brown stained fissures below 7.00m depth.			
7.00-8.00	U7							
7.15-7.45	S	N15	1.00					
7.90	V10	(102)			(WEATHERED LONDON CLAY)			
8.00	D18							
8.00-9.00	U8		1.00					
8.15-8.45	S	N13						
8.75	P1	(115)						
9.00	D19							
9.00-10.00	U9							
9.15-9.45	S	N17	1.00					
9.50	D20						9.50	40.40
					Stiff, closely fissured, dark brown/dark grey CLAY. (LONDON CLAY)			
10.00	D21			BENEATH			10.00	39.90

REMARKS
1. Starter pit excavated from GL to 1.20m depth
2. No live roots observed
3. Hole sides stable
4. Borehole cased to 1.00m depth
5. Gas monitoring standpipe installed to 5.00m depth

Project No 12520

Scale 1:50

Page 1/2

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
▽ Water Strike
▼ Depth to Water on completion
J - Jar Sample
M - Mackintosh Probe
V - Vane Shear Test Cohesion ( ) kPa
P( ) - Hand Penetrometer Cohesion ( ) kPa
▽s Standpipe Level

Groundwater Strikes

No	Depth m Struck	Rose to	Rate	Cased	Sealed
1	1.20	1.20	seepage		

Groundwater Observations

Date	Depth m Hole	Casing	Water
19/10/11	10.00	1.00	9.90
19/10/11	10.00	0.00	9.80
27/10/11	5.00	1.50	0.34
24/11/11	5.00	1.50	0.51

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: 11 WADHAM GARDENS, LONDON NW3

WINDOW SAMPLE
WS2

Date: 19/10/11

Hole Size: 87mm dia to 3.00m
77mm dia to 5.00m
57mm dia to 10.45m

Ground Level: 49.90m. S.D.

Samples and in-situ Tests			(Date) Water	Inst.	Description of Strata	Legend	Depth m	S.D. Level m
Depth m	Type	Result						
10.15-10.45	S	N30	1.00	BENEATH INSTALLATION	Stiff, closely fissured, dark brown/dark grey CLAY. (LONDON CLAY)		10.00	39.90
					Borehole completed at 10.45m depth		10.45	39.45

REMARKS

Project No 12520

Scale 1:50

Page 2/2

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
▽ Water Strike
▼ Depth to Water on completion
J - Jar Sample
M - Mackintosh Probe
V - Vane Shear Test Cohesion ( ) kPa
P( ) - Hand Penetrometer Cohesion ( ) kPa
▽s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water

Borehole Number	Depth (m)	Casing Depth (m)	Depth to Water (m)	Type of Test *	Seating Drive: Blows/Penetration (mm)	Test Drive: 300mm Blows for each successive 75 mm Penetration				N Value	Extrapolated Value
BH1	1.65 - 2.10			S	2/150	2	2	2	2	8	
	2.55 - 3.00	2.20		S	3/150	2	3	4	4	13	
	3.45 - 3.90	2.20		S	3/150	2	3	3	4	12	
	4.45 - 4.90	2.20		S	3/150	2	4	4	5	15	
	5.45 - 5.90	2.20		S	3/150	3	4	4	5	16	
	6.45 - 6.90	2.20		S	3/150	3	4	5	5	17	
	7.55 - 8.00	2.00		S	3/150	3	4	4	5	16	
	8.45 - 8.90	2.20		S	3/150	3	4	4	5	16	
	9.55 - 10.00	2.20		S	3/150	3	4	5	5	17	
	11.50 - 11.95	2.20		S	5/150	4	4	6	6	20	
	13.50 - 13.95	2.20		S	5/150	4	5	6	6	21	
	15.50 - 15.95	2.20		S	7/150	5	6	7	7	25	
	17.50 - 17.95	2.20		S	7/150	5	7	8	9	29	
	19.50 - 19.95	2.20		S	7/150	6	6	9	10	31	
	21.50 - 21.95	2.20		S	7/150	6	9	10	13	38	
WS2	1.20 - 1.65			S	1/150	1	1	2	2	6	
	2.00 - 2.45	1.00		S	3/150	1	2	2	2	7	
	3.00 - 3.45	1.00		S	3/150	2	2	2	3	9	
	4.00 - 4.45	1.00		S	4/150	3	3	3	3	12	
	5.00 - 5.45	1.00		S	5/150	3	3	4	4	14	
	6.00 - 6.45	1.00		S	6/150	3	4	4	5	16	
	7.00 - 7.45	1.00		S	4/150	3	4	4	4	15	
	8.00 - 8.45	1.00		S	4/150	2	3	4	4	13	
	9.00 - 9.45	1.00		S	5/150	4	4	4	5	17	
	10.00 - 10.45	1.00		S	7/150	7	8	7	8	30	

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

* C denotes test using a solid cone
S denotes test using a split barrel sampler

Results of Standard/Cone Penetration Tests

12520

11 WADHAM GARDENS, LONDON NW3

Table No

Gas & Groundwater Monitoring Record

Site: **11 Wadham Gardens, London NW3**

Report Ref: **C12520**

Date	Borehole No.	Methane (% v/v)		Methane LEL (%LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (mbgl)	Depth to Groundwater (mbgl)	Comments
		Peak	Steady	Peak	Steady	Peak	Steady	Min.	Max.					
27/10/2011	BH1	<0.1	<0.1	<0.1	<0.1	0.4	0.1	17.9	20.8	<0.1	999		5.11	
	WS2	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	20.8	21.2	<0.1	999		0.34	
24/11/2011	BH1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	20.2	20.2	<0.1	1026		2.20	
	WS2	<0.1	<0.1	<0.1	<0.1	0.9	0.9	20.3	20.3	<0.1	1026		0.51	

LEL – Lower Explosive Limit

LABORATORY TEST RESULTS

CONTRACT 11 WADHAM GARDENS, LONDON NW3

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
BH1	D2	1.20				22												
	U1	1.20 - 1.65	51	14	37	24	2.08	1.68	Q	122	50	61	0					SOIL CLASSIFICATION = CH 6% retained on 425µm sieve
	D3	1.60				21												
	D4	2.05				27												
	U2	2.10 - 2.55	48	16	32	27	2.13	1.68	Q	128	50	64	0					SOIL CLASSIFICATION = CI 0% retained on 425µm sieve
	D5	2.55				24												
	U3	3.00 - 3.45	73	22	51	28	2.02	1.57	Q	134	60	67	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve Particle Density = 2.75Mg/m3
	B5	3.45 - 4.00													429		7.7	
	U4	4.00 - 4.45	78	26	52	33	1.93	1.46	Q	104	80	52	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve
	U5	5.00 - 5.45	72	24	48	29	1.98	1.54	Q	178	100	89	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve Particle Density = 2.80Mg/m3

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

12520

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

LABORATORY TEST RESULTS

CONTRACT 11 WADHAM GARDENS, LONDON NW3

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
BH1	U6	6.00 - 6.45	73	25	48	31	1.97	1.50	Q	202	120	101	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve
	U7	7.10 - 7.55	74	25	49	29	1.99	1.54	Q	167	145	84	0					SOIL CLASSIFICATION = CV 3% retained on 425µm sieve Particle Density = 2.78Mg/m3
	U8	8.00 - 8.45	79	26	53	31	1.95	1.49	Q	169	160	84	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve
	B6	8.45 - 9.00													2639		7.6	
	U9	9.10 - 9.55	77	26	51	33	1.92	1.44	Q	150	180	75	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve
	U10	10.70 - 11.15	80	26	54	31	1.95	1.49	Q	173	220	86	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve
	U11	12.50 - 12.95	80	28	52	29	1.97	1.53	Q	218	250	109	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve
	U12	14.50 - 14.95	79	30	49	29	2.00	1.56	Q	218	290	109	0					SOIL CLASSIFICATION = CV 0% retained on 425µm sieve

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

12520

LABORATORY TEST RESULTS

CONTRACT 11 WADHAM GARDENS, LONDON NW3

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
BH1	D24	14.95													706		8.1	
	U13	16.50 - 16.95	78	27	51	31	2.00	1.53	Q	242	330	121	0					SOIL CLASSIFICATION = CV 0% retained on 425μm sieve
	U14	18.50 - 18.95	70	25	45	24	2.13	1.73	Q	292	370	146	0					SOIL CLASSIFICATION = CH/CV 0% retained on 425μm sieve
	D29	19.95													536		8.3	
	U15	20.50 - 20.95	70	26	44	26	1.97	1.56	Q	265	410	132	0					SOIL CLASSIFICATION = CH/CV 0% retained on 425μm sieve

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

12520

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

LABORATORY TEST RESULTS

CONTRACT 11 WADHAM GARDENS, LONDON NW3

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
WS2	D4	0.90				38												
	D5	1.20				37												
	D6	1.30													106		8.0	
	D7	1.90	74	26	48	33												SOIL CLASSIFICATION = CV 0% retained on 425μm sieve
	D8	2.00				33												
	D9	2.90	78	28	50	35												SOIL CLASSIFICATION = CV 0% retained on 425μm sieve
	D10	3.00				34												
	D11	3.90	79	29	50	34												SOIL CLASSIFICATION = CV 0% retained on 425μm sieve
	D13	4.90	71	26	45	31												SOIL CLASSIFICATION = CV 0% retained on 425μm sieve
	D16	6.70	77	28	49										2349		7.7	SOIL CLASSIFICATION = CV 0% retained on 425μm sieve
	D20	9.50													2066		7.7	

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

12520

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

Enverity

Newark Road Peterborough

t:01733 555525 f:01733 315280

e: peterborough@enverity.co.uk

TEST CERTIFICATE

One-Dimensional Consolidation Properties

(Tested in accordance with BS1377 : Part 5 1990)

Client:	Ground Engineering Ltd	Certificate Number:	PL3452-1-7/731
Client Address:	Newark Road	Client Reference Number:	C12520
	Peterborough	Date Sampled:	Unknown
	Cambridgeshire	Date Received:	27.10.2011
Postcode:	PE1 5UA	Date Tested:	02.11.2011
Contact:	Chris Ebeling	Sampling Certificate No:	N/A
Site Name:	11 Wadham Gardens	Certificate of Sampling:	N/A
Site Address:	London NW3	Sampled By:	Client

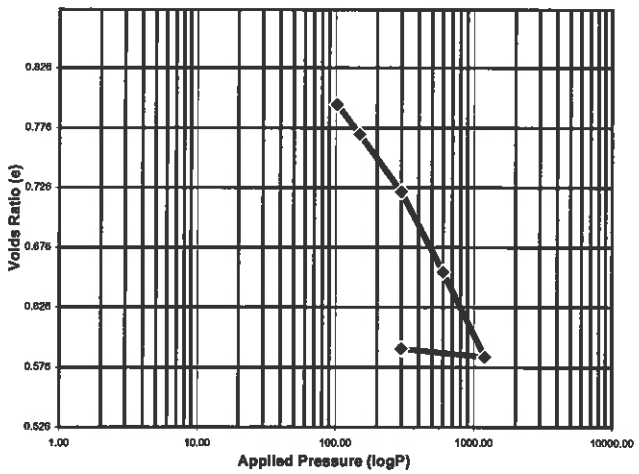
Test Details

Location:	BH1	
Sample Ref:	U3	
Sample Description:	Stiff brown CLAY	
Particle Density (Mg/m^3):	2.75	Measured
Mean Lab Temp. (°C):	22	
Variations from Standard:	None	
Lab Reference:	PL3452-1-7	
Depth (m):	3.00 m	

Specimen Details

	INITIAL	FINAL
Height (mm):	18.48	16.38
Bulk Density (Mg/m^3):	1.95	2.15
Moisture Content (%):	27	24
Dry Density (Mg/m^3):	1.53	1.73
Voids Ratio:	0.795	0.591
Degree of Saturation (%):	94.0	112.9
Diameter (mm):	74.96	N/A
Swelling Pressure (kPa):	102	N/A
Method of time fitting used:	Log Time	N/A

Voids Ratio against logarithm of Applied Pressure



Applied Pressure (kPa)	Coefficient of Compressibility m_v (m^2/MN)	Coefficient of Consolidation c_v (m^2/year)
102		
150	0.29	0.15
300	0.18	0.20
600	0.13	0.19
1200	0.07	0.20
300	0.01	---

Comments:

Approved Signatory: [x] M.Hartnup - Laboratory Manager
[ ] G.Meadows - Team Leader

Signed:

for and on behalf of Enverity Ltd

Date Reported: 15/11/2011

Registered in England and Wales
Reg Number 6930692
Registered Office: Diasma
Willie Snaith Rd
Newmarket CB8 7SQ

Enverity

Newark Road Peterborough

t:01733 555525 f:01733 315280

e: peterborough@enverity.co.uk

TEST CERTIFICATE

One-Dimensional Consolidation Properties

(Tested in accordance with BS1377 : Part 5 1990)

Client:	Ground Engineering Ltd	Certificate Number:	PL3452-1-10/731
Client Address:	Newark Road	Client Reference Number:	C12520
	Peterborough	Date Sampled:	Unknown
	Cambridgeshire	Date Received:	27.10.2011
Postcode:	PE1 5UA	Date Tested:	02.11.2011
Contact:	Chris Ebeling	Sampling Certificate No:	N/A
Site Name:	11 Wadham Gardens	Certificate of Sampling:	N/A
Site Address:	London NW3	Sampled By:	Client

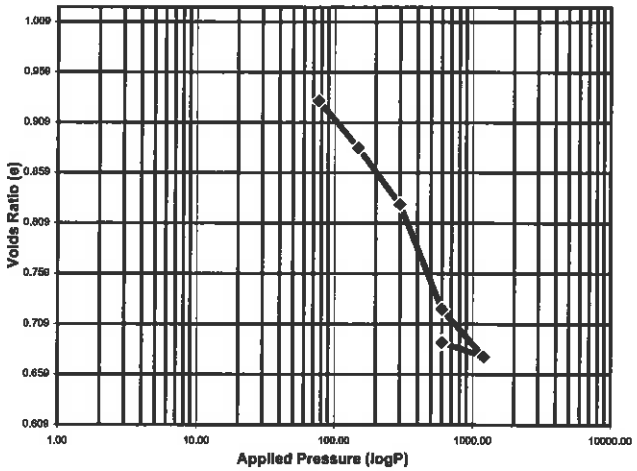
Test Details

Location:	BH1	
Sample Ref:	U5	
Sample Description:	Stiff brown CLAY	
Particle Density (Mg/m^3):	2.8	Measured
Mean Lab Temp. (°C):	22	
Variations from Standard:	None	
Lab Reference:	PL3452-1-10	
Depth (m):	5.00 m	

Specimen Details

	INITIAL	FINAL
Height (mm):	18.93	16.58
Bulk Density (Mg/m^3):	1.89	2.12
Moisture Content (%):	30	28
Dry Density (Mg/m^3):	1.45	1.66
Voids Ratio:	0.931	0.691
Degree of Saturation (%):	91.2	114.0
Diameter (mm):	74.99	N/A
Swelling Pressure (kPa):	77	N/A
Method of time fitting used:	Log Time	N/A

Voids Ratio against logarithm of Applied Pressure



Applied Pressure (kPa)	Coefficient of Compressibility m_v (m^2/MN)	Coefficient of Consolidation c_v (m^2/year)
77		
150	0.33	0.61
300	0.20	0.56
600	0.19	0.40
1200	0.05	0.44
600	0.01	—

Comments:

Approved Signatory: [x] M.Hartnup - Laboratory Manager
[ ] G.Meadows - Team Leader

Signed:

for and on behalf of Enverity Ltd

Date Reported: 15/11/2011

Registered in England and Wales
Reg Number 6930692
Registered Office: Diasma
Willie Snaith Rd
Newmarket CB8 7SQ

Enverity

Newark Road Peterborough

t:01733 555525 f:01733 315280

e: peterborough@enverity.co.uk

TEST CERTIFICATE

One-Dimensional Consolidation Properties

(Tested in accordance with BS1377 : Part 5 1990)

Client:	Ground Engineering Ltd	Certificate Number:	PL3452-1-12/731
Client Address:	Newark Road	Client Reference Number:	C12520
	Peterborough	Date Sampled:	Unknown
	Cambridgeshire	Date Received:	27.10.2011
Postcode:	PE1 5UA	Date Tested:	02.11.2011
Contact:	Chris Ebeling	Sampling Certificate No:	N/A
Site Name:	11 Wadham Gardens	Certificate of Sampling:	N/A
Site Address:	London NW3	Sampled By:	Client

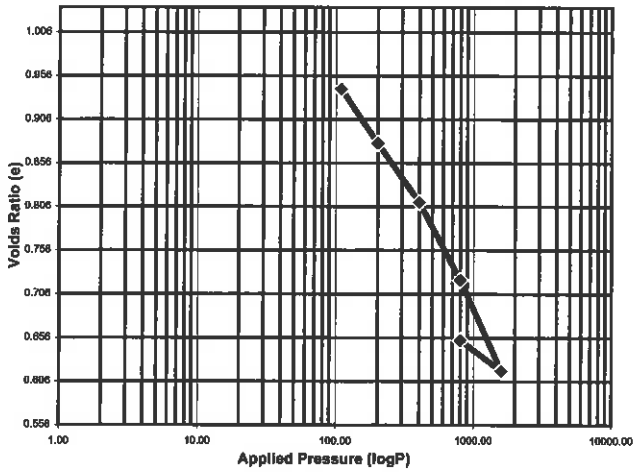
Test Details

Location:	BH1	
Sample Ref:	U7	
Sample Description:	Stiff brown CLAY	
Particle Density (Mg/m^3):	2.78	Measured
Mean Lab Temp. (^oC):	22	
Variations from Standard:	None	
Lab Reference:	PL3452-1-12	
Depth (m):	7.10 m	

Specimen Details

	INITIAL	FINAL
Height (mm):	18.78	15.99
Bulk Density (Mg/m^3):	1.89	2.18
Moisture Content (%):	32	29
Dry Density (Mg/m^3):	1.43	1.68
Voids Ratio:	0.941	0.653
Degree of Saturation (%):	95.1	125.6
Diameter (mm):	74.95	N/A
Swelling Pressure (kPa):	109	N/A
Method of time fitting used:	Log Time	N/A

Voids Ratio against logarithm of Applied Pressure



Applied Pressure (kPa)	Coefficient of Compressibility m_v (m^2/MN)	Coefficient of Consolidation c_v (m^2/year)
109		
200	0.36	0.40
400	0.18	0.45
800	0.12	0.40
1600	0.08	0.45
800	0.03	----

Comments:

Approved Signatory: [x] M.Hartnup - Laboratory Manager
[ ] G.Meadows - Team Leader

Signed:

for and on behalf of Enverity Ltd

Date Reported: 15/11/2011

Registered in England and Wales
Reg Number 6930692
Registered Office: Diasma
Willie Snaith Rd
Newmarket CB8 7SQ

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling
07 November 2011

Dear Chris Ebeling

Test Report Number **150339**
Your Project Reference **11 Wadham Gardens, London NW3 - C12520**

Please find enclosed the results of analysis for the samples received 28 October 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

KT Jones

Authorised Signatory

☐ Darrell Hall	Director
☐ Phil Hellier	Director
☑ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 28 October 2011

11 Wadham Gardens, London NW3 - C12520

Chemtest
The right chemistry to deliver results

Report Date
07 November 2011

Login Batch No					150339							
Chemtest LIMS ID					AG63710	AG63711	AG63712	AG63713	AG63714	AG63715	AG63716	AG63717
Sample ID					BH1	BH1	BH1	BH1	BH1	WS2	WS2	WS2
Sample No					B1	B2	B5	B6	D24	D16	D1	D20
Sampling Date					27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011
Depth					0.2m - 0.5m	0.5m - 1m	3.45m - 4m	8.45m - 9m	14.95m	6.7m	0.2m	9.5m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*								
2010	pH			M	8.2	8.0					7.3	
2175	Sulfur (total TRL report 447)		%	M			0.03	0.23	0.46	0.16		0.32
2300	Cyanide (free)	57125	mg kg^{-1}	M	<0.50	<0.50					<0.50	
	Cyanide (total)	57125	mg kg^{-1}	M	<0.50	<0.50					<0.50	
2325	Sulfide	18496258	mg kg^{-1}	M	1.7	1.1	3.8	1.1	1.1	1.5	1.3	6.5
2625	Organic matter		%	M	1.7	1.5	0.76	1.3	1.3	1.2	7.2	1.1
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M	<0.4	<0.4					<0.4	
	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.02	0.01					0.05	
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N	<0.5	<0.5					<0.5	
2430	Sulfate (total BS1377 HCl extract)	14808798	%				0.06	0.28	0.11	0.84		0.88
2450	Arsenic	7440382	mg kg^{-1}	M	17	10					20	
	Cadmium	7440439	mg kg^{-1}	M	<0.10	<0.10					<0.10	
	Chromium	7440473	mg kg^{-1}	M	54	62					38	
	Copper	7440508	mg kg^{-1}	M	33	23					69	
	Mercury	7439976	mg kg^{-1}	M	0.23	<0.10					0.62	
	Nickel	7440020	mg kg^{-1}	M	30	37					31	
	Lead	7439921	mg kg^{-1}	M	160	41					660	
	Selenium	7782492	mg kg^{-1}	M	<0.20	<0.20					<0.20	
	Zinc	7440666	mg kg^{-1}	M	75	61					200	
2700	Naphthalene	91203	mg kg^{-1}	M	0.56	0.39					0.46	
	Acenaphthylene	208968	mg kg^{-1}	M	< 0.1	< 0.1					< 0.1	
	Acenaphthene	83329	mg kg^{-1}	M	0.33	0.15					0.13	
	Fluorene	86737	mg kg^{-1}	M	0.2	< 0.1					< 0.1	
	Phenanthrene	85018	mg kg^{-1}	M	2.2	0.56					0.53	
	Anthracene	120127	mg kg^{-1}	M	0.4	< 0.1					< 0.1	
	Fluoranthene	206440	mg kg^{-1}	M	2.6	0.52					1.3	
	Pyrene	129000	mg kg^{-1}	M	2.3	0.46					1.1	

All tests undertaken between 31/10/2011 and 03/11/2011

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 28 October 2011

11 Wadham Gardens, London NW3 - C12520

Chemtest
The right chemistry to deliver results

Report Date
07 November 2011

Login Batch No					150339	
Chemtest LIMS ID					AG63718	AG63719
Sample ID					WS2	BH1
Sample No					D6	D29
Sampling Date					27/10/2011	27/10/2011
Depth					1.3m	19.95m
Matrix					*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓			
2010	pH			M		
2175	Sulfur (total TRL report 447)		%	M	0.02	0.46
2300	Cyanide (free)	57125	mg kg^{-1}	M		
	Cyanide (total)	57125	mg kg^{-1}	M		
2325	Sulfide	18496258	mg kg^{-1}	M	1.8	1.9
2625	Organic matter		%	M	1.2	1.6
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M		
	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M		
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N		
2430	Sulfate (total BS1377 HCl extract)	14808798	%		0.07	0.08
2450	Arsenic	7440382	mg kg^{-1}	M		
	Cadmium	7440439	mg kg^{-1}	M		
	Chromium	7440473	mg kg^{-1}	M		
	Copper	7440508	mg kg^{-1}	M		
	Mercury	7439976	mg kg^{-1}	M		
	Nickel	7440020	mg kg^{-1}	M		
	Lead	7439921	mg kg^{-1}	M		
	Selenium	7782492	mg kg^{-1}	M		
	Zinc	7440666	mg kg^{-1}	M		
2700	Naphthalene	91203	mg kg^{-1}	M		
	Acenaphthylene	208968	mg kg^{-1}	M		
	Acenaphthene	83329	mg kg^{-1}	M		
	Fluorene	86737	mg kg^{-1}	M		
	Phenanthrene	85018	mg kg^{-1}	M		
	Anthracene	120127	mg kg^{-1}	M		
	Fluoranthene	206440	mg kg^{-1}	M		
	Pyrene	129000	mg kg^{-1}	M		

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 28 October 2011

11 Wadham Gardens, London NW3 - C12520

Report Date
07 November 2011

					150339							
					AG63710	AG63711	AG63712	AG63713	AG63714	AG63715	AG63716	AG63717
					BH1	BH1	BH1	BH1	BH1	WS2	WS2	WS2
					B1	B2	B5	B6	D24	D16	D1	D20
					27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011	27/10/2011
					0.2m - 0.5m	0.5m - 1m	3.45m - 4m	8.45m - 9m	14.95m	6.7m	0.2m	9.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2700	Benzo[a]anthracene	56553	mg kg^{-1}	M	1.1	0.17					0.72	
	Chrysene	218019	mg kg^{-1}	M	1.1	0.18					0.81	
	Benzo[b]fluoranthene	205992	mg kg^{-1}	M	1.2	< 0.1					0.88	
	Benzo[k]fluoranthene	207089	mg kg^{-1}	M	0.79	< 0.1					0.54	
	Benzo[a]pyrene	50328	mg kg^{-1}	M	1.6	< 0.1					3.6	
	Dibenzo[a,h]anthracene	53703	mg kg^{-1}	M	< 0.1	< 0.1					< 0.1	
	Indeno[1,2,3-cd]pyrene	193395	mg kg^{-1}	M	0.81	< 0.1					0.66	
	Benzo[g,h,i]perylene	191242	mg kg^{-1}	M	0.66	< 0.1					0.49	
	Total (of 16) PAHs		mg kg^{-1}	M	16	2.4					11	
2920	Phenols (total)		mg kg^{-1}	N	<0.3	<0.3					<0.3	

All tests undertaken between 31/10/2011 and 03/11/2011

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 28 October 2011

11 Wadham Gardens, London NW3 - C12520

Chemtest
The right chemistry to deliver results

Report Date
07 November 2011

					150339	
					AG63718	AG63719
					WS2	BH1
					D6	D29
					27/10/2011	27/10/2011
					1.3m	19.95m
					SOIL	*SOIL*
2700	Benzo[a]anthracene	56553	mg kg^{-1}	M		
	Chrysene	218019	mg kg^{-1}	M		
	Benzo[b]fluoranthene	205992	mg kg^{-1}	M		
	Benzo[k]fluoranthene	207089	mg kg^{-1}	M		
	Benzo[a]pyrene	50328	mg kg^{-1}	M		
	Dibenzo[a,h]anthracene	53703	mg kg^{-1}	M		
	Indeno[1,2,3-cd]pyrene	193395	mg kg^{-1}	M		
	Benzo[g,h,i]perylene	191242	mg kg^{-1}	M		
	Total (of 16) PAHs		mg kg^{-1}	M		
2920	Phenols (total)		mg kg^{-1}	N		

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO C Ebeling
18 November 2011

Dear C Ebeling

Test Report Number **160405**

Your Project Reference **11 Wadham Gardens, London NW3 - C12520**

Please find enclosed the results of analysis for the samples received 10 November 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

- ☐ Darrell Hall — Director
- ☐ Phil Hellier — Director
- ☐ Keith Jones — Technical Manager
- ☐ John Crawford — Quality Manager
- ☐ Malcolm Avis — Director

UKAS TESTING 2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO C Ebeling

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 10 November 2011

11 Wadham Gardens, London NW3 - C12520

Chemtest
The right chemistry to deliver results

Report Date
18 November 2011

Login Batch No					160405
Chemtest LIMS ID					AG68635
Sample ID					WS2
Sample No					W1
Sampling Date					07/11/2011
Depth					0.34m
Matrix					*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓		
1010	pH	PH		U	7.7
1220	Chloride	16887006	mg l-1	U	59
	Nitrate	14797558	mg l-1	U	100
1220	Sulfate	14808798	mg l-1	U	200

All tests undertaken between 17/11/2011 and 18/11/2011

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling
08 November 2011

Dear Chris Ebeling

Test Report Number **150340**
Your Project Reference **11 Wadham Gardens, London NW3 - C12520**

Please find enclosed the results of analysis for the samples received 28 October 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely,

Authorised Signatory

☐ Darrell Hall	Director
☐ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Chemtest

LABORATORY TEST REPORT

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Chris Ebeling

Result of analysis of 2 samples recieved 28 October 2011

11 Wadham Gardens, London NW3 - C12520

Report Date 8 November 2011

Log Batch No	**150340**
Customer LIMS ID	AG63721
Sample ID	WS2
Sample No	D2
Sampling Date	28/10/2011
Depth	0.4m

Solid Waste Analysis

Determinand ↓	SOP ↓		*		Landfill Waste Acceptance Criteria Limits: Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon	2625	%	M	0.85	3	5	6
Loss on ignition	2610	%	N	3.32			10
Total BTEX	2761	mg kg⁻¹	M	<0.005	6		
Total PCBs (7 congeners)	2811	mg kg⁻¹	N	<1	1		
TPH Total WAC	2670	mg kg⁻¹	M	< 10	500		
Total (of 17) PAHs	2700	mg kg⁻¹	N	3.7	100		
pH	2010		M	8.0		>6	
Acid Neutralisation Capacity	2015	mol kg⁻¹	N	0.018		To evaluate	To evaluate

Eluate Analysis

Determinand ↓	SOP↓	*	2:1 Eluate mg l⁻¹	8:1 Eluate mg l⁻¹	2:1 Eluate mg kg⁻¹	Cumulative 10:1 Eluate mg kg⁻¹	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
Arsenic	1450	N	0.001	<0.001	<0.05	<0.05	0.5	2	25
Barium	1450	N	0.038	0.022	<0.5	<0.5	20	100	300
Cadmium	1450	N	<0.0005	<0.0005	<0.01	<0.01	0.04	1	5
Chromium	1450	N	<0.001	<0.001	<0.05	<0.05	0.5	10	70
Copper	1450	N	0.005	0.003	<0.05	<0.05	2	50	100
Mercury	1450	N	0.0008	0.0005	<0.01	0.01	0.01	0.2	2
Molybdenum	1450	N	0.006	0.006	<0.05	0.06	0.5	10	30
Nickel	1450	N	0.007	0.005	<0.05	0.05	0.4	10	40
Lead	1450	N	0.002	0.004	<0.005	0.04	0.5	10	50
Antimony	1450	N	0.002	0.001	<0.01	0.01	0.06	0.7	5
Selenium	1450	N	0.006	0.003	0.01	0.03	0.1	0.5	7
Zinc	1450	N	0.01	0.005	<0.5	<0.5	4	50	200
Chloride	1220	N	13	3	26	35.8	800	15000	25000
Fluoride	1220	N	1.1	1.1	2.2	11	10	150	500
Sulphate	1220	N	46	9.5	91.9	116	1000	20000	50000
Total Dissolved Solids	1040	N	240	110	479	1170	4000	60000	100000
Phenol Index	1920	N	<0.03	<0.03	<0.5	<0.5	1		
Dissolved Organic Carbon	1610	N	29	9	57.9	102	500	800	1000

Solid Information

Dry mass of test portion/kg	0.175
Moisture (%)	23.1

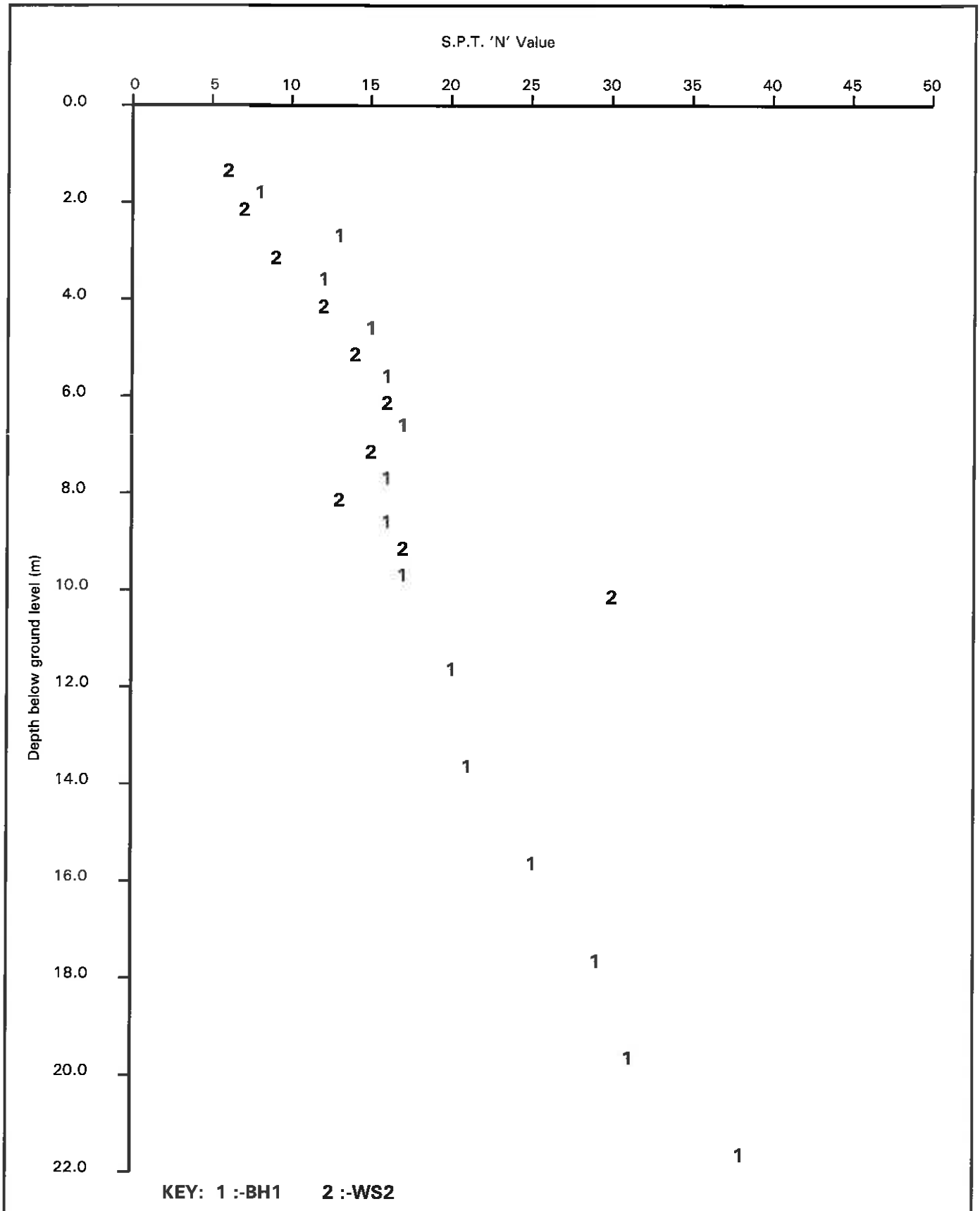
Leach Test Information

Leachant volume 1st extract/l	0.297	4-Nov-2011
Leachant volume 2nd extract/l	1.4	4-Nov-2011
Eluate recovered from 1st extract/l	0.1013	

All tests undertaken between 28-Oct-2011 and 8-Nov-2011

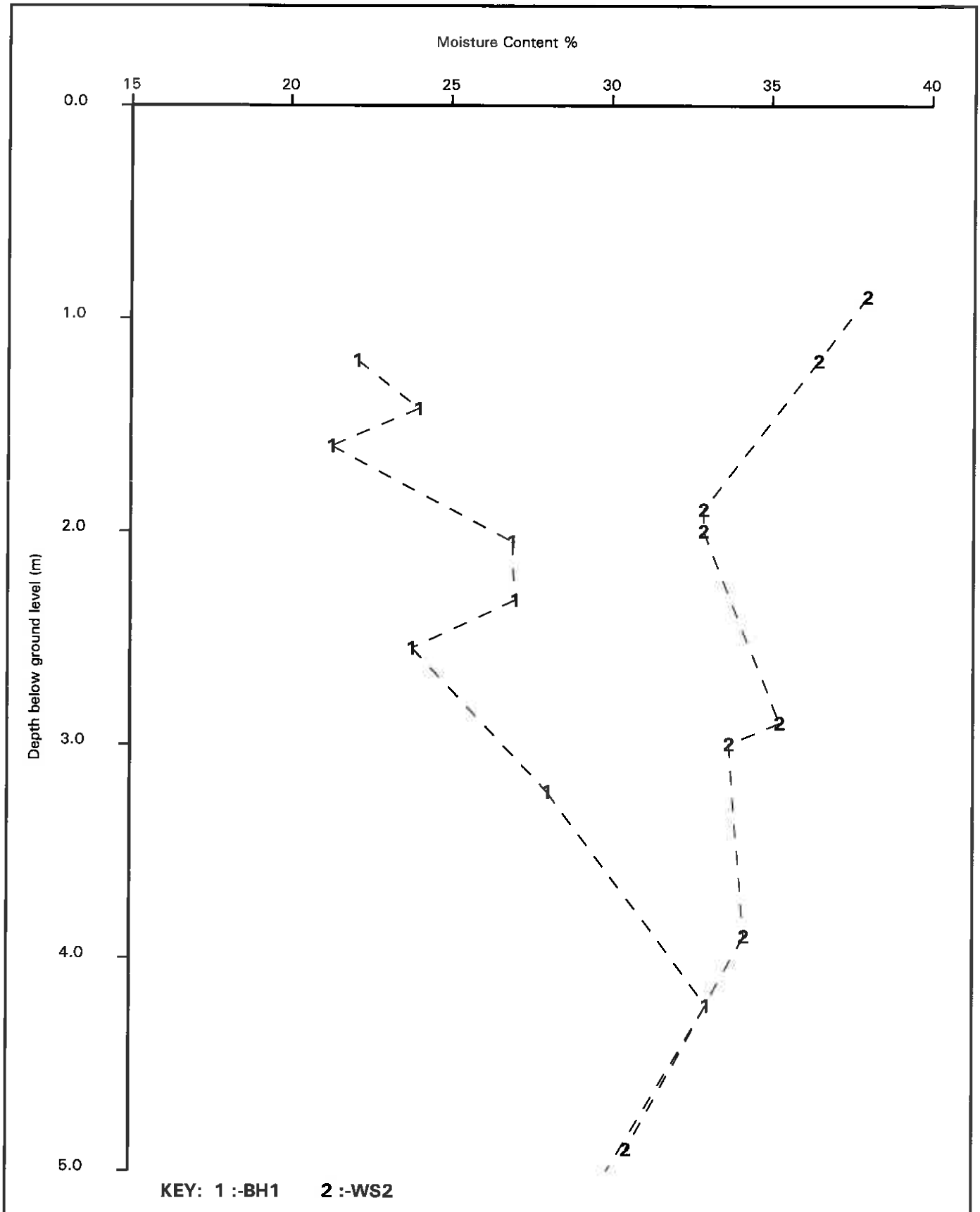
* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.



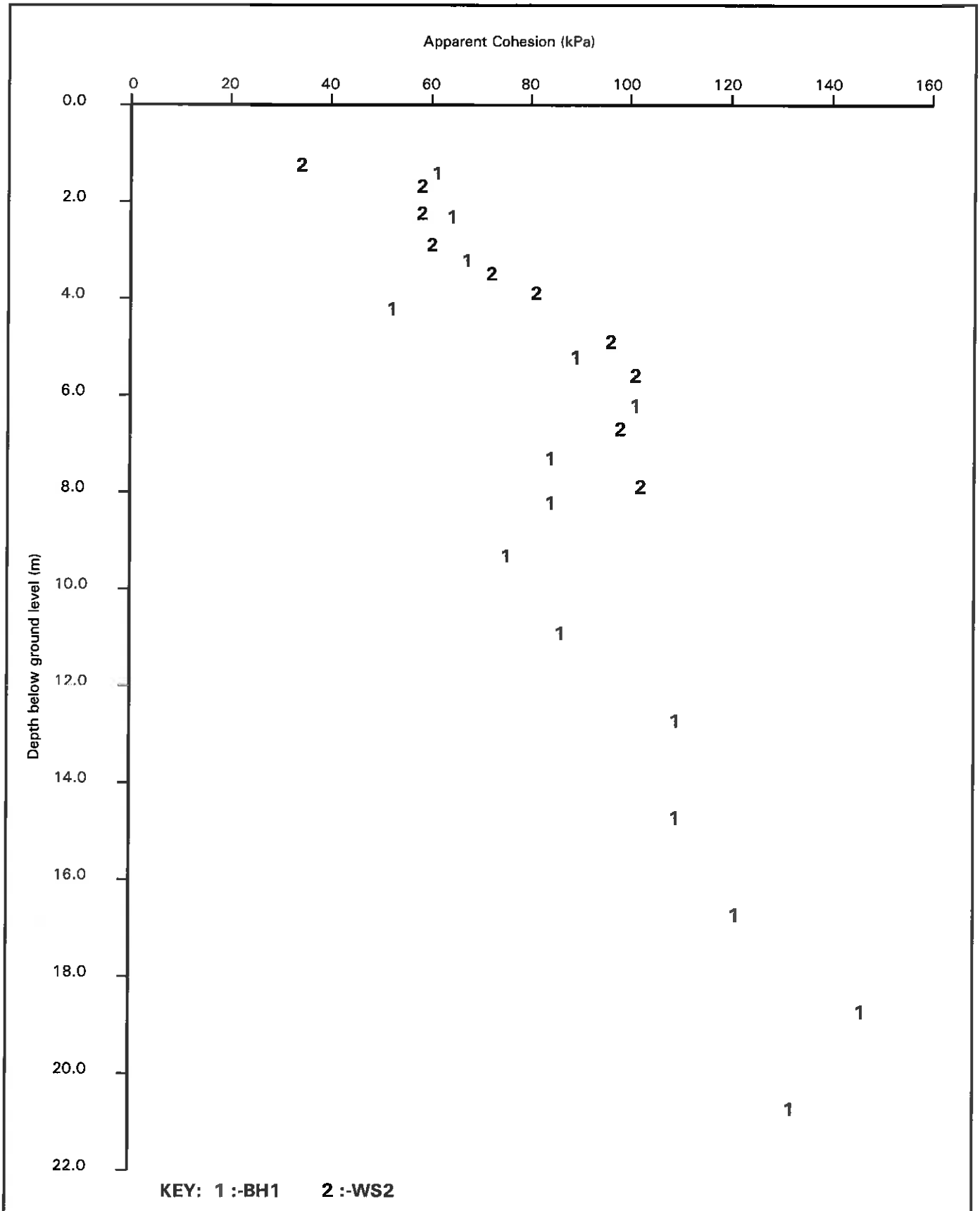
S.P.T. 'N' Value vs Depth below ground level (m).

SITE	11 WADHAM GARDENS, LONDON NW3	
CLIENT	MR. M. STEINBERG	Contract Number 12520
GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk	Date 24/11/11	Figure 1



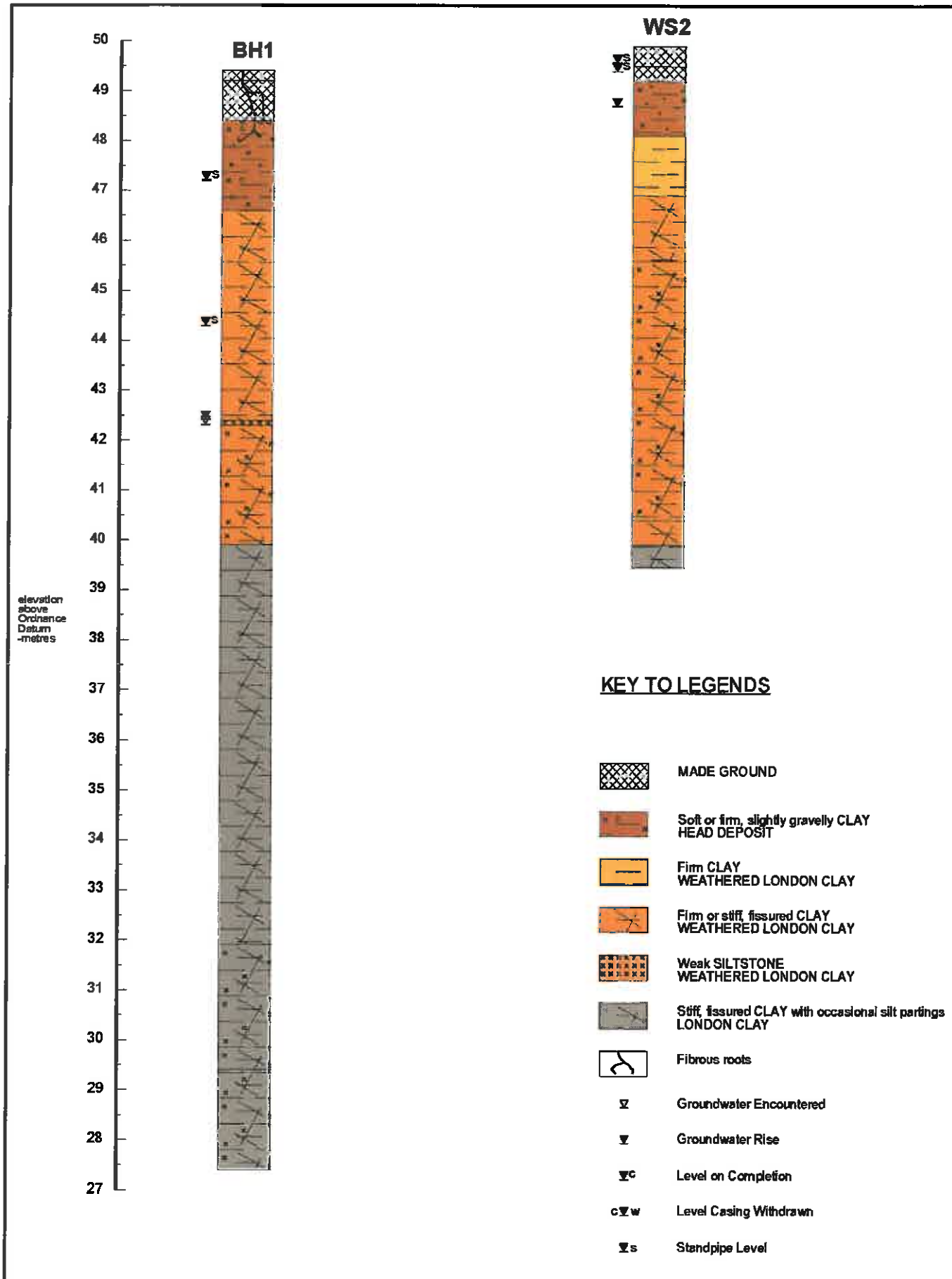
Moisture Content % vs Depth below ground level (m).

SITE	11 WADHAM GARDENS, LONDON NW3	
CLIENT	MR. M. STEINBERG	Contract Number 12520
GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk	Date 24/11/11	Figure 2



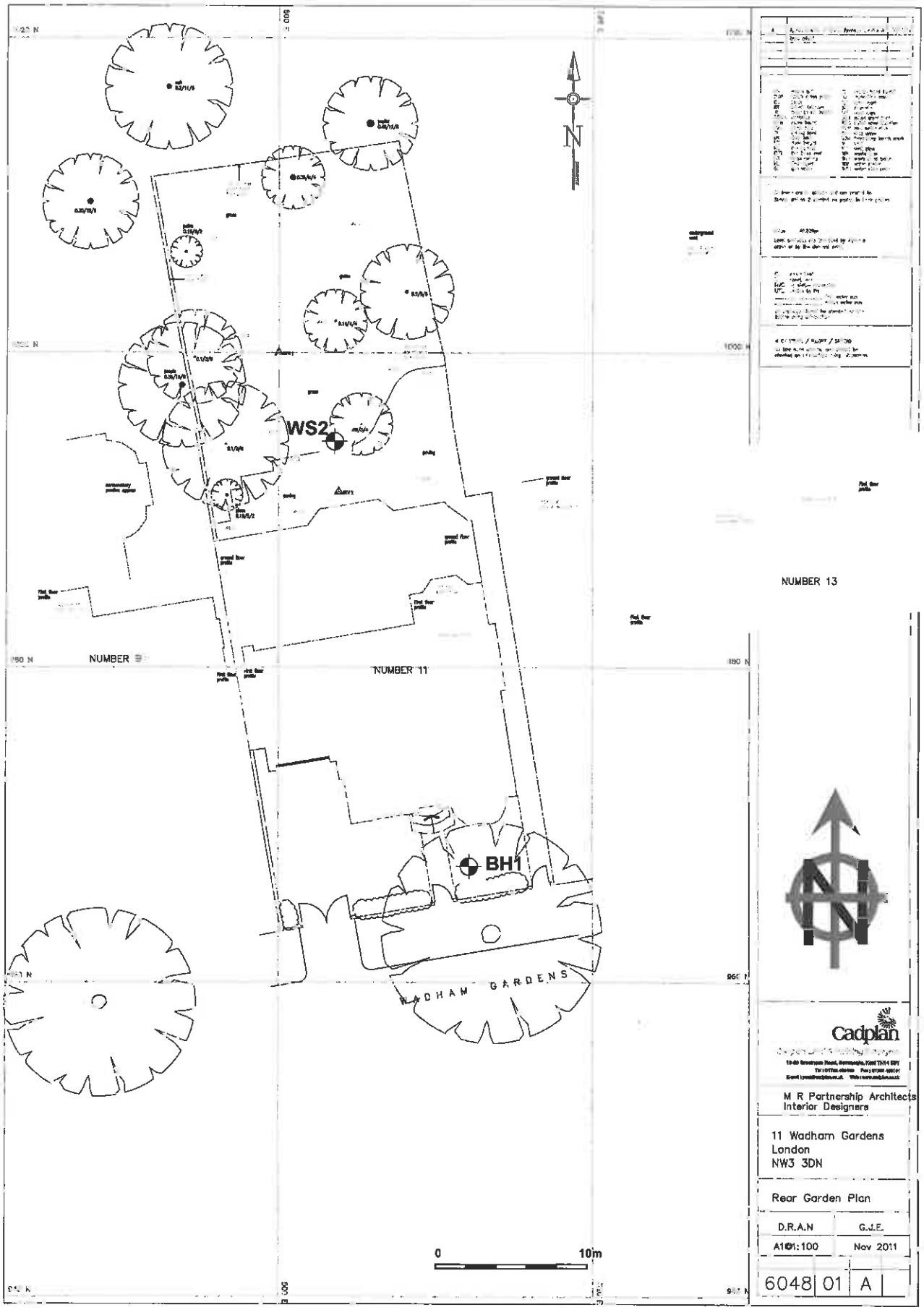
Apparent Cohesion (kPa) vs Depth below ground level (m).

SITE	11 WADHAM GARDENS, LONDON NW3		
CLIENT	MR. M. STEINBERG		Contract Number 12520
GROUND ENGINEERING LIMITED	Tel: 01733-566566 www.groundengineering.co.uk	Date 24/11/11	Figure 3



SITE	11 WADHAM GARDENS, LONDON NW3		Contract No. 12520
CLIENT	MR. M. STEINBERG	Soil Profile	Vertical Scale 1:100
GROUND ENGINEERING LIMITED, PETERBOROUGH. Tel (01733) 566566		Date 24/11/11	Fig. No 4

Borehole Location Plan



Project: 11 Wadham Gardens, London NW3	**GROUND ENGINEERING LIMITED**	**Project No.**
Client: Mr. M. Steinberg	Peterborough Tel : 01733 566566	**C12520a**