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140 ROYAL COLLEGE STREET LONDON NW1

Phase II

Client
Alp-Design

Report No. 3444-2

1 July 2010

CONTENTS

140 ROYAL COLLEGE STREET LONDON NW1

Phase II

Synopsis

An investigation has been carried out at 140 Royal College Street on the instructions of Alp-Design. An Environmental Assessment[1] has been prepared for the site and should be read in conjunction with this report.

The purpose of the investigation was to determine the ground conditions and to provide recommendations in respect of foundation design and other geoenvironmental matters for the proposed extension.

Five continuous open drive (windowless) samplers and two dynamic probes were carried out, supported by a programme of laboratory testing.

The Client has indicated that piled construction is preferred and appropriate design data is provided. Chemical analysis revealed some contamination.

1

Site description

The area under investigation comprises a small walled courtyard / garden area to the rear of No. 140 Royal College Street, as shown on Figure 1 at Appendix A. A full site description is contained within the Environmental Assessment to which the reader is referred.

2

Development proposals

It is intended to construct an extension to the building, as shown on Figure 2 at Appendix A.

No details of the expected loadings were available during preparation of this report but they are expected to be light to moderate.

3

Geology

Published records of the British Geological Survey indicate the site to lie on London Clay.

4

Field work

The extent of the field work was influenced by the London Borough of Camden's Contaminated Land Contractor's requirements and the need to gain geotechnical data. It comprised five windowless samplers advanced to a maximum depth of 4 m. In addition, two dynamic probes were advanced to a depth of 10 m. The location of the exploratory positions is shown on Figure 1 at Appendix A.

Representative soil samples were recovered from the boreholes for subsequent laboratory examination and testing. Details of the strata encountered are provided on the Exploratory Hole Records at Appendix B; together with particulars of the samples recovered and groundwater observations.

A standpipe was installed in WS2 to permit monitoring of water levels on one occasion.

5

Laboratory testing

The following laboratory tests were conducted on samples recovered during the field work:-

- Natural moisture content: to assess the in situ condition of the soil.
- Liquid and Plastic Limits: to classify cohesive soil into behavioural groups.
- Unconsolidated undrained triaxial compression: to determine the shear strength of cohesive material and thus to assess its load bearing capacity.

- Soluble sulphate concentration and pH value: for the specification of buried concrete.
- Contamination: chemical analyses to detect the presence of contaminants highlighted by the Environmental Assessment, viz:-

  Total arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc.
  Water sol. Boron and asbestos screen.
  Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH).

Results of these tests are presented at Appendix C and the variation of shear strength with depth is shown on Figure 3 at Appendix A.

6
Ground conditions

6.1
Stratigraphy

The stratigraphy of the site as revealed by the investigation is described in detail at Appendix A and in general terms hereafter.

6.1.1
Fill material

Fill material was encountered in all windowless samplers and was observed to a maximum depth of 2.4 m in WS3, although WS 4 and 5 were terminated within fill material at 2.0 m depth. The uppermost layer of fill was fairly similar across the site and generally comprised a granular melange of man-made detritus in a matrix of silt and sand sized particles. This was generally underlain by an orange brown clay with similar additions, i.e. fragments of brick, concrete, flint, ash, coal and slate.

6.1.2
London Clay

London Clay was proved beneath the fill material and continued to the limit of investigation in the windowless samplers. It comprised a brown grey clay which is consistent with the weathered portion of this formation. Boreholes 1, 2 & 3 were terminated within this stratum at 4.0 m below adjacent site level.

Laboratory testing showed the clay to be in a generally firm to stiff condition although one soft result was obtained from WS1 at 2.7 m depth.

6.2
Groundwater

No groundwater inflows were noted in the boreholes. However, the speed of drilling may have masked any small inflows and more onerous conditions may be experienced during construction.

Subsequent monitoring of the standpipe recorded groundwater at 3.40 m below adjacent site level. However, this is likely to be perched water and not a true reflection of the actual water table.

7
Discussion

7.1
General

The site has evidently already carried development and the investigation has revealed fill material to be present. It is possible that other pockets of fill material may also be present; perhaps deeper, of different character or associated with the remains of underground construction; even though not detected by this investigation.

All remnants of previous construction should be removed prior to redevelopment to enable the proposals to be constructed without hindrance and to perform satisfactorily.

7.2

Piled foundations

Either driven or bored piles would be suitable in the ground conditions found at this site. However, compared with bored piling, construction of driven piles generates greater noise and vibration which is unlikely to be acceptable in this environment. In particular, high levels of ground - borne vibrations could damage nearby structures. Bored piles are therefore recommended and parameters for their preliminary design are provided in Tables 1 and 2.

No shaft friction (either positive or negative) will be generated in the fill material or within 1 m of pile cut - off level. The top 2.5 m has therefore been ignored.

Table 1: Design parameters for CFA piles - Shaft friction

Stratum	Depth, m	Ultimate unit shaft friction
All material	0.0 - 2.5	Ignore
London Clay	2.5 - 10.0	Increases linearly from 15 to 120 kPa

Table 1 has been derived in conjunction with an adhesion factor of 0.6 in the London Clay.

Table 2: Design parameters for CFA piles - End bearing capacity

Stratum	Depth, m	Ultimate unit end bearing capacity
London Clay	8.0 - 10.0	Increases linearly from 1350 to 1800 kPa

A factor of safety must be applied to derive the allowable working load from the ultimate values obtained from Tables 1 and 2. A value of 3 is recommended for both shaft friction and end bearing.

It has been assumed that mini-piles will be used for the extension. When the exact method of pile installation is known then a site specific pile design can be undertaken. Evidently it would be possible to utilise other pile types and different geometries. Further advice could be given on the load capacity for any other configuration which may be under consideration.

The actual load capacity achieved in practice depends upon the precise installation procedures. Advice should therefore be sought from specialist contractors to verify the load capacity and settlement characteristics of their particular piles in the ground conditions revealed by this investigation.

No details of the existing foundations were available during preparation of this report. However, it is assumed that settlement of the existing building is complete and differential settlement between it and the new extension should be anticipated. Therefore care should be taken to ensure that the extension is structurally separate from the existing building.

7.3
Ground floor slabs

Fill material will not form a reliable bearing stratum, therefore suspended ground floor construction should be adopted.

7.4

Excavations

All material above the London Clay should be regarded as unstable. Some apparent stability may be present immediately on excavation, especially where there is a high clay content, but this must not be relied upon.

Provision of adequate support is especially important for the safety of personnel when required to work in or close to excavations. Particular care should be exercised since excavations will be close to existing structures to ensure they do not experience any loss of support.

Temporary and permanent works should be designed to resist the additional lateral earth pressures arising from superimposed loads in addition to those generated by the soil itself, without significant deformation.

Observations during drilling and the subsequent standpipe reading indicates that water currently lies at over three metres depth and therefore beyond normal construction activities (save for piling works). However, groundwater levels may rise and more onerous conditions might be expected during construction. Any small inflows should be easily controlled by conventional pumping from shallow sumps.

7.5

Contaminant analysis

Contaminant testing was undertaken on selected soil samples and the results compared with the limited number of CLEA[2] Soil Guideline Values (SGVs) for residential land use that have been published to date. Where not available from that source, reference has also been made to the LQM CIEH Generic Assessment Criteria[3]. Appropriate trigger levels are given with the results at Appendix C and individual values exceeding the triggers have been highlighted.

Analysis for metals/metalloids revealed most determinands to be below the relevant triggers. However, the residential SGV for arsenic (As) of 32 mg/kg was exceeded in WS4 and WS5, with concentrations of 36 mg/kg and 57 mg/kg respectively. WS4 also exceeded the cadmium (Cd) SGV of 3 mg/kg with a concentration of 4.7 mg/kg. The lead (Pb) SGV was also exceeded in three of the five holes, with a maximum recorded concentration of 2353 mg/kg in WS5, versus an SGV of 450 mg/kg.

The garden could be taken as the averaging area to allow statistical analysis of the results in accordance with the methodology described in R&D Publication CLR 7[4], namely the Mean Value Test. However, application of these tests to the results still means that that As, Cd and Pb are above the SGVs with US95 of 47 mg/kg, 3.4 mg/kg and 1947 mg/kg respectively.

No UK SGV exists for TPH contamination. However, LQM GAC have been published for carbon bands. The investigation recorded fairly low levels of TPH, with two samples below the limit of detection for the test of 5 mg/kg and two less than 30 mg/kg. However, 180 mg/kg was recorded in WS4. If it is assumed that all of the TPH is aromatic (worst case), the

GAC for >EC_{16} to EC_{21} is 250 mg/kg versus the recorded concentration of 8 mg/kg. The heavier carbon band of >EC_{21} to EC_{35} was also below the GAC of 890 mg/kg with a concentration of 173 mg/kg. The slight TPH contamination is not therefore considered significant.

Similarly, no UK SGV exists for PAH contamination and reference has therefore been made to the LQM GAC. Three total determinations were carried out and two speciated tests were undertaken. Of the three total determinations, two samples recorded concentrations below the limit of detection for the test of 0.5 mg/kg, being WS1 & 2 whilst WS5 recorded a concentration of 23 mg/kg. Within the speciated test results, only Benzo(a)pyrene was found to exceed the residential GAC of 0.83 mg/kg, with a concentration of 2.1 mg/kg.

Three samples were also subject to an asbestos screen, no asbestos fibres were detected.

The contamination identified by this investigation could be considered typical of older London or urban gardens. Coal, and the products of incomplete combustion such as ash have the potential to give rise to the contamination revealed. The source of which was the widespread use of coal burning fires for heating etc., the ash of which would be spread over the garden. In view of the foregoing, many Local Authorities are devising in house trigger levels to ensure that slight contamination does not result in overly expensive remediation for what is quite a low risk.

It is our understanding that the remnants of the garden not covered by the extension will be paved, thus blocking the pathway for human ingestion of potentially contaminated soil. However, this does leave the possibility that a future resident may remove the paving / hardstanding to allow cultivation of edible plants.

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7.6

Buried concrete

Laboratory tests on soil samples yielded a maximum soluble sulphate concentration of 1.17 g/l which results in a Design Sulphate Class[5] of DS-2.

The groundwater is considered to be mobile and all pH determinations were in excess of 6.5. Therefore, the Aggressive Chemical Environment for Concrete, ACEC, is classed as AC-2.

R G Chapman
AP GEOTECHNICS LTD.
01 July 2010

References

[1] Report No. 3444-1
Environmental Assessment
140 Royal College Street, London NW1
AP Geotechnics Ltd., 1 July 2010

[2] The Contaminated Land Exposure Assessment Model
Department for Environment, Food and Rural Affairs
The Environment Agency
R & D Publications SGV 1 *et al.*, March 2002

[3] Generic Assessment Criteria for Human Health Risk Assessment. Second edition
Land Quality Management Ltd & Chartered Institute of Environmental Health
Land Quality Press, 2009

[4] Assessment of Risks to Human Health from Land Contamination:
An Overview of the Development of Soil Guideline Values and Related Research
Department for Environment, Food and Rural Affairs
The Environment Agency
R & D Publication CLR7, March 2002

[5] Concrete in aggressive ground
BRE Special Digest 1
Building Research Establishment, 2005

PROCEDURAL NOTES for GROUND INVESTIGATIONS

General

This report is based upon data obtained from field descriptions of the strata and examination of the samples by an engineer, together with the results of in situ and laboratory tests as appropriate. Responsibility cannot be accepted for variations in ground conditions between and around any of the exploratory points that is not revealed by the data. Whilst the report may offer an opinion on the ground conditions between exploratory points and below the depth of investigation, this is for guidance only and no liability is accepted for its accuracy.

Drilling procedure

Boring by light cable percussion drilling allows the ground conditions to be reasonably well established. However, a certain amount of disturbance is inevitable and some mixing of soils can occur.

Sampling procedure

"Undisturbed" samples of predominantly cohesive soils are taken with a 100mm diameter open tube sampler, generally in accordance with BS 5930: 1999.

Where appropriate, or where an undisturbed sample is unsuccessful, disturbed samples are recovered and sealed into polythene bags.

Groundwater samples are taken when water is encountered in sufficient quantity.

Standard penetration tests

The test is conducted generally in accordance with BS 1377: Part 9: 1990. The sampler tube is subject to a seating drive of 150mm into the soil at the base of the borehole. Results are given on the Borehole Records as the number of blows required to drive the sampler tube a further 300mm and this is known as the "N" value. Where the driving resistance is such that full penetration is not achieved, the test is generally terminated after 50 blows and the actual distance penetrated is recorded.

Groundwater

Groundwater observations necessarily reflect the conditions encountered at the time of the exploratory work. Long term monitoring of standpipes is usually required to establish an equilibrium water level since the normal rate of boring is too fast to permit steady state conditions to be achieved.

Groundwater levels are subject to variations caused by changes in drainage conditions and seasonal climatic changes.

Water may necessarily be added to advance the bore whilst casing may be required to maintain an open hole. These can both mask subsequent groundwater observations and are therefore noted on the individual Borehole Record.

April 2002

APPENDICES

APPENDIX A

FIGURES

140 Royal College Street, London NW1

Site plan

Scale unknown

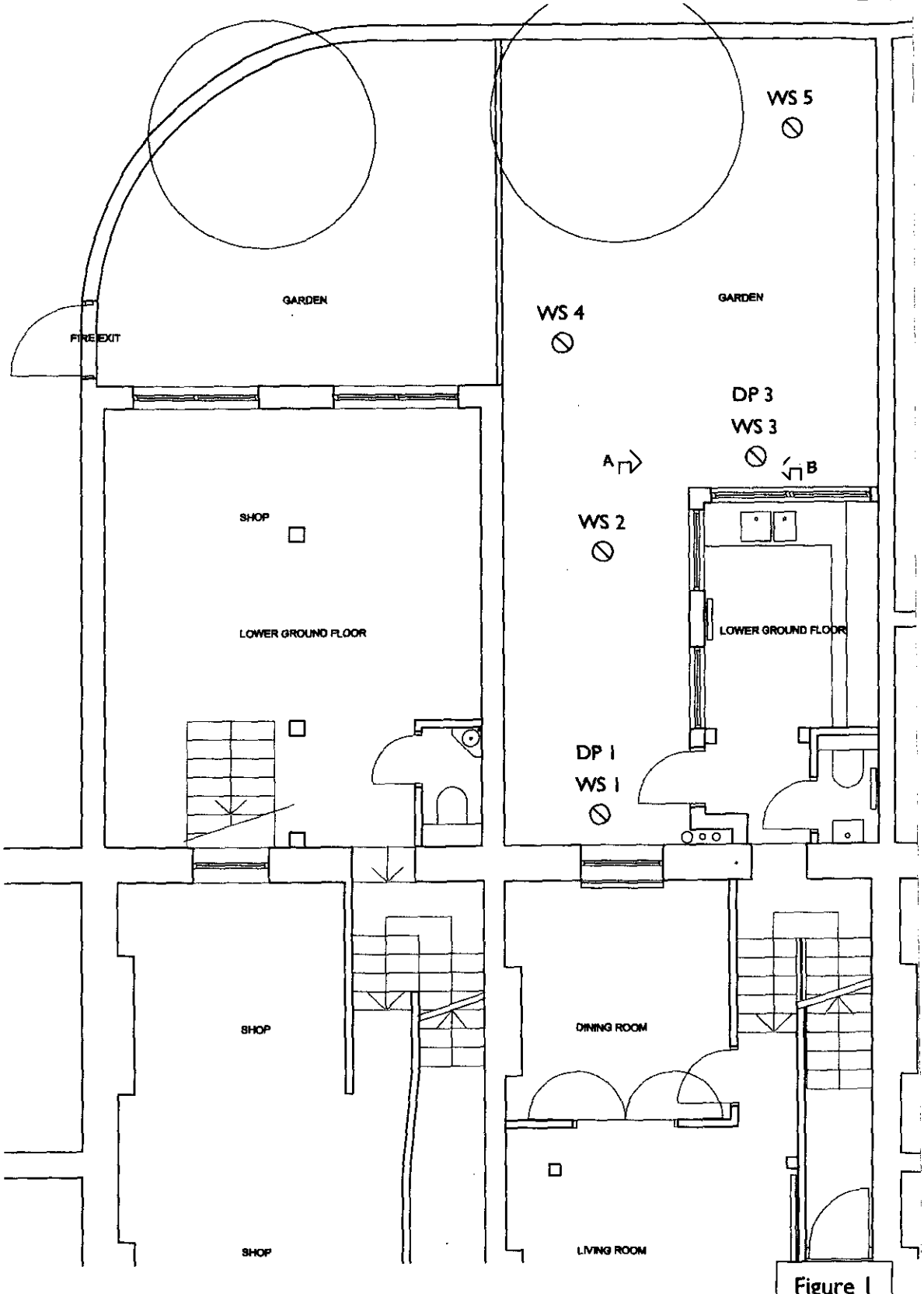
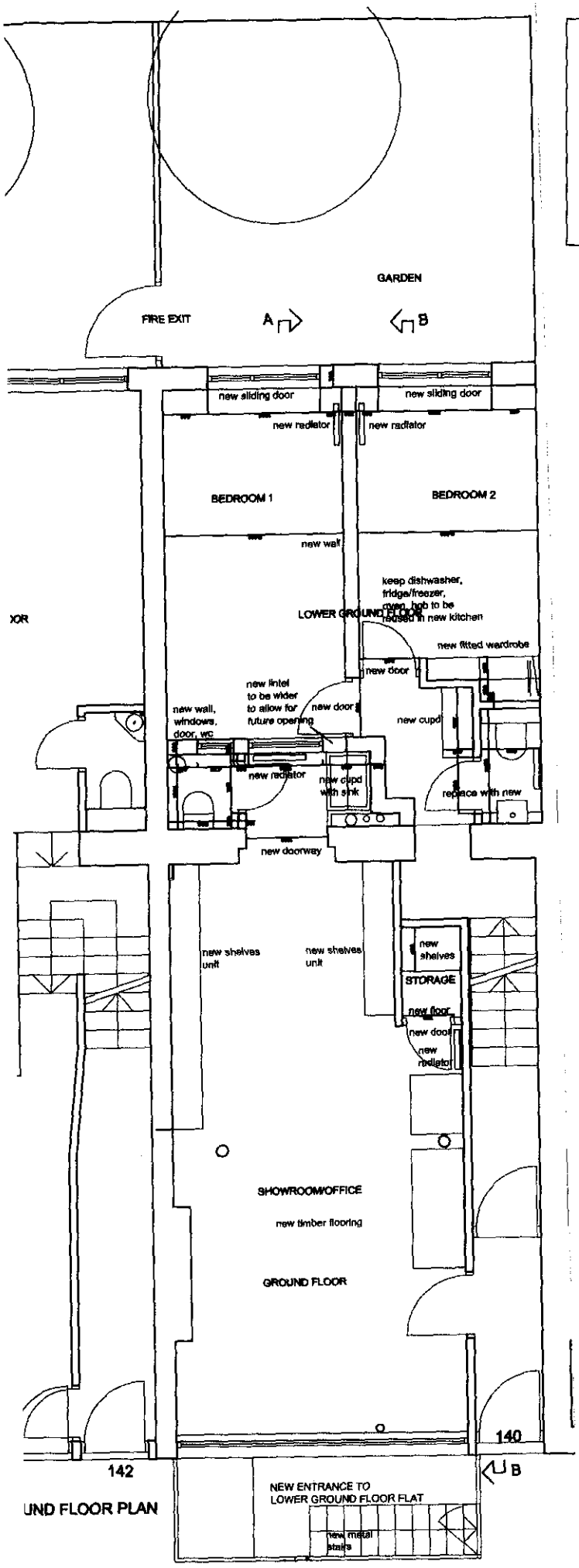


Figure 1

140 Royal College Street, London NW1

Proposed Development

Scale unknown



UND FLOOR PLAN

Figure 2

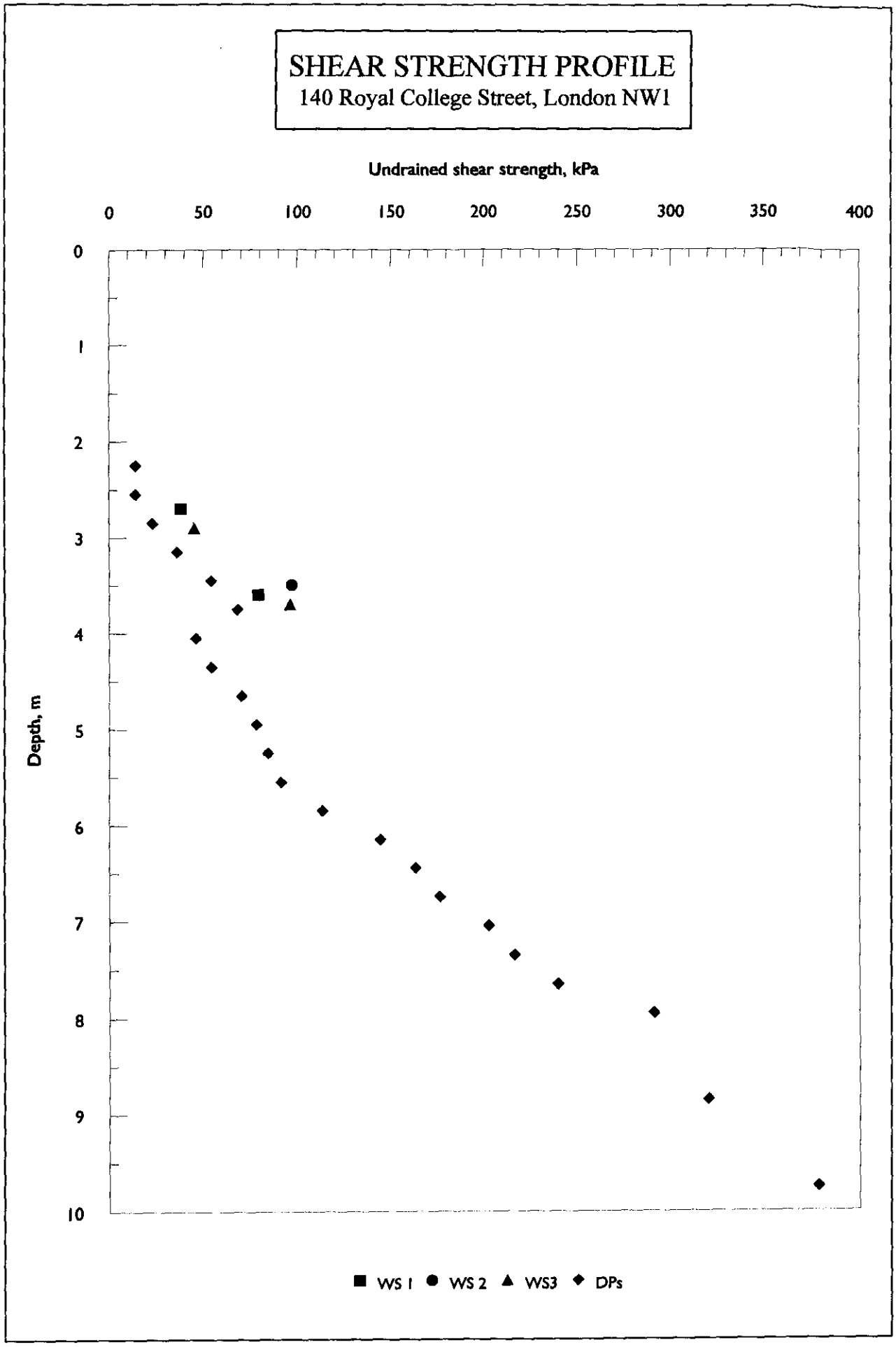


Figure 3

APPENDIX B

EXPLORATORY HOLE RECORDS

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Site	Number
140 ROYAL COLLEGE STREET, LONDON NW1	1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler	115mm to 1.00m		Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	L1		80 % recovery		(1.00)	FILL: Sand and cement over fragments of brick, slate, concrete, mortar, flint, ash and coal in matrix of silt and sand sized particles		
1.00-2.00	L2		100 % recovery		1.00 (0.80)	FILL: Soft to firm dark brown slightly sandy clay with fragments of brick, flint and occasional ash		
2.00-3.00	L3		60 % recovery		1.80 (2.20)	Soft becoming stiff with depth brown grey mottled CLAY		
3.00-4.00	L4		100 % recovery		4.00	Complete at 4.00m		

Remarks
Borehole dry
Borehole continued by dynamic probe to 10 m depth
Strata boundaries approximate where recovery less than 100 %

Scale (approx)	Logged By
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Figure No. 3444.1

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Site	Number
140 ROYAL COLLEGE STREET, LONDON NW1	2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler	115mm to 1.00m		Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	L1		20 % recovery		(0.20) 0.20	FILL: Paving slab over sand and cement			
					(0.80)	FILL: Light brown grey fragments of concrete in matrix of silt and sand sized particles			
1.00-2.00	L2		100 % recovery		1.00				
					(0.70)	FILL: Firm brown clay with fragments of brick, flint, concrete and occasional ash			
2.00-3.00	L3		100 % recovery		1.70	Firm to stiff brown grey mottled CLAY with occasional fine gravel			
					(2.30)				
3.00-4.00	L4		100 % recovery		4.00	Complete at 4.00m			

Remarks
Strata boundaries approximate where recovery less than 100 %
Borehole dry

Scale (approx)	Logged By
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Figure No. 3444.2

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Site	Number
140 ROYAL COLLEGE STREET, LONDON NW1	3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler	115mm to 1.00m		Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	L1		80 % recovery		(0.40)	FILL: Topsoil with brick fragments		
					0.40	FILL: Firm orange brown and grey clay with fragments of brick, flint, coal, ash and slate		
1.00-2.00	L2		100 % recovery		(2.00)			
2.00-3.00	L3		100 % recovery		2.40	Firm to stiff brown grey mottled CLAY		
3.00-4.00	L4		100 % recovery		(1.60)			
					4.00	Complete at 4.00m		

Remarks
Borehole dry
Strata boundaries approximate where recovery less than 100 %

Scale (approx)	Logged By
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Figure No. 3444.3

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Site	Number
140 ROYAL COLLEGE STREET, LONDON NW1	4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler	115mm to 1.00m		Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	L1		70 % recovery		(0.70)	FILL: Fragments of brick, ash, concrete and coal in matrix of silt and sand sized particles		
					0.70	FILL: Firm brown clay with fragments of brick, flint and occasional ash. Locally sandy		
1.00-2.00	L2		100 % recovery		(1.30)			
					2.00	Complete at 2.00m		

Remarks
Borehole dry
Strata boundaries approximate where recovery less than 100 %

Scale (approx)	Logged By
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Figure No. 3444.4

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Site	Number
140 ROYAL COLLEGE STREET, LONDON NW1	5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler	115mm to 1.00m		Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	L1		80 % recovery		0.10	FILL: Topsoil with brick and flint		
					(0.70)	FILL: Topsoil with fragments of brick, concrete, ash and coal, locally claybound		
					0.80	FILL: Firm brown clay with fragments of brick, flint and occasional ash. Locally sandy		
1.00-2.00	L2		100 % recovery		(1.20)			
					2.00	Complete at 2.00m		

Remarks
Strata boundaries approximate where recovery is less than 100 %
Borehole dry

Scale (approx)	Logged By
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Figure No. 3444.5

AP GEOTECHNICS
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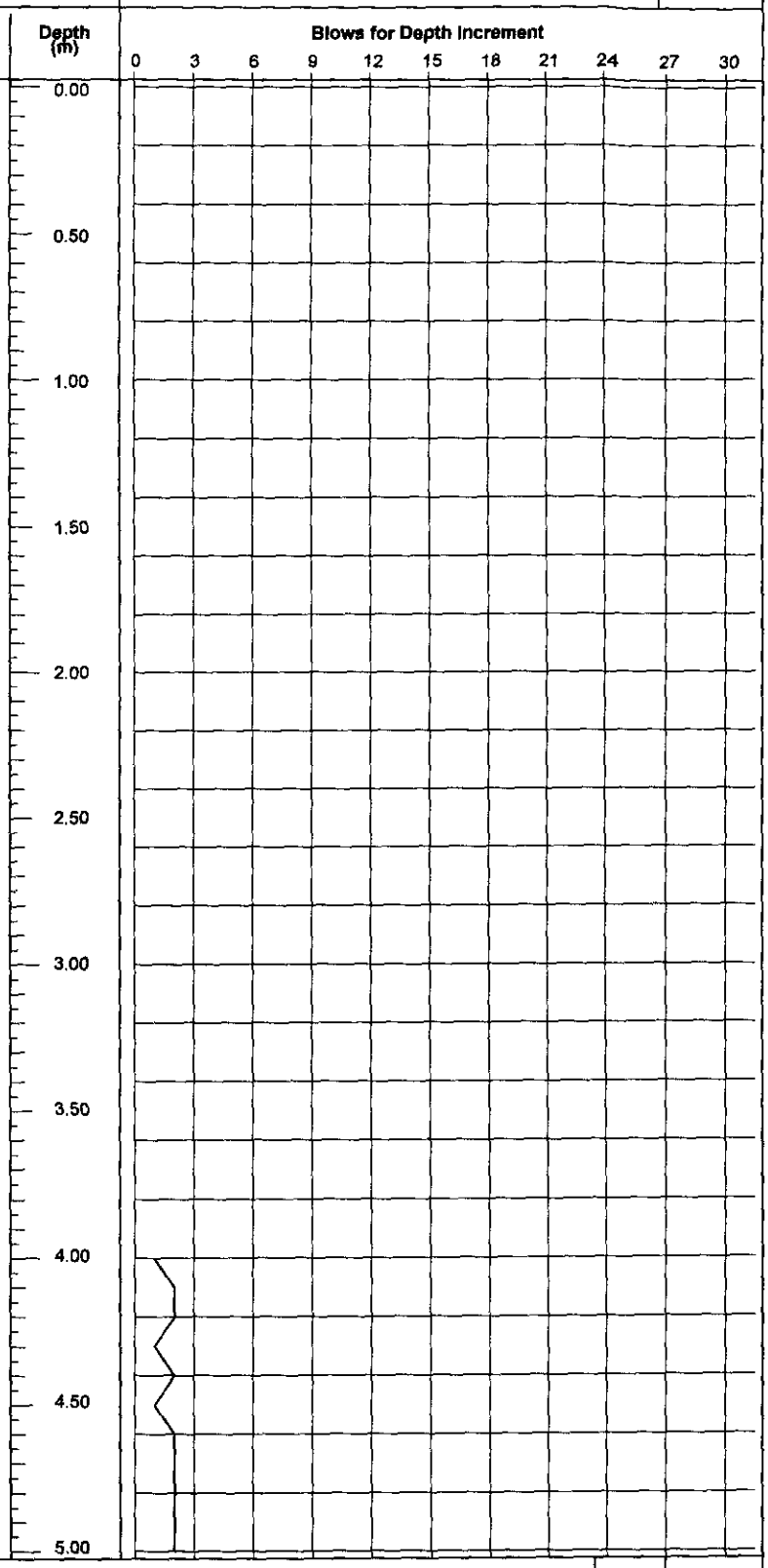
Site	Probe Number
140 ROYAL COLLEGE STREET, LONDON NW1	DP1

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe			Alp-Design	3444

Location	Dates	Engineer	Sheet
See site plan	25/05/2010		1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
4.00-4.10	1		
4.10-4.20	2		
4.20-4.30	2		
4.30-4.40	1		
4.40-4.50	2		
4.50-4.60	1		
4.60-4.70	2		
4.70-4.80	2		
4.80-4.90	2		
4.90-5.00	2		



Remarks

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Figure No. 3444.DP1

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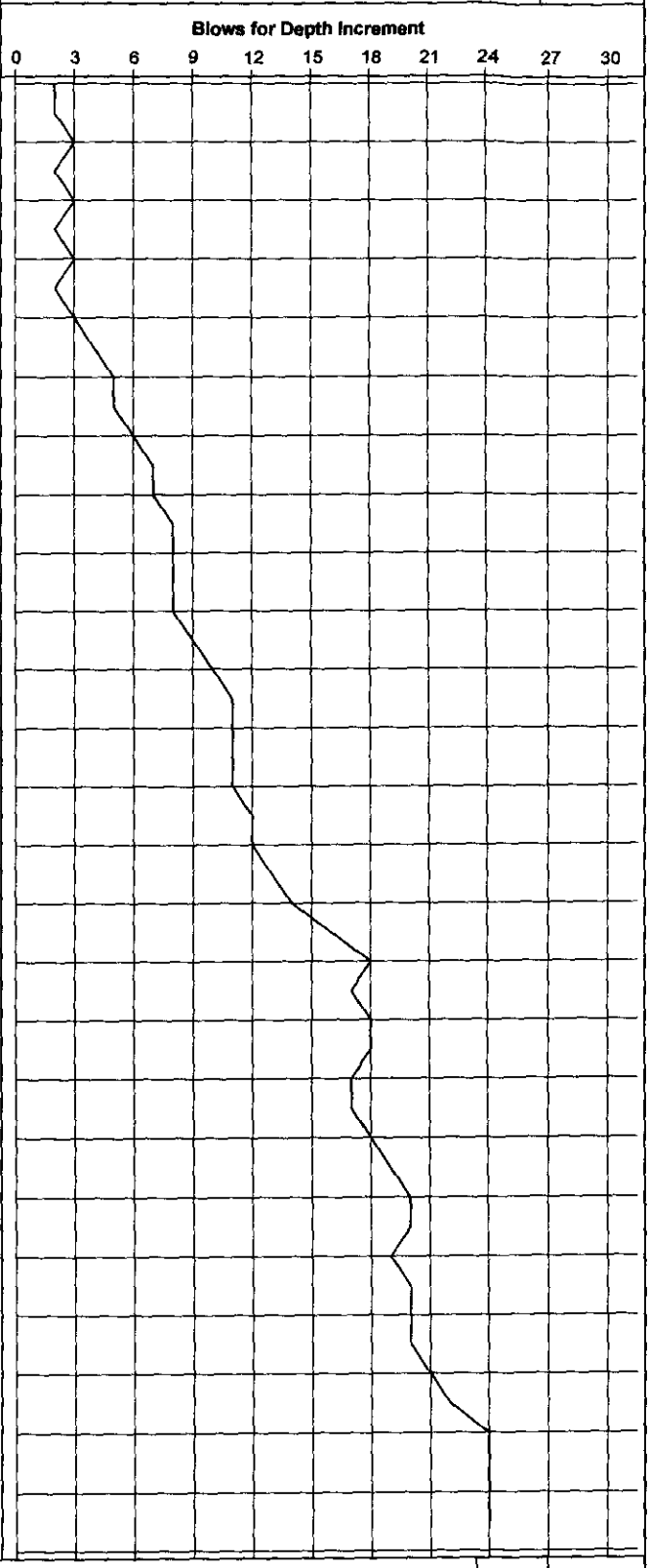
Site	Probe Number
140 ROYAL COLLEGE STREET, LONDON NW1	DP1

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe			Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	2			5.00
5.10-5.20	2			
5.20-5.30	3			
5.30-5.40	2			
5.40-5.50	3			
5.50-5.60	2			5.50
5.60-5.70	3			
5.70-5.80	2			
5.80-5.90	3			
5.90-6.00	4			
6.00-6.10	5			6.00
6.10-6.20	5			
6.20-6.30	6			
6.30-6.40	7			
6.40-6.50	7			
6.50-6.60	8			6.50
6.60-6.70	8			
6.70-6.80	8			
6.80-6.90	8			
6.90-7.00	9			
7.00-7.10	10			7.00
7.10-7.20	11			
7.20-7.30	11			
7.30-7.40	11			
7.40-7.50	11			
7.50-7.60	12			7.50
7.60-7.70	12			
7.70-7.80	13			
7.80-7.90	14			
7.90-8.00	16			
8.00-8.10	18			8.00
8.10-8.20	17			
8.20-8.30	18			
8.30-8.40	18			
8.40-8.50	17			
8.50-8.60	17			8.50
8.60-8.70	18			
8.70-8.80	19			
8.80-8.90	20			
8.90-9.00	20			
9.00-9.10	19			9.00
9.10-9.20	20			
9.20-9.30	20			
9.30-9.40	20			
9.40-9.50	21			
9.50-9.60	22			9.50
9.60-9.70	24			
9.70-9.80	24			
9.80-9.90	24			
9.90-10.00	24			10.00



Remarks

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Figure No. 3444.DP1

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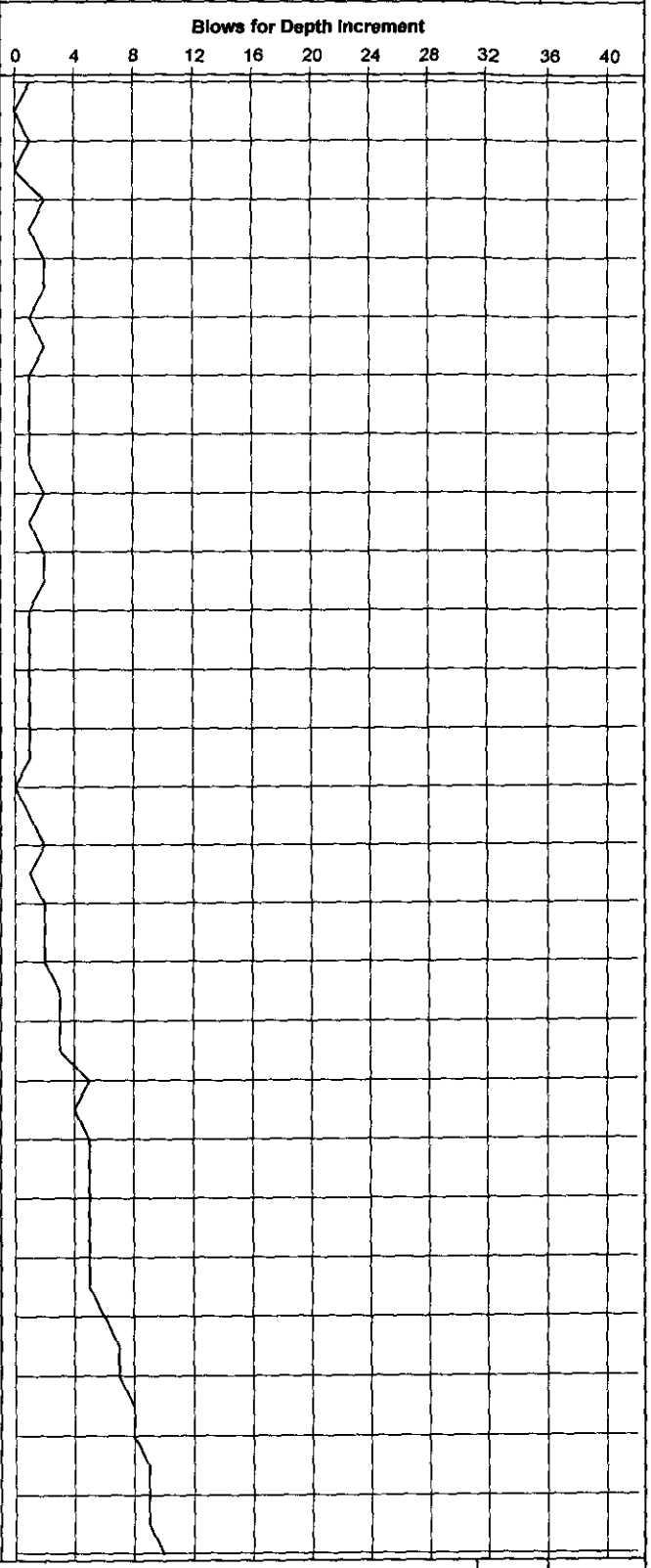
Site	Probe Number
140 ROYAL COLLEGE STREET, LONDON NW1	DP3

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe			Alp-Design	3444

Location	Dates	Engineer	Sheet
See site plan	25/05/2010		1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	1		
0.10-0.20	0		
0.20-0.30	1		
0.30-0.40	0		
0.40-0.50	2		
0.50-0.60	1		
0.60-0.70	2		
0.70-0.80	2		
0.80-0.90	1		
0.90-1.00	2		
1.00-1.10	1		
1.10-1.20	1		
1.20-1.30	1		
1.30-1.40	1		
1.40-1.50	2		
1.50-1.60	1		
1.60-1.70	2		
1.70-1.80	2		
1.80-1.90	1		
1.90-2.00	1		
2.00-2.10	1		
2.10-2.20	1		
2.20-2.30	1		
2.30-2.40	1		
2.40-2.50	0		
2.50-2.60	1		
2.60-2.70	2		
2.70-2.80	1		
2.80-2.90	2		
2.90-3.00	2		
3.00-3.10	2		
3.10-3.20	3		
3.20-3.30	3		
3.30-3.40	3		
3.40-3.50	5		
3.50-3.60	4		
3.60-3.70	5		
3.70-3.80	5		
3.80-3.90	5		
3.90-4.00	5		
4.00-4.10	5		
4.10-4.20	5		
4.20-4.30	6		
4.30-4.40	7		
4.40-4.50	7		
4.50-4.60	8		
4.60-4.70	8		
4.70-4.80	9		
4.80-4.90	9		
4.90-5.00	9		



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
3444.DP3

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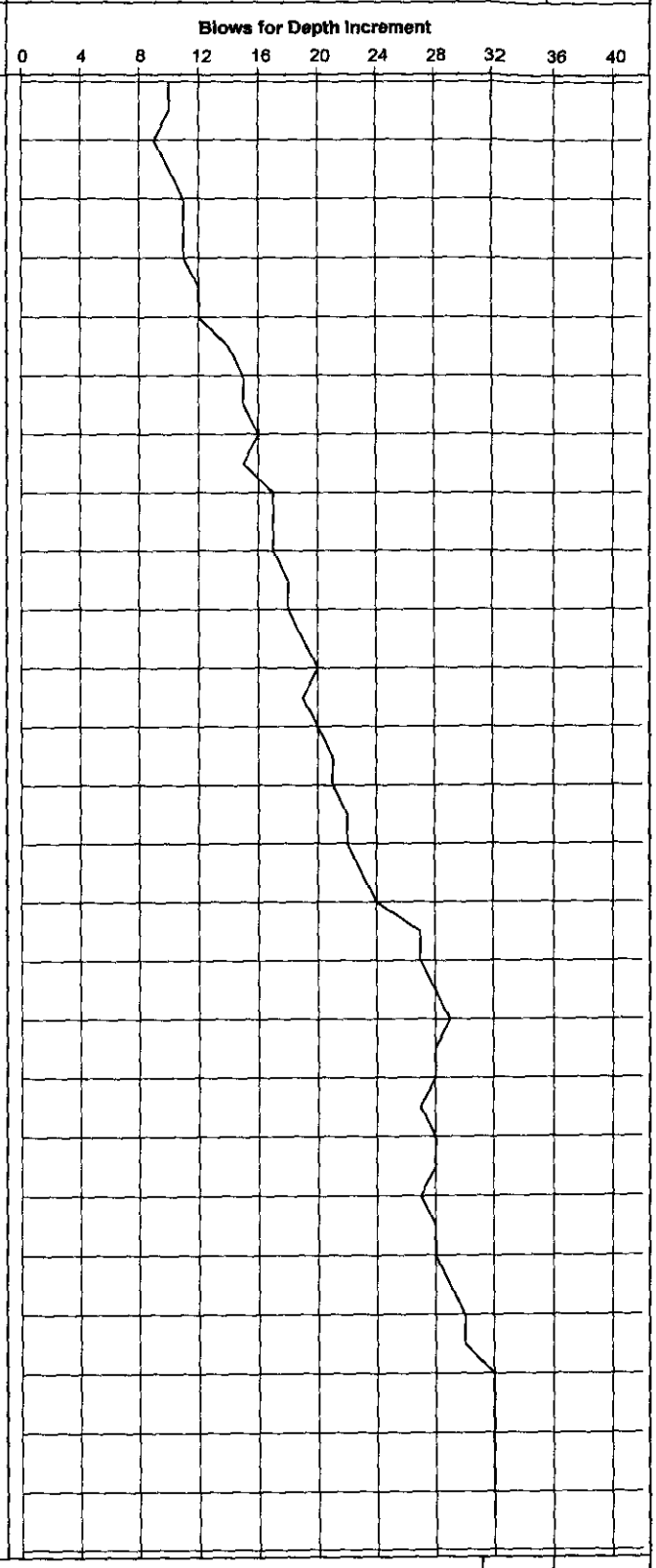
Site	Probe Number
140 ROYAL COLLEGE STREET, LONDON NW1	DP3

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe			Alp-Design	3444
	Location	**Dates**	**Engineer**	**Sheet**
	See site plan	25/05/2010		2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	10			5.00
5.10-5.20	10			
5.20-5.30	9			
5.30-5.40	10			
5.40-5.50	11			
5.50-5.60	11			5.50
5.60-5.70	11			
5.70-5.80	12			
5.80-5.90	12			
5.90-6.00	14			
6.00-6.10	15			6.00
6.10-6.20	15			
6.20-6.30	16			
6.30-6.40	15			
6.40-6.50	17			
6.50-6.60	17			6.50
6.60-6.70	17			
6.70-6.80	18			
6.80-6.90	18			
6.90-7.00	19			
7.00-7.10	20			7.00
7.10-7.20	19			
7.20-7.30	20			
7.30-7.40	21			
7.40-7.50	21			
7.50-7.60	22			7.50
7.60-7.70	22			
7.70-7.80	23			
7.80-7.90	24			
7.90-8.00	27			
8.00-8.10	27			8.00
8.10-8.20	28			
8.20-8.30	29			
8.30-8.40	28			
8.40-8.50	28			
8.50-8.60	27			8.50
8.60-8.70	28			
8.70-8.80	28			
8.80-8.90	27			
8.90-9.00	28			
9.00-9.10	28			9.00
9.10-9.20	29			
9.20-9.30	30			
9.30-9.40	30			
9.40-9.50	32			
9.50-9.60	32			9.50
9.60-9.70	32			
9.70-9.80	32			
9.80-9.90	32			
9.90-10.00	32			10.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No. 3444.DP3

APPENDIX C

LABORATORY TEST RESULTS

SUMMARY OF GEOTECHNICAL TESTS

Project: 140 ROYAL COLLEGE STREET, LONDON, NW1
Client: Alp-Design

Project No: 3444
Sheet No: 1/1

Location	Sample No	Depth m	Description	CLASSIFICATION							TRIAXIAL COMPRESSION - TOTAL STRESS							CHEMICAL		
				Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plast. Index %	Passing 425µm %	Mod. Plast. Index %	Class	Type	Moisture Content %	Bulk Density Mg/m³	Radial Stress kPa	Deviator Stress kPa	Cohesion cu, kPa assuming Øu = 0	Cohesion cu, kPa Øu, deg	Sulphate (SO4) Water g/l	Sulphate (SO4) Soil (Sol) g/l	pH
WS1	L3	2.00	Soft brown grey mottled CLAY																0.15	8.09
	L3	2.70	Soft brown grey mottled CLAY	32	74	26	48	98		CV	UU 38	32	1.91	54	75	38				
	L4	3.60	Stiff brown grey mottled CLAY								UU 38	32	2.01	72	158	79				
WS2	L4	3.00	Stiff brown grey mottled CLAY with occasional fine gravel																1.17	7.98
	L4	3.50	Stiff brown grey mottled CLAY with occasional fine gravel								UU 38	31	1.95	70	193	97				
WS3	L3	2.00	Firm brown grey mottled CLAY																0.55	8.03
	L3	2.90	Firm brown grey mottled CLAY	30	74	25	49	100		CV	UU 38	30	2.08	58	91	45				
	L4	3.00	Stiff brown grey mottled CLAY																0.23	8.08
	L4	3.70	Stiff brown grey mottled CLAY								UU 38	31	2.05	74	192	96				

Note: Soil Classification based upon unmodified Plasticity Index

CONTAMINANTS IN SOIL

Project: 140 ROYAL COLLEGE STREET, LONDON, NW1
Client: Alp-Design

Project No: 3444
Sheet No: 1/1

Location	Sample	Depth m	Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	Copper	Zinc	Selenium	Boron water sol.	PAH Total	TPH Total	Total phenols						
WS1		0.5-1.0	10	<0.5	25	100	<0.5	21	26	59	<0.5	<0.5	<0.5	<5	<1						
WS2		1.0-1.5	16	<0.5	37	214	0.8	25	49	104	<0.5	1.0	<0.5	<5							
WS3		0.3-0.5	29	1.2	34	1005	4.3	33	234	460	0.6	2.1			<1						
WS4		0.2-0.5	36	4.7	36	1565	2.3	35	144	1071	<0.5	1.3			<1						
WS5		0.5-1.0	57	1.8	42	2353	4.1	51	816	1319	1.6	3.9	23								
LQM/	residential			3	3000				2330	3750		291			210						
CIEH	allotments			0.53	34600				524	618		45			32						
GAC[1]	commercial			348	30400				71700	665000		192000			1100000						
CLEA	residential	32				450*	170	130			350										
	commercial	640				750*	3600	1800			13000										

Notes

1. GAC given at 1% soil organic matter
2. * denotes withdrawn CLEA SGV

All units are mg/kg dry weight of soil unless otherwise stated, except for pH which is dimensionless

Exceptions denoted thus: Residential XX
Commercial [redacted]

CONTAMINANTS IN SOIL

Project: 140 ROYAL COLLEGE STREET, LONDON, NW1
Client: Alp-Design

Project No: 3444
Sheet No: 1/1

Speciated Total Petroleum Hydrocarbons			
Location	WS3	WS4	WS5
Sample			
Depth, m	0.3-0.5	0.2-0.5	0.5-1.0
Determinand	Concentration, mg/kg		
TPH by GC (C8 to C10)	<5	<5	<5
TPH by GC (C10 to C12)	<5	<5	<5
TPH by GC (C12 to C16)	<5	<5	<5
TPH by GC (C16 to C21)	<5	8	<5
TPH by GC (C21 to C35)	20	173	25
Total Petroleum Hydrocarbons	20	180	25

Results expressed on a dry weight basis after correction for moisture content.

Sampled: 25 May 2010
Report date: 22 June 2010

CONTAMINANTS IN SOIL

Project: 140 ROYAL COLLEGE STREET, LONDON, NW1
Client: Alp-Design

Project No: 3444
Sheet No: 1/1

Speciated Polyaromatic Hydrocarbons by GCMS

Location	WS3	WS4										LQM/CIEH GAC[3]		
Sample														
Depth, m	0.3-0.5	0.2-0.5										residential	allotments	commercial
Determinand	Concentration, mg/kg													
PAH														
Naphthalene	<0.5	<0.5										1.5	4.1	200
Acenaphthylene	<0.5	<0.5										170	28	84000
Acenaphthene	<0.5	<0.5										210	34	85000
Fluorene	<0.5	<0.5										160	27	64000
Phenanthrene	0.9	2.0										92	16	22000
Anthracene	<0.5	<0.5										2300	380	530000
Fluoranthene	1.4	4.0										260	52	23000
Pyrene	1.1	3.1										560	110	54000
Benzo(a)anthracene	0.9	2.4										3.1	2.5	90
Chrysene	1.2	2.5										6.0	2.6	140
Benzo(b)fluoranthene	0.6	2.0										5.6	3.5	100
Benzo(k)fluoranthene	0.9	2.3										8.5	6.8	140
Benzo(a)pyrene	0.7	2.1										0.83	0.6	14
Indeno(123-cd)pyrene	<0.5	1.5										3.2	1.8	60
Dibenzo(ah)anthracene	<0.5	0.6										0.76	0.76	13
Benzo(ghi)perylene	<0.5	1.4										44	70	650
Total PAH	7.7	23.7												

Notes

1. Total PAH = Sum of EPA16 identified components
2. The results are expressed as mg/kg dry weight soil after correction for moisture content
3. GAC given at 1% soil organic matter

Exceptions denoted thus: Residential XX
Commercial [redacted]

CONTAMINANTS IN SOIL

Project: 140 ROYAL COLLEGE STREET, LONDON, NW1
Client: Alp-Design

Project No: 3444
Sheet No: 1/1

Location	Sample	Depth	Asbestos identification		
		m	Description of matrix	Overall percentage of asbestos identified (approx.)	Type of asbestos identified
WS3		0.3-0.5	Silt loam		none detected
WS4		0.2-0.5	Silt loam		none detected
WS5		0.5-1.0	Silt loam		none detected