BASIC GEOTECHNICAL GROUND INVESTIGATION REPORT

AT

15 SOUTH HILL PARK
LONDON, NW3

JONAS

Specialists in the investigation & reclamation of brownfield sites

Report Title : Basic Geotechnical Ground Investigation Report at 15 South Hill Park, London, NW3

Job No : P8525J292

Report Status : Final v1.1 **Date:** September 2013

Prepared by: JOMAS ASSOCIATES LTD For: DAVID ZOBEL

Approved by Roni Savage BEng (hons), MSc, SiLC, CGeol, MCIWM, FGS
Technical Director

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1 INTRODUCTION

1.1 Terms of Reference

1.1.1 David Zobel ("The Client") has commissioned Jomas Associates Ltd ('JAL'), to obtain ground parameters at 15 South Hill Park, London NW3, to enable preliminary foundation recommendations to be offered, prior to redevelopment of the site for residential use.

1.1.2 To this end a basic intrusive investigation of the site, has been undertaken in accordance with JAL's email proposal dated 08 August 2013.

1.2 Objectives

1.2.1 The objectives of JAL's investigation were as follows:

- To assess ground conditions and obtain geotechnical parameters to inform foundation design, which is to be undertaken by the structural engineer.

1.3 Scope of Works

1.3.1 The following tasks were undertaken to achieve the objectives listed above:

- Basic intrusive ground investigation to determine shallow ground conditions;
- Laboratory geotechnical and chemical testing on soil samples collected from the site; and,
- The compilation of this report, which provides data above, and indicative recommendations for foundation design.

1.4 Limitations

1.4.1 Jomas Associates Ltd ('JAL') has prepared this report for the sole use of David Zobel, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of JAL. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

1.4.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless JAL has actual knowledge to the contrary, information obtained from public sources or provided to JAL by site personnel and other information sources, have been assumed to be correct. JAL does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

1.4.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

1.4.4 **This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.**

2 SITE SETTING

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

2.2 Desk Study

2.2.1 A desk study was not commissioned as part of this investigation.

2.2.2 Published data indicates that the site is directly underlain by solid deposits of the London Clay Formation.

2.2.3 The proposed development area is situated at the rear of 15 South Hill Park. South Hill Park rises fairly steeply north and eastwards away from Hampstead high street and comprises mostly 3 storey Victorian houses. The rear garden is approximately 15 x 10m, laid to lawn and is bordered by hedgerows to the neighbouring properties along with several fruit trees. A decking area is present outside the rear doors with a summerhouse at the top of the garden. Access to the rear is either through the house on the upper ground floor level or via a narrow steep side pathway.

2.3 Previous Investigation

2.3.1 JAL are not aware of any previous investigations at the site

2.4 Proposed Development

It is understood that the proposed development is to comprise an extension to the lower ground floor of the existing property. The floor level is anticipated to be approximately 4m below existing garden level.

3 GROUND INVESTIGATION

3.1 Rationale for Ground Investigation

3.1.1 The ground investigation was designed in order to gather data representative of the ground conditions within the vicinity of the proposed building. The exploratory hole locations were as specified by the Structural Engineer and Building Contractor

3.2 Scope of Ground Investigation

3.2.1 The ground investigation was undertaken on 02-03 September 2013, and comprised;

- Drilling of 4 No. boreholes via windowless and handheld window sampling to a depth of up to 8.45m below ground level (mbgl) with in-situ testing and sampling.

3.2.2 2 No. boreholes (BH3 and BH4) were drilled in the lawned area, BH2 was drilled through the decking and BH1 was drilled inside the kitchen downstairs.

3.2.3 The exploratory hole position was measured in using tape and reel, as shown in Appendix 1. The exploratory borehole records are included in Appendix 2.

3.2.4 The exploratory holes were backfilled with the arisings (in the reverse order in which they were drilled) and the ground surface was reinstated with soft-standing so that no depression was left.

3.3 Sampling Rationale

3.3.1 Soil samples were taken at various depths as shown in the borehole log. Undisturbed liner samples were collected from the borehole where possible.

3.4 Standard Penetration Tests (SPTs)

3.4.1 In-situ standard/cone penetration tests were undertaken in the windowless sampling boreholes in accordance with BS EN ISO 22476-2 ‘Methods of Test on Soils for Engineering Purposes (Part 9)’; to determine the relative density of the underlying , and therefore give an indication of soil ‘strength’.

3.4.2 The results are presented on the individual exploratory hole records in Appendix 2.

3.5 Groundwater Monitoring

3.5.1 Groundwater strikes noted during drilling (if any), are recorded within the exploratory hole records in Appendix 2.

3.6 Laboratory Analysis

3.6.1 A number of soil samples obtained from the exploratory holes were submitted to UKAS accredited The Environmental Laboratory Ltd and Professional Soils Laboratory Ltd;

- 6 No. samples for Water Soluble Sulphate and pH Analyses
- 2 No. Waste Acceptance Criteria analyses
- 8 No. samples for Plasticity Indices and Moisture Content Analyses

- 3 No. samples for Undrained Shear Strength in Triaxial Compression

3.6.2 Where required, testing was undertaken in accordance with BS1377:1990 Method of Tests for Soils for Civil Engineering Purposes.

3.6.3 Results are presented in Appendix 3.

4 GROUND CONDITIONS

4.1 Soil

4.1.1 Ground conditions were logged in accordance with the requirements of BS5930:1999. Detailed borehole logs are provided in Appendix 2. The ground conditions encountered are summarised in Table 4.1 below, based on the strata observed during the investigation.

Table 4.1 : Ground Conditions Encountered

Stratum and Description	Encountered from (m bgl)	Base of strata (m bgl)	Thickness range (m)
MADE GROUND (clay/silt/gravel with flint, brick, mortar, concrete)	0.0	0.3 – 0.8	0.3 – 0.8
Grey brown/orange veined blue grey silty CLAY	0.3 – 0.8	>4.0 - >8.45 (terminal depth of all boreholes)	>3.7 - >7.9

4.2 Hydrogeology

4.2.1 Boreholes were reported to be dry during the drilling operations.

5 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

5.1 Ground Investigation Summary

5.1.1 No detailed structural engineering design information, with respect to the type of construction and associated structural loadings, was provided at the time of preparing this report. Consequently, a detailed discussion of all the problems that may arise during the proposed redevelopment scheme is beyond the scope of this report.

5.1.2 Practical solutions to the difficulties encountered, both prior to, and during construction, are frequently decided by structural constraints or economical factors. For these reasons, this discussion is predominantly confined to remarks of a general nature, which are based on site conditions encountered during the intrusive investigations.

5.1.3 It is understood that the proposed development is to comprise an extension to the rear of the existing property.

5.1.4 The results of JAL's ground investigation revealed a ground profile comprising Made Ground (up to 0.8m thick) over deposits of CLAY (revealed to terminal depth of boreholes to a maximum of 8.45mbgl).

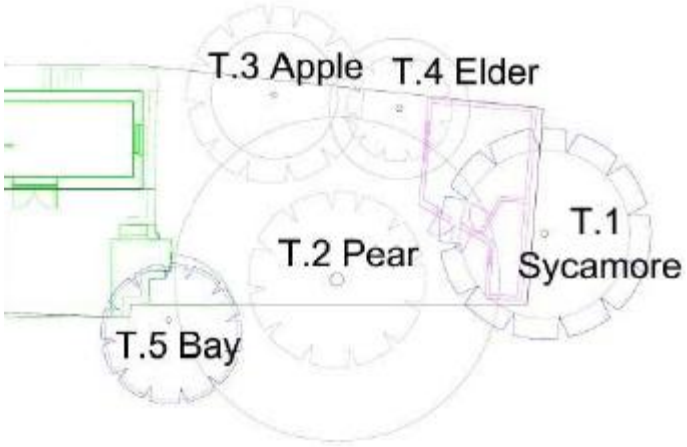
5.1.5 A summary of ground conditions is provided in table 4.1, with results of laboratory geotechnical testing summarised in table 5.1 below.

Table 5.1 – Preliminary Geotechnical Parameters

Strata	SPT 'N' Value	Shear Strength Cu (kPa)	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (Plasticity Term)	Particle Size Distribution (% passing 0.425mm)	Modified Plasticity Index	NHBC Volume Change Classification
MADE GROUND (clay/silt/gravel with flint, brick, mortar, concrete)	-		-	-	-	-	-	-	-
Grey brown/orange veined blue grey silty CLAY	15-32	111-146	20-30	67-79	23-27	44-53	100%	44-53	High

5.2 Trees near Building

5.2.1 JAL were provided with a copy of a Tree Survey Report for the site, produced by Phelps Associates (08 August 2013), and attached in Appendix 5 of this report.



5.2.2 The extract above shows five trees in the vicinity of the proposed extension. It is understood that Trees T2 – T4 will be removed as part of the proposed development operations. All trees including those that will be removed or retained, must however be taken into account in the design of foundations in accordance with NHBC guidance.

5.2.3 The Tree Survey Report provides individual tree survey data, however their distance from the building footprint is not provided, and has thus been estimated by Jomas as presented in table 5.2 below.

Table 5.2 – Tree Data

Tree Species	Estimated distance to building footprint – Lower GF (m)	Current Height (m)	Mature Height	Water Demand Category
T1 - Sycamore	8m	9	22	Moderate
T2 - Pear	2m	6	12	Moderate
T3 - Apple	2m	5	10	Moderate
T4 - Elder	5m	4	10	Low
T5 – Bay [laurel?]	1m	5	10	Moderate

5.3 Foundations

5.3.1 Structural loads for the proposed development are currently unavailable. The ground investigation has shown that ground conditions comprise Made Ground over clayey sand deposits, overlying clay.

5.3.2 The clay deposits have been reported to be of high volume change potential. Given that a number of trees have been identified within close proximity to the proposed building footprint, consideration should be give to the effects of their removal, in particular the change in groundwater profile due to the removal of these trees which will likely result in a rebound in the groundwater table. Therefore heave precaution will be required where existing trees have been or are to be removed. This should also be considered during design of the site drainage.

5.3.3 Shrinkable soils are subject to changes in volume as their moisture content is altered. The resulting shrinkage or swelling of the soil can cause subsidence or heave damage to foundations, the structures they support and services.

5.3.4 The results of standard penetration testing undertaken in the CLAY deposits at between 2m and 8m bgl indicated SPT values of 15 – 32, indicating a firm to stiff material. It is considered that conventional strip or spread foundations extending into the CLAY, can be designed with allowable bearing pressure in the region of 140kPa.

5.3.5 However, assuming high shrinkage soil and moderate water demand tree of approximately 22m height (mature height has been used as tree is to be retained), approximately 8m from building footprint, NHBC recommend foundations must extend to 1.75mbgl. With respect to a moderate water demand tree of 10m mature height (T5 – Bay, which is also to be retained), approximately 1m from the building footprint, the NHBC guidance recommends that foundations extend to 2.25mbgl.

5.3.6 It is noted that the lower ground floor is proposed to be constructed approximately 4m below existing ground level. Based upon the calculations presented above, the floor level will be outside the zone of influence of the trees identified above. On this basis, it is considered that conventional foundations may be used with an allowable bearing pressure of 140kPa.

5.3.7 Reference should be made to guidance provided within the NHBC Standards in the design of foundations for the proposed new house. Design should be undertaken by a Structural Engineer.

5.4 Ground Floor Slabs

5.4.1 Where clay sub-soils persist at formation level within the influence of trees or other significant vegetation, it is recommended that suspended ground floor slabs are adopted, with a 75mm void to accommodate any potential heave.

5.4.2 Formations of the structures should be inspected by a competent person. Any loose or soft material should be removed and replaced with well-graded, properly compacted granular fill or lean mix concrete. The formation should be blinded if left exposed for more than a few hours or if inclement weather is experienced.

5.5 Excavations

5.5.1 Excavations during the intrusive works although open for a relatively short period of time remained reasonably stable. However it is recommended that the stability of all excavations should be assessed during construction.

5.5.2 Any vertically sided excavations require support to provide safe man access and to support the sides of the excavation. Supports should be installed as excavation proceeds. For service excavations, overlapping trench sheets could be used as close support in the Made Ground and Sand deposits to minimise ground loss. Alternatively consideration could be given to the use of trench boxes provided excavations take place within the boxes.

5.6 Groundwater Control

5.6.1 Groundwater was not encountered during the ground investigation. Depending upon the impact of seasonal variations, groundwater is not anticipated during construction works.

5.7 Ground Movement

5.7.1 The effects of settlement and settlement due to recoverable heave should be considered upon receipt of the structural loads for the proposed development.

5.8 Concrete in the Ground

5.8.1 Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.

5.8.2 Characteristic sulphate values for soil and groundwater have been devised based upon the recommendations set out in the BRE Special Digest 1: 2005.

5.8.3 This indicates that in a data set where there are five to nine results available, the mean of the highest two of the sulphate test results should be taken as the characteristic value for water-soluble sulphate (mg/l SO4).

5.8.4 Consideration of pH (of soils and groundwater) is also necessary in selecting a Design Sulphate Class. The Design Sulphate Class should subsequently be selected based upon the lower pH determination resulting from these reviews.

5.8.5 Six soil samples collected from the site were analysed for water soluble sulphate (SO_4). Results reported were between 329mg/l and 3531mg/l, with associated pH concentrations of 7.5 to 8.0. The full analytical results are presented in Appendix 4.

5.8.6 Based on the results described above, the mean of the highest two concentrations has been calculated as 3070mg/l. Consequently, the required concrete class for the site is DS-4 with ACEC class of AC-3s (assuming static groundwater) in accordance with the procedures outlined in BRE Special Digest 1.

6 REFERENCES

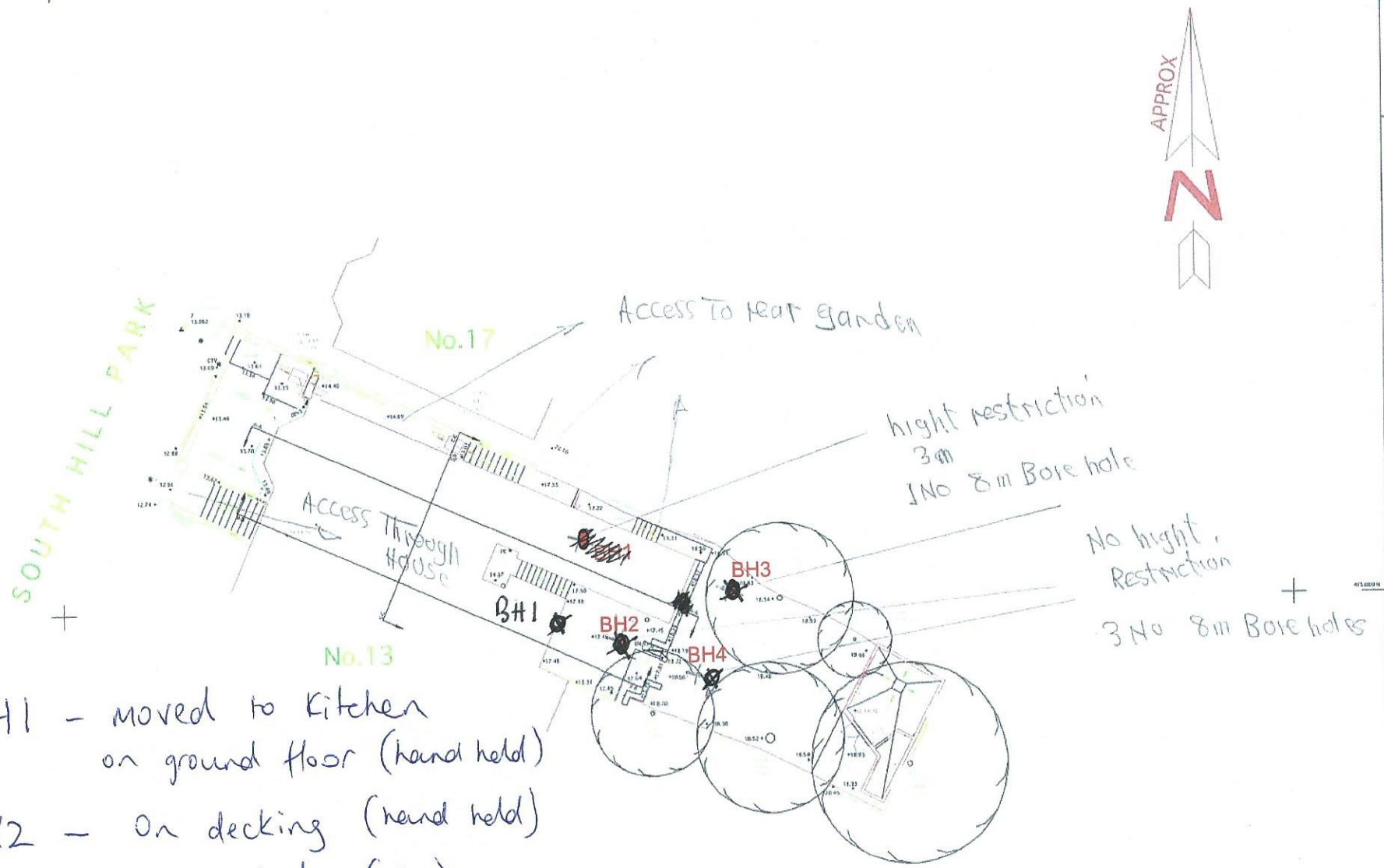
Arboricultural Tree Report Phelps Associates Ltd ref PA.S781: 8 August 2013

Code of Practice for Site Investigations BS5930: 1999

NHBC Standards Chapter 4: 2011

APPENDICES

APPENDIX 1 – FIGURES



BH1 – moved to Kitchen
on ground floor (hand held)

BH2 – On decking (hand held)

BH3 – As marked (rig)

BH4 – Moved in garden (rig)

LASER SURVEYS

LAND AND BUILDING SURVEYS, UNDERGROUND SERVICES LOCATION, CCTV DRAINAGE SURVEYS

Established 1975, Member of The Survey Association

15 SOUTH HILL
LONDON
NW3 2ST

TOPOGRAPHICAL SU

APPENDIX 2 – EXPLORATORY HOLE RECORDS

JOMAS Specialists in the investigation & reclamation of brownfield sites		Exploratory Hole No	**BH1**
Site Address	15 South Hill Park	Project No	P8574J326
Client	London Kutz Ltd	Ground Level	
Site Personnel	TC/JE	Boring Commenced	02/09/2013
		Boring Completed	03/09/2013

Type and diameter of equipment: Hand held window sampling

Water levels recorded during boring, m

Date						
Hole Depth						
Casing Depth						
Water Level on strike						
Water Level after 20mins						

Remarks

1. Hole dry - sides stable
2. UCS results presented in kg/cm2
3.
4

Samples or Tests										Strata		Strata Description
Type	Depth (m)	Results								Depth (m)	Legend	
		75	75	75	75	75	75	N				
										0.08		Kitchen floor - screed
										0.30		MADE GROUND -Grey brown fine to coarse gravel comprising brick, mortar, concrete fragments in a silty clay matrix.
D	0.5											Grey brown patched orange silty CLAY with occasional selenite crystals.
UCS	0.5	2.8										
D	1.0											
UCS	1.0	2.7										
D	1.5											
UCS	1.5	3.5										
D	2.0											
UCS	2.0	3.5										
D	3.0											
UCS	3.0	4.3										
D	4.0											
UCS	4.0	4.7								4.00		

Sampling Code: U- Undisturbed B - Large Distrubed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS Specialists in the investigation & reclamation of brownfield sites		Exploratory Hole No	**BH2**
Site Address	15 South Hill Park	Project No	P8574J326
Client	London Kutz Ltd	Ground Level	
Site Personnel	TC/JE	Boring Commenced	02/09/2013
		Boring Completed	03/09/2013

Type and diameter of equipment: Hand held window sampler

Water levels recorded during boring, m

Date						
Hole Depth						
Casing Depth						
Water Level on strike						
Water Level after 20mins						

Remarks

1. Hole dry - sides stable
2. UCS results presented in kg/cm2
3.
4

Samples or Tests										Strata		Strata Description
Type	Depth (m)	Results								Depth (m)	Legend	
		75	75	75	75	75	75	N		0.03		Decking
										0.30		Void
D	0.5									0.65		MADE GROUND dark grey silty clay with brick, flint, roots, clinker.
D	1.0											Dark yellow brown silty CLAY with occasional rootlets and black speckling.
UCS	1.0	4.5										
D	1.5											
UCS	1.5	5.5								1.70		
D	2.0											Grey brown veined blue grey, silty CLAY with orange silty patches, occasional root trace to 3.5m.
UCS	2.0	3.5										
D	2.5											
UCS	2.5	3.7										[Darker grey brown from 6.0m with fine crystals }
D	3.0											
UCS	3.0	3.7										
D	3.5											
UCS	3.5	3.0										
D	4.0											
UCS	4.0	3.2										
D	5.0											
UCS	5.0	3.0										
D	6.0											
UCS	6.0	3.0								6.00		

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Site Address	15 South Hill Park	Exploratory Hole No	**BH3**
Client	London Kutz Ltd	Project No	P8574J326
Site Personnel	TC/JE	Ground Level	
		Boring Commenced	02/09/2013
		Boring Completed	03/09/2013

Type and diameter of equipment: Breakdown Terrier

Water levels recorded during boring, m

Date						
Hole Depth						
Casing Depth						
Water Level on strike						
Water Level after 20mins						

Remarks

1. Dry hole - sides stable
2. UCS (kg/cm2) 2m = 6.0, 3m = 5.0, 4m = 4.6, 5m = 5.0, 6m = 4.0, 7m = 4.8, 8m = 5.5
3.
4

Samples or Tests									Strata		
Type	Depth (m)	Results							Depth (m)	Legend	Strata Description
		75	75	75	75	75	75	N			
D	0.3								0.55		MADE GROUND dark brown clayey silt with fine brick, flint, glass,
D	0.5										Orange brown / grey brown fissured CLAY with roots.
D	1.0										
U	1.0-2.0								1.20		
D	2.0										Firm to stiff orange brown veined blue grey silty CLAY with rootlets, some polished surfaces, selenite crystals.
S	2.0	3	3	5	5	7	7	24			[Some orange silty patches, roots noted to 3.5m]
D	2.5										
D	3.0										
S	3.0	2	3	4	3	4	4	15			
D	3.5										
D	4.0										
S	4.0	2	3	4	4	5	6	19			
U	4.0-5.0								4.00		
D	5.0										Stiff to very stiff grey brown veined blue grey, silty CLAY with orange silty patches
S	5.0	2	3	3	4	4	6	17			[Darker grey brown from 6.0m with fine crystals }
D	6.0										
S	6.0	2	3	3	4	4	5	16			
D	7.0										
S	7.0	3	4	4	6	5	6	21			
D	8.0										
S	8.0	4	5	6	9	8	9	32			
									8.45		

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Site Address	15 South Hill Park	Exploratory Hole No	**BH4**
Client	London Kutz Ltd	Project No	P8574J326
Site Personnel	TC/JE	Ground Level	
		Boring Commenced	02/09/2013
		Boring Completed	03/09/2013

Type and diameter of equipment: Breakdown Terrier

Water levels recorded during boring, m

Date						
Hole Depth						
Casing Depth						
Water Level on strike						
Water Level after 20mins						

Remarks

1. Hole dry - sides stable
2. UCS (kg/cm2) 1m = 6.0. 2m = 4.5, 4m = 4.2, 5m = 3.5, 5.5m = 3.8, 6m = 3.8, 7m = 4.2, 8m = 4.2
3.
4

Samples or Tests									Strata		
Type	Depth (m)	Results							Depth (m)	Legend	Strata Description
		75	75	75	75	75	75	N			
D	0.25										MADE GROUND Dark brown silty clay with frequent brick, plastic, flints, roots.
D	0.5								0.40		
									0.80		MADE GROUND dark brown / orange brown silty clay with occasional brick, flint and roots.
D	1.0										Stiff partly fissured grey brown veined blue grey silty CLAY with numerous selenite crystals.
D	1.5										[Some buff calcareous patches and band of dark orange brown claystone 3.0 - 3.1m.]
D	2.0										
U	2.0-3.0										
S	3.0	5	4	4	5	5	6	20	3.10		
D	4.0										Stiff grey brown veined blue grey, silty CLAY with orange silty patches, occasional root trace to 3.5m.
S	4.0	2	2	3	4	4	5	16			[Darker grey brown from 6.0m with fine crystals }
D	4.5										
D	5.0										
S	5.0	3	3	4	4	5	5	18			
D	5.5										
D	6.0										
S	6.0	3	4	4	4	5	6	19			
D	6.5										
D	7.0										
S	7.0	4	5	5	5	6	5	21			
D	7.5										
D	8.0										
S	8.0	4	4	5	6	6	8	25	8.00		

Sampling Code: U- Undisturbed B - Large Distrubed D - Small Disturbed W - Water (U*) Non recovery of Sample

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APPENDIX 3 – GEOTECHNICAL LABORATORY TEST RESULTS

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL13/3242

Client's Reference: Report Date: 17 September 2013

Client Name: Jomas
Jomas Associates Ltd
1 Furzeground Way
Lakeside House
Stockley Park
UB11 1BD

For the attention of: Roni Savage

Contract Title: South Hill Park

Date Received: 9/9/2013
Date Commenced: 9/9/2013
Date Completed: 17/9/2013

Notes: Observations and Interpretations are outside the UKAS Accreditation

Checked and Approved Signatories:

R Gunson (Director) | A Watkins (Director) | M Beastall (Laboratory Manager)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
BH1		D	1.00	Brown slightly sandy CLAY.
BH1		U	1.00-2.00	Stiff brown slightly sandy CLAY.
BH1		U	4.00-5.00	Stiff brown slightly gravelly slightly sandy CLAY.
BH2		D	1.00	Reddish brown slightly sandy CLAY.
BH2		U	2.00-3.00	Stiff brown slightly gravelly sandy silty CLAY.
BH3		D	1.00	Reddish brown slightly sandy CLAY.
BH3		D	2.00	Brown slightly sandy CLAY.
BH3		D	5.00	Reddish brown slightly sandy CLAY.
BH4		D	1.00	Reddish brown slightly sandy CLAY.
BH4		D	2.00	Reddish brown slightly sandy CLAY.
BH4		D	4.00	Reddish brown slightly sandy CLAY.

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Compiled by	Date	Checked by	Date	Approved by	Date
	17/09/13		17/09/13		17/09/13

SOUTH HILL PARK.

Contract No: PSL13/3242

Client Ref:

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.	Plasticity Index % Clause 6.	% Passing .425mm	Remarks
BH1			1.00	28				78	27	51	100	Very high plasticity CV.
BH2			1.00	20				67	23	44	100	High plasticity CH.
BH3			1.00	24				74	27	47	100	Very high plasticity CV.
BH3			2.00	24				77	27	50	100	Very high plasticity CV.
BH3			5.00	30				77	26	51	100	Very high plasticity CV.
BH4			1.00	24				75	25	50	100	Very high plasticity CV.
BH4			2.00	27				78	26	52	100	Very high plasticity CV.
BH4			4.00	29				79	26	53	100	Very high plasticity CV.

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

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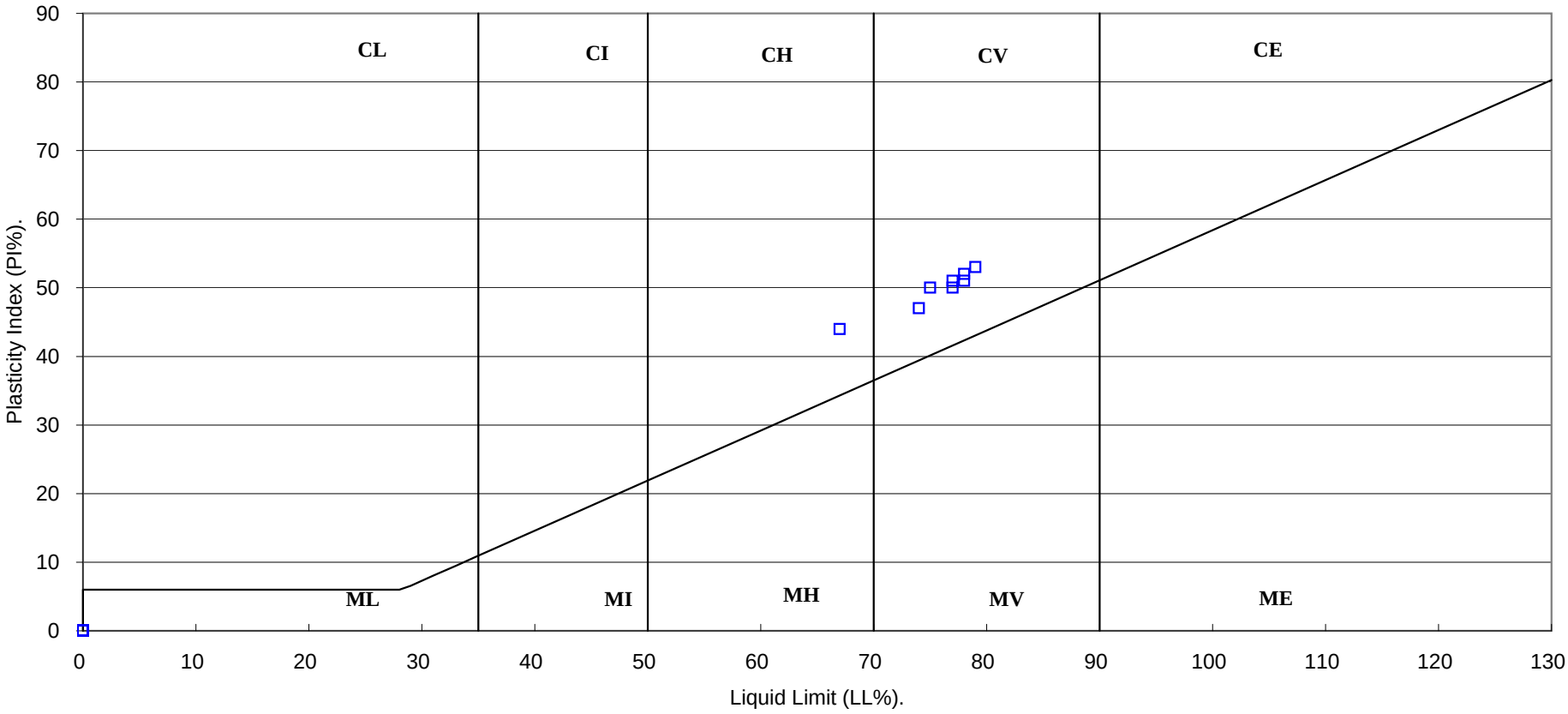
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	17/09/13		17/09/13		17/09/13
SOUTH HILL PARK.				Contract No:	PSL13/3242
				Client Ref:	

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



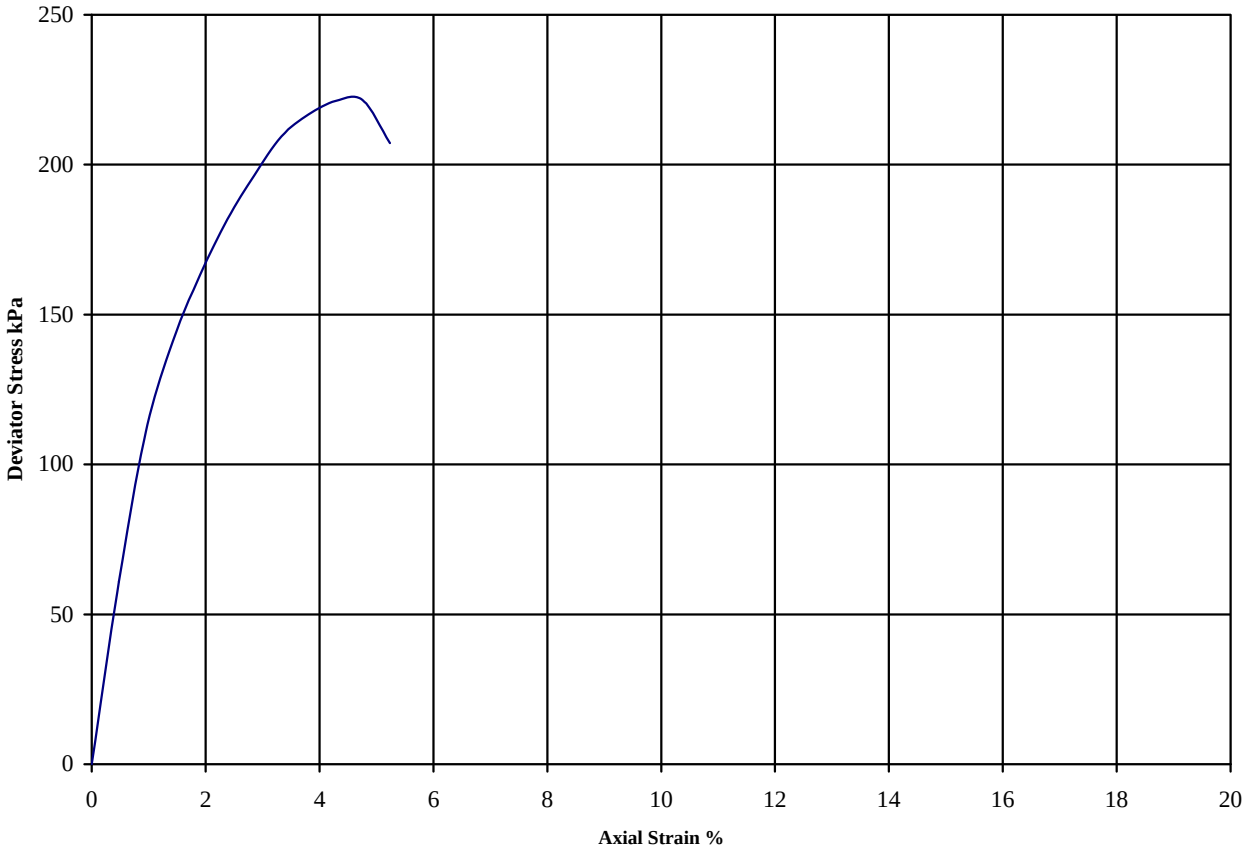
	Compiled by	Date	Checked by	Date	Approved by	Date
PSL Professional Soils Laboratory		17/09/13		17/09/13		17/09/13
	SOUTH HILL PARK.				Contract No:	PSL13/3242
					Client Ref:	

Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure
B.S. 1377 : Part7 : Clause 8 : 1990

Hole Number: BH1 **Depth (m):** 1.00-2.00

Sample Number: **Sample Type:** U



Diameter (mm):		102.0	Height (mm):		210.0	Test:	100 mm Single Stage. Undisturbed		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Remarks
A	25	1.80	1.43	20	222	111	4.8	Brittle	Sample taken from top of tube Rate of strain = 1.9 %/min Latex Membrane used 0.2 mm thickness, Correction applied 0.36 kPa See summary of soil descriptions.

Checked	Date	Approved	Date
	17/09/13		17/09/13

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Professional Soils Laboratory

SOUTH HILL PARK.

Contract No: PSL13/3242

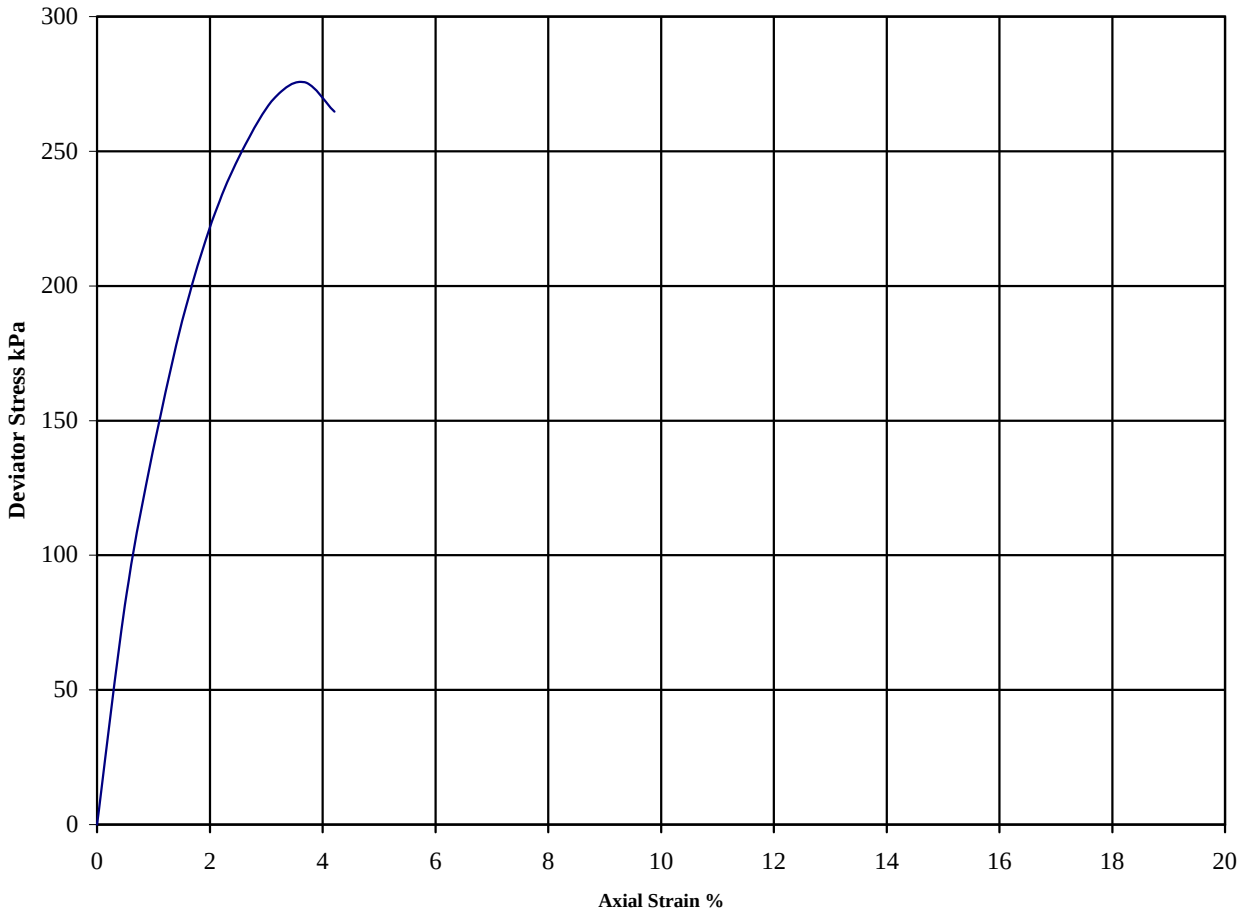
Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

B.S. 1377 : Part7 : Clause 8 : 1990

Borehole Number: **BH1** **Depth (m):** **4.00-5.00**

Sample Number: **Sample Type:** **U**



Diameter (mm):		38	Height (mm):		76	Test:	38 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Strength (kPa)	Failure Strain (%)	Mode of Failure	Remarks
A	29	1.94	1.51	80	276	138	3.7	Brittle	See summary of soil descriptions.

Checked and Approved By Date

17/09/13

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SOUTH HILL PARK. **Contract No:** **PSL13/3242**

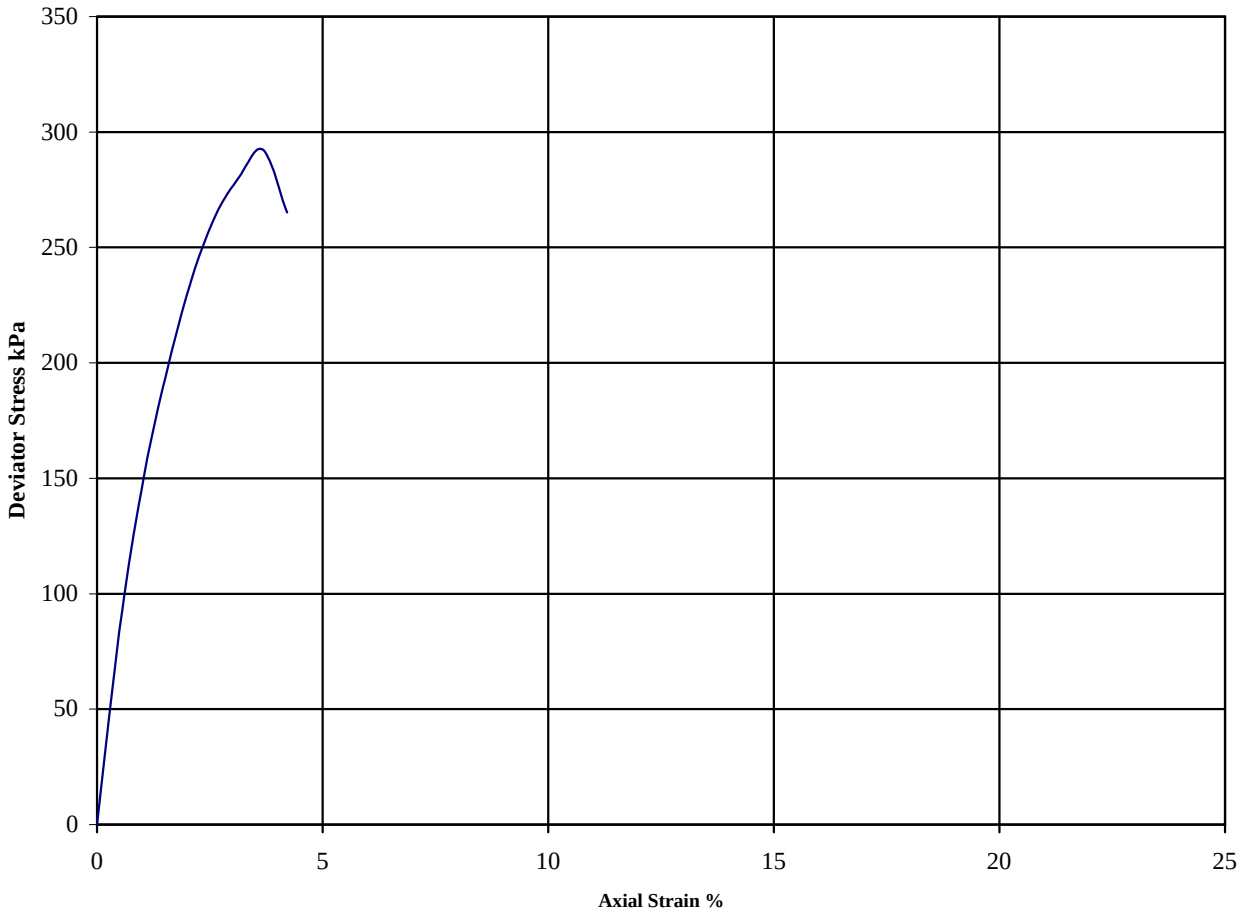
Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

B.S. 1377 : Part7 : Clause 8 : 1990

Borehole Number: BH2 **Depth (m):** 2.00-3.00

Sample Number: **Sample Type:** U



Diameter (mm):		38	Height (mm):		76	Test:	38 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Strength (kPa)	Failure Strain (%)	Mode of Failure	Remarks
A	27	1.96	1.54	40	292	146	3.7	Brittle	See summary of soil descriptions.

Checked and Approved By Date

17/09/13

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SOUTH HILL PARK. **Contract No:** **PSL13/3242**

APPENDIX 4 – CHEMICAL LABORATORY TEST RESULTS

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Unit A2
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TN38 9BY
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THE ENVIRONMENTAL LABORATORY LTD

F.A.O. Roni Savage
Jomas Associates Limited
Lakeside House
1 Furzeground Way
Stockley Park, UB11 1BD

Reporting Date: 12 September 2013

ANALYTICAL REPORT No. AR50605

Samples Received By: Courier
Sample Receipt Date: 06/09/13
Your Job No: P8574J326
Your Order No: ---
Site Location: South Hill Park
No Samples Received: 6
Date of Sampling: 02/09/13 - 03/09/13

This report was written by: Stuart Ballard

Authorised By;

Steve Knight
Reporting Manager

THE ENVIRONMENTAL LABORATORY LTD

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards On Sea, East Sussex, TN38 9BY
Tel: 01424 718618 Fax: 01424 729911

ANALYTICAL REPORT No. AR50605

Location: South Hill Park

2683 2683

Your Job No: P8574J326
Your Order No: ---
Reporting Date: 12/09/13

F.A.O. Roni Savage
Jomas Associates Limited
Lakeside House
1 Furzeground Way
Stockley Park, UB11 1BD

Soils	Characteristic	Clay loam	Clay loam	Silty Clay loam	Silt loam	Clay loam	Clay loam
	Date Sampled	02/09/13 -	02/09/13 -	02/09/13 -	02/09/13 -	02/09/13 -	02/09/13 -
	TP/BH	BH1	BH2	BH3	BH4	BH4	BH4
	Depth (m)	0.50	1.50	2.50	0.25	4.00	8.00
	Our ref	82895	82903	82915	82923	82929	82937
pH Value**	(Units)	7.8	8.0	7.7	7.5	7.8	7.7
Water Soluble 2:1 Sulphate	(mg/l as SO_4)	1419.0	329.0	2323.0	199.0	2609.0	3531.0

All results expressed on dry weight basis
** - MCERTS accredited test
* = UKAS accredited test

Stuart Ballard

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THE ENVIRONMENTAL LABORATORY LTD

Waste Acceptance Criteria ANALYTICAL _RESULTS_

Report No:	ANALYTICAL REPORT No. AR50605				Page 3 of 7		
					CLIENT:	Jomas Associates Limited	
Project Name:	Location: South Hill Park						
Lab Reference	82897				Landfill Waste Acceptance Critena Limits		
Sampling Date	02/09/13 - 03/09/13				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH1						
Depth	1.50						
Solid Waste Analysis							
TOC (%)	0.2				3%	5%	6%
Loss on Ignition (%)**	3.9				--	--	10%
BTEX (mg/kg)**	<0.01				6	--	--
Sum of PCBs (mg/kg)**	<0.01				1	--	--
Mineral Oil (mg/kg)**	<5				500	--	--
Total PAH (mg/kg)**	<0.5				100	--	--
pH (Units)**	7.8				--	--	--
Acid Neutralisation Capacity (mol/kg)	<0.1				--	To be	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
	mg/l	mg/l		mg/kg			
Arsenic*	<0.005	<0.005		<0.1	0.5	2	25
Barium*	0.027	0.021		<0.1	20	100	300
Cadmium*	<0.001	<0.001		<0.01	0.04	1	5
Chromium*	<0.005	<0.005		<0.1	0.5	10	70
Copper*	0.007	<0.005		<0.1	2	50	100
Mercury*	<0.0001	<0.0001		<0.001	0.01	0.2	2
Molybdenum*	<0.005	<0.005		<0.1	0.5	10	30
Nickel*	<0.005	<0.005		<0.1	0.4	10	40
Lead*	<0.005	<0.005		<0.1	0.5	10	50
Antimony	<0.005	<0.005		<0.01	0.06	0.7	5
Selenium*	<0.005	<0.005		<0.01	0.1	0.5	7
Zinc*	0.009	<0.005		<0.1	4	50	200
Chloride*	42	3		41	800	15000	25000
Fluoride*	<1	<1		<1	10	150	500
Sulphate*	2021	680		3899	1000	20000	50000
TDS	3530	1210		6888	4000	60000	100000
Phenol Index	<0.5	<0.5		<0.5	1	-	-
DOC	11.6	5.1		26	500	800	1000
Leach Test Information							
pH *	7.9	7.7					
EC*	3370	1384					
Sample Mass (kg)	0.221						
Dry Matter (%)	79						
Moisture (%)	27						
Stage 1							
Volume Eluate L2 (litres)	0.302						
Filtered Eluate VE1 (litres)	0.132						

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ELAB cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** - MCERTS accredited test

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THE ENVIRONMENTAL LABORATORY LTD

Waste Acceptance Criteria* ANALYTICAL *RESULTS

Report No:	ANALYTICAL REPORT No. AR50605				Page 4 of 7		
					CLIENT:	Jomas Associates Limited	
Project Name:	Location: South Hill Park						
Lab Reference	82912				Landfill Waste Acceptance Critena Limits		
Sampling Date	02/09/13 - 03/09/13				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH3						
Depth	0.30						
Solid Waste Analysis							
TOC (%)	2.7				3%	5%	6%
Loss on Ignition (%)**	6.0				--	--	10%
BTEX (mg/kg)**	<0.01				6	--	--
Sum of PCBs (mg/kg)**	<0.01				1	--	--
Mineral Oil (mg/kg)**	19				500	--	--
Total PAH (mg/kg)**	35.2				100	--	--
pH (Units)**	7.6				--	--	--
Acid Neutralisation Capacity (mol/kg)	<0.1				--	To be	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
	mg/l	mg/l		mg/kg			
Arsenic*	0.011	0.011		<0.1	0.5	2	25
Barium*	0.013	0.010		<0.1	20	100	300
Cadmium*	<0.001	<0.001		<0.01	0.04	1	5
Chromium*	<0.005	<0.005		<0.1	0.5	10	70
Copper*	0.027	0.008		<0.1	2	50	100
Mercury*	<0.0001	<0.0001		<0.001	0.01	0.2	2
Molybdenum*	0.031	0.014		<0.1	0.5	10	30
Nickel*	<0.005	<0.005		<0.1	0.4	10	40
Lead*	<0.005	0.010		<0.1	0.5	10	50
Antimony	0.015	0.008		0.05	0.06	0.7	5
Selenium*	<0.005	<0.005		<0.01	0.1	0.5	7
Zinc*	0.006	0.007		<0.1	4	50	200
Chloride*	4	<1		2	800	15000	25000
Fluoride*	<1	<1		<1	10	150	500
Sulphate*	30	8		57	1000	20000	50000
TDS	350	150		895	4000	60000	100000
Phenol Index	<0.5	<0.5		<0.5	1	-	-
DOC	28.0	13.7		79	500	800	1000
Leach Test Information							
pH *	8.3	8.1					
EC*	278	146					
Sample Mass (kg)	0.206						
Dry Matter (%)	85						
Moisture (%)	18						
Stage 1							
Volume Eluate L2 (litres)	0.318						
Filtered Eluate VE1 (litres)	0.112						

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ELAB cannot be held responsible for any discrepencies with current legislation

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THE ENVIRONMENTAL LABORATORY LTD

SAMPLE RECEIPT AND TEST DATES

Our Analytical Report Number	AR50605
Your Job No:	P8574J326
Sample Receipt Date:	06/09/13
Reporting Date:	12/09/13
Registered:	06/09/13
Prepared:	07/09/13
Analysis complete:	12/09/13

TEST METHOD SUMMARY

PARAMETER	Analysis Undertaken on	Date Tested	Method Number	Technique
pH Value**	Air dried sample	10/09/13	113	Probe
Water Soluble 2:1 Sulphate	Air dried sample	09/09/13	209	Colorimetry

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** - MCERTS Accredited test
Determinands not marked with * or ** are not accredited
MCERTS accreditation covers samples which are predominantly sand, clay, loam or combinations of these three soil types

Any comments, opinions, or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

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SAMPLE RECEIPT AND TEST DATES

Our Analytical Report Number	AR50605
Your Job No:	P8574J326
Sample Receipt Date:	06/09/13
Reporting Date:	12/09/13
Registered:	06/09/13
Prepared:	07/09/13
Analysis complete:	12/09/13

TEST METHOD SUMMARY

PARAMETER	Undertaken on	Date Tested	Method Number	Technique
pH Value**	Air dried sample	09/09/13	113	Electrometric
Total Organic Carbon	Air dried sample	10/09/13	210	Automated IR Absorption
Loss on Ignition**	Air dried sample	09/09/13	129	Gravimetric
Neutralization Capacity to pH 7	Air dried sample	09/09/13	-	EA
Benzene**	As submitted sample	09/09/13	181	GCMS
Toluene**	As submitted sample	09/09/13	181	GCMS
Ethyl Benzene**	As submitted sample	09/09/13	181	GCMS
Xylenes**	As submitted sample	09/09/13	181	GCMS
Mineral Oil**	As submitted sample	09/09/13	117	GCFID
PCB 28**	Air dried sample	10/09/13	120	GCMS
PCB 52**	Air dried sample	10/09/13	120	GCMS
PCB 101**	Air dried sample	10/09/13	120	GCMS
PCB 118**	Air dried sample	10/09/13	120	GCMS
PCB 138**	Air dried sample	10/09/13	120	GCMS
PCB 153**	Air dried sample	10/09/13	120	GCMS
PCB 180**	Air dried sample	10/09/13	120	GCMS
Speciated PAH**	As submitted sample	09/09/13	133	GCFID

The analysts' guide for sampling, analysis and clearance procedures
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** - MCERTS Accredited test
Determinands not marked with a * or ** are not accredited
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THE ENVIRONMENTAL LABORATORY LTD

LEACHATE SAMPLE RECEIPT AND TEST DATES

Our Analytical Report Number	AR50605
Your Job No:	P8574J326
Sample Receipt Date:	06/09/13
Reporting Date:	12/09/13
Registered:	06/09/13
Prepared:	07/09/13
Analysis complete:	12/09/13

LEACHATE TEST METHOD SUMMARY

PARAMETER	Method Number	Technique
Arsenic*	101	ICPMS
Cadmium*	101	ICPMS
Chromium*	101	ICPMS
Lead*	101	ICPMS
Nickel*	101	ICPMS
Copper*	101	ICPMS
Zinc*	101	ICPMS
Mercury*	101	ICPMS
Selenium*	101	ICPMS
Antimony	101	ICPMS
Barium*	101	ICPMS
Molybdenum*	101	ICPMS
pH Value*	113	Electrometric
Electrical Conductivity*	136	Probe
Dissolved Organic Carbon	102	TOC analyser
Chloride*	131	Ion Chromatography
Fluoride*	131	Ion Chromatography
Sulphate*	131	Ion Chromatography
Total Dissolved Solids	144	Gravimetric
Phenol Index	121	HPLC

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APPENDIX 5 – TREE REPORT

4.1 Tree Survey Schedule

Site:	15 South Hill Park, London, NW3 2ST	**Surveyor:**	**Andrew Phelps**
Date of Survey:	15th July 2013	Ref:	PA S781

Tree No	English Name	Height (m)	Crown Spread	Ground Clearance	Age Class	Stem Diameter (mm)	No of Stems	Protection Radius (Metres)	Vigour (Growth Vitality)	Structural Condition	Amenity Landscape Contribution	B.S Cat Ret Value	Sub Cat	Useful Life	Structural Condition/Observations
T.1	Sycamore	9	3	3	Mature	200	1	**2.4**	Normal	Good	Medium	B	2	40	No visible defects
T.2	Pear	6	3	3	Over Mature	380	1	**4.5**	Moderate	Good	Low	C	-	<20	Life expectancy less than 20 years in my view
T.3	Apple	5	2.5	3	Over Mature	150	1	**1.8**	Moderate	Good	Low	C	-	<20	Life expectancy less than 20 years in my view
T.4	Elder	4	1.5	2	Mature	100	1	**1.2**	Moderate	Good	Low	C	-	20	No visual defects
T.5	Bay	5	2.5	2	Mature	160	1	**1.9**	Normal	Good	Low	B	-	30	No visual defects
T.6	Hornbeam	8	5	5	Mature	350	1	**4.2**	Normal	Good	High	A	1/2	>40	Council owned tree

Notes:

1. Height describes the approx. height of the tree in metres from ground level.
2. Crown spread refers to the crown radius in metres from the stem centre and is expressed as an average of NESW if symmetrical
3. Ground Clearance is the height in metres of crown clearance above adjacent ground level.
4. Diameter Breast Height (DBH) is the diameter of the stem measured in mm at 1.5m from ground level for single stemmed trees or at ground level for multi-stemmed trees. DBH may be estimated where access is restricted.
5. Age Class is the tree's relative age to its species and is expressed as Newly planted (NP) Young (Y), Middle Mature (MM), Mature (M) and Over Mature (OM).
6. Protection Multiplier is 12 for single stemmed trees and for trees with more than one stem diameter(s) should be measured in accordance with Annex C, and the RPA should be determined from Annex D of the BS5837:2012.
7. Protection Radius is a radial distance in metres measured from the trunk centre.
8. Growth Vitality - Normal ; Moderate (below normal); Poor (sparse, weak); Dead (dead or dying tree)
9. Structural/Arboricultural Condition – Good (no or only minor defects); Moderate (remediable defects); Poor (major defects present). See Condition Key (4.1) for detail
10. Landscape Contribution – High (prominent landscape feature); Medium (visible in landscape); Low (secluded/among other trees)
11. B.S Cat refers to (BS 5837:2012 Table 1) and refers to tree/group quality and value; 'A' – High; 'B' – Moderate; 'C' – Low; 'U' – Remove. **See Table 1 – Cascade chart for tree quality assessment**
12. Sub Cat refers to the retention criteria values where 1 is arboricultural, 2 is landscape and 3 mainly cultural values, including conservation.
13. Useful Life is the tree's estimated remaining contribution in years.

Plan 1

Existing Site Layout

Cat 'A' Tree

Cat 'B' Tree

Cat 'C' Tree

Trees for Removal

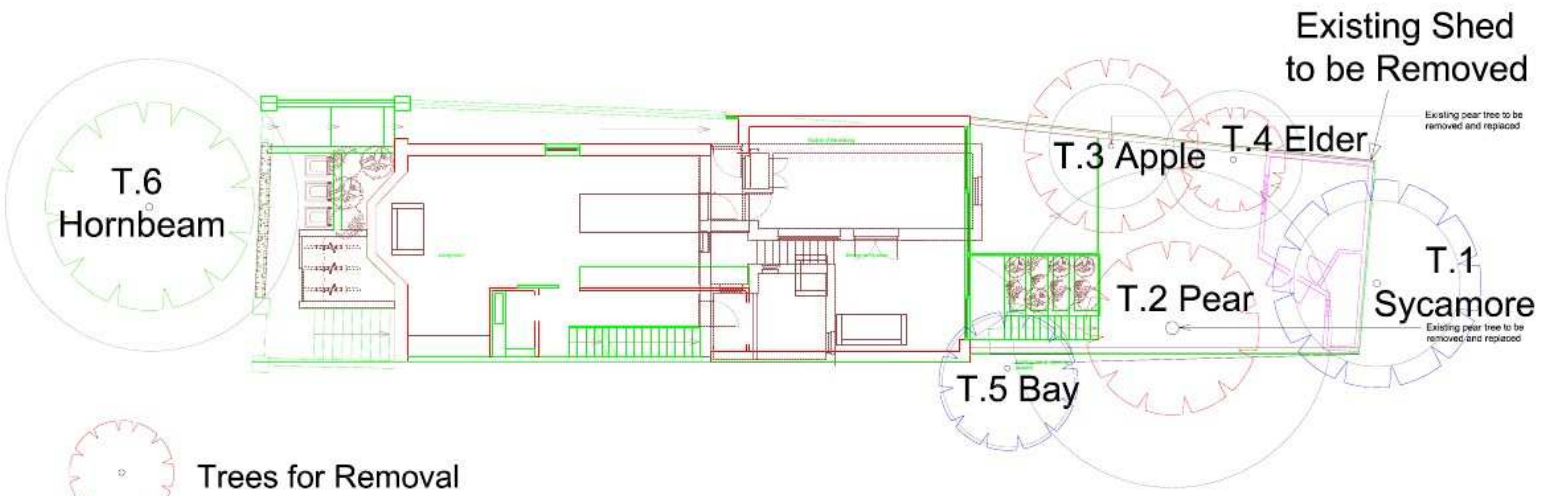
Root Protection Area

Existing Shed to be Removed

Scale 1:150@A3 Title Block Drawing No:3001	Phelps Associates	1 Church St Epsom KT17 4PF	15 South Hill Park London NW3 2ST

Plan 2

Trees for Removal



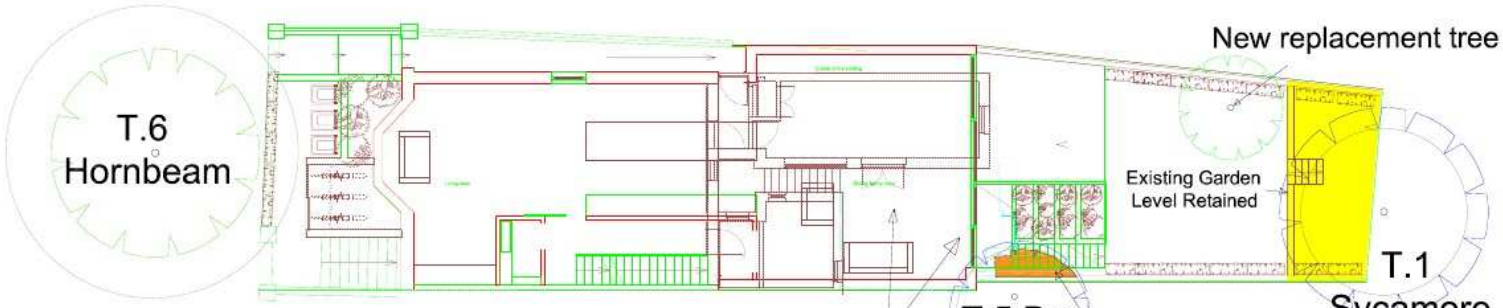
Trees for Removal

Existing Shed
to be Removed

Scale 1:150@A3 Title Block Drawing No:3002	Phelps Associates	1 Church St Epsom KT17 4PF	15 South Hill Park London NW3 2ST

Plan 3

Proposed Site Layout



Existing Area approximately 0.5m below tree level

Area for Excavation within RPA

Following Shed Removal this Area Retained with no Level Changes to Ensure Root Protection

Small Incursion into Trees RPA

Scale 1:150@A3 Title Block Drawing No:3003	Phelps Associates	1 Church St Epsom KT17 4PF	15 South Hill Park London NW3 2ST