REPORT ON A SITE INVESTIGATION

at

UCL, ASTOR COLLEGE, CHARLOTTE STREET, ST PANCRAS, LONDON W1T 4QB

for

CARTER CLACK

Report No 14/10260/CVS **September 2014**

ALBURY S.I. LTD

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FOREWORD

The following notes should be read in conjunction with the report. Any variations on the general procedures outlined below are indicated in the text.

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General

The recommendations made and opinions expressed in the report are based on the strata conditions revealed by the fieldworks as indicated on the boring and trialpit records, together with an assessment of the data from insitu and laboratory tests. No responsibility can be accepted for conditions, which have not been revealed by the fieldworks, for example, between borehole and/or trialpit positions. While the report may offer opinions on the possible configuration of strata, both between the excavations and below the maximum depth achieved by the investigation, these comments are for guidance only and no liability can be accepted for their accuracy. For investigations, which include environmental issues, the data obtained relate to the conditions which are relevant at the time of the investigation.

Boring Techniques

Unless otherwise stated, the light cable percussion technique of soft ground boring has been used. This method generally enables the maximum information to be obtained in respect of strata conditions, but a degree of mixing of some layered soils, for example, thin bands of coarse and fine granular soils, is inevitable. Specific attention is drawn to this occurrence where evidence of such a condition is available.

The penetration resistances quoted on the boring records have been determined generally in accordance with the procedure given in BS1377:1990. The suffix '+' donates that the result has been extrapolated from less than 0.3m penetration into undisturbed soil.

Routine Sampling

During construction of boreholes, sampling and insitu testing will be completed in general accordance with Eurocode EN 1997-2:2007 and BS5930:1999. Variations to this code of practice will only occur where the strata conditions preclude implementation or the contract specifies alternatives.

Samples which are required for environmental testing will be stored in suitable glass containers in accordance with current guidelines.

Groundwater

The groundwater observations entered on boring and trialpit records are those noted at the time of the investigation. The normal rate of progress does not usually permit the recording of any equilibrium water level for any one water strike. Moreover, groundwater levels are prone to seasonal variation and to changes in local drainage conditions. The table on each boring record shows the groundwater level at the quoted borehole and casing depths usually at the start and finish of a day's work. The word 'none' indicates that groundwater was sealed off by the borehole casing or that no water was observed in the borehole.

Trialpits

The method of construction employed to form the trialpits is entered in their records. In general, it is not possible to extend machine excavated trialpits to depths significantly below the water table, especially in predominantly granular soils. Except for manually excavated pits, and unless otherwise stated, the trialpits have not been provided with temporary side support during their construction, hence, personnel have not entered them and examined the insitu exposed strata.

Window Sampling

Window sampling comprises driving a probe into the ground. On extraction of the probe the strata encountered are logged and representative disturbed samples recovered. In general, window sampling cannot be completed in granular soils, or below the water table.

Laboratory Testing

Unless stated in the tests, all laboratory tests have been performed in accordance with the requirements detailed in BS1377 (1990): Parts 1-9, or other standards or specifications that may be appropriate.

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Prepared by **C V Sweby CEng MICE**
Managing Director

1.0 INTRODUCTION

It is understood that it is proposed to undertake redevelopment works at Astor College. Consequently, an investigation has been undertaken in order to determine the current foundation details and establish whether contamination is present associated with former activities in the site area.

The programme of this investigation comprised the construction of a single trialpit and three probeholes using manual excavation methods. During this work samples were taken for further examination and laboratory testing. This report describes the work undertaken, presents the information obtained and discusses the ground conditions.

A copy of the order for these works is presented as Appendix 1. This report is for the benefit of the Client alone and cannot be assigned to a third party without the consent of Albury SI Ltd.

2.0 FIELDWORKS

The trialpit and probeholes were completed on 8th September 2014 at the positions as shown on the site plan, drawing no 14/10260/1, which is presented as Appendix 2 to this report. It should be noted that trialpit 2 was not completed and probehole 3/3a encountered an obstruction.

The depths and descriptions of the strata encountered at the test locations are given on their respective records, which comprise Appendix 3 to this report. These records note the depths at which samples were taken. The foundation details revealed in trialpit 1 are presented on a sectional drawing, no 14/10260/2, included in Appendix 3.

3.0 STRATA CONDITIONS

A study of the site records indicates that made ground, generally comprising a paving slab bedded on concrete was present at surface. Brown sand with considerable amounts of brick and concrete rubble, metal fragments, gravel and roots was revealed beneath the surface horizon. Probeholes 3 and 3a were terminated in the made ground at 0.8m, whilst probehole 4 was terminated at 1.8m. In each case an obstruction was revealed and the excavation works could not continue.

Trialpit 1 was extended by probing and the made ground was proved to 2.6m depth. Brown sandy gravel was revealed at this depth and proved to 2.8m the work being terminated at this depth.

Trialpit 1 indicated that the "foundation" extended to a depth of 970mm below surface, which locates it within made ground. It is not clear, however, whether the concrete revealed in the trialpit is part of a more comprehensive foundation system, for example a pile cap or beam associated with piled foundations supporting the building, piling being completed in view of the depth of made ground.

No groundwater strikes were noted during the siteworks. Consequently, no short-term standing water levels were recorded.

4.0 LABORATORY TESTING

4.1 Chemical Analyses - Contamination

Samples of the made ground have been analysed for the presence of contamination in accordance with the current CLEA guidelines together with other currently available guidance data. This work has been completed in the *M*CERT*S* and UKAS accredited laboratories operated by SAL Ltd. The results are presented as Appendix 4 to this report.

5.0 DISCUSSION OF GROUND CONDITIONS

It is understood that consideration is being given to the construction of extensions to Astor College. At the time of the preparation of this report the extent of the proposed works had not been finalised.

Samples of the near surface made ground have been tested for a range of parameters based upon the CLEA framework. These results can be used, when the scope of works is finalised, to complete an assessment in respect of the potential risk to human health, using the available data published at the time of the issue of this report. This includes SGVs published in 2009 by the Environment Agency, the LQM/CIEH GAC and where applicable the EIC/AGS/CL:AIRE GAC. The tables, which comprise Appendix 5, list the determinants, current guideline values and their sources. Where no current UK standard guidelines exist for the proposed land use it will be appropriate to refer to the Atkins ATRISK^{SOIL} SSVs and WSVs. There is no current UK standard guideline for Lead. Therefore, the ATRISK^{SOIL} SSV for derived for Lead should be considered.

A preliminary assessment of the results indicates that high levels of Lead have been determined. Hence, the potential impact of the high Lead levels should be considered when establishing Health & Safety protocols for the development of this site.

The landfill directive indicates that there is a duty of care that all controlled wastes are transferred to an authorised person or site. The waste holder should take all reasonable steps to ensure that there are no unauthorised deposits and documentation is maintained for the movement and management and should include a List of Wastes code, in accordance with the 2005 Regulations. The soils descriptions and contamination test results should be used by the waste producer to provide a List of Wastes Code and thus identify sites which will accept the excavated materials. The waste regulations have stipulated that all building waste should be treated prior to disposal. A précis of the regulations is included within Appendix 5.

6.0 REFERENCES

- 2009a, Environment Agency "Human health toxicological assessment of contaminants in soil." Science Report: SC050021/SR2.

- 2009b, Environment Agency "Updated technical background to the CLEA model." Science Report: SC050021/SR3.

- 2009 "LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition)."

- 2010 "EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment."

- Atkins ATRISK^{SOIL} Screening Values: www.atrisksoil.co.uk

7.0 GLOSSARY

b(a)p	benzo(a)pyrene
CIEH	Chartered Institute of Environmental Health
GAC	Generic Assessment Criteria
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo Ionisation Detector
SGV	Soil Guideline Value

SOM	Soil Organic Matter
SSV	Soil Screening Values
SVOC	Semi-volatile Organic Compounds
TPH	Total Petroleum Hydrocarbon
VOC	Volatile Organic Compound
WSV	Water Screening Values

A P P E N D I X 1

Order

ALBURY SI LTD

Miltons Yard Petworth Road Witley Godalming Surrey GU8 5LH
Email info@alburysi.co.uk Tel 01428 684836 Fax 01428 685261

Geotechnical and environmental testing specialists

ORDER MANDATE FORM

To be signed by Client or signatory responsible for payment of invoice

Client Name	CARTER CLACK		
Invoicing Address	49 ROMNEY STREET LONDON SW1P 3RF		
Telephone No	0207 233 0303	Email Address	timsmith@carterclack.co.uk
Registered Address (if different from above)			
Company Reg No	2001554	VAT No	333 2391 80
Estimate Ref	AD13/8/14b	Estimate Date	8th September 2014
Site Address	UCL Astor College Charlotte Street London W1T 4QB		
Your Order No	4370		

To be signed by the Client or signatory responsible for payment of invoice

I hereby confirm acceptance of the estimate detailed above from Albury SI Ltd and agree to the Conditions of Tender

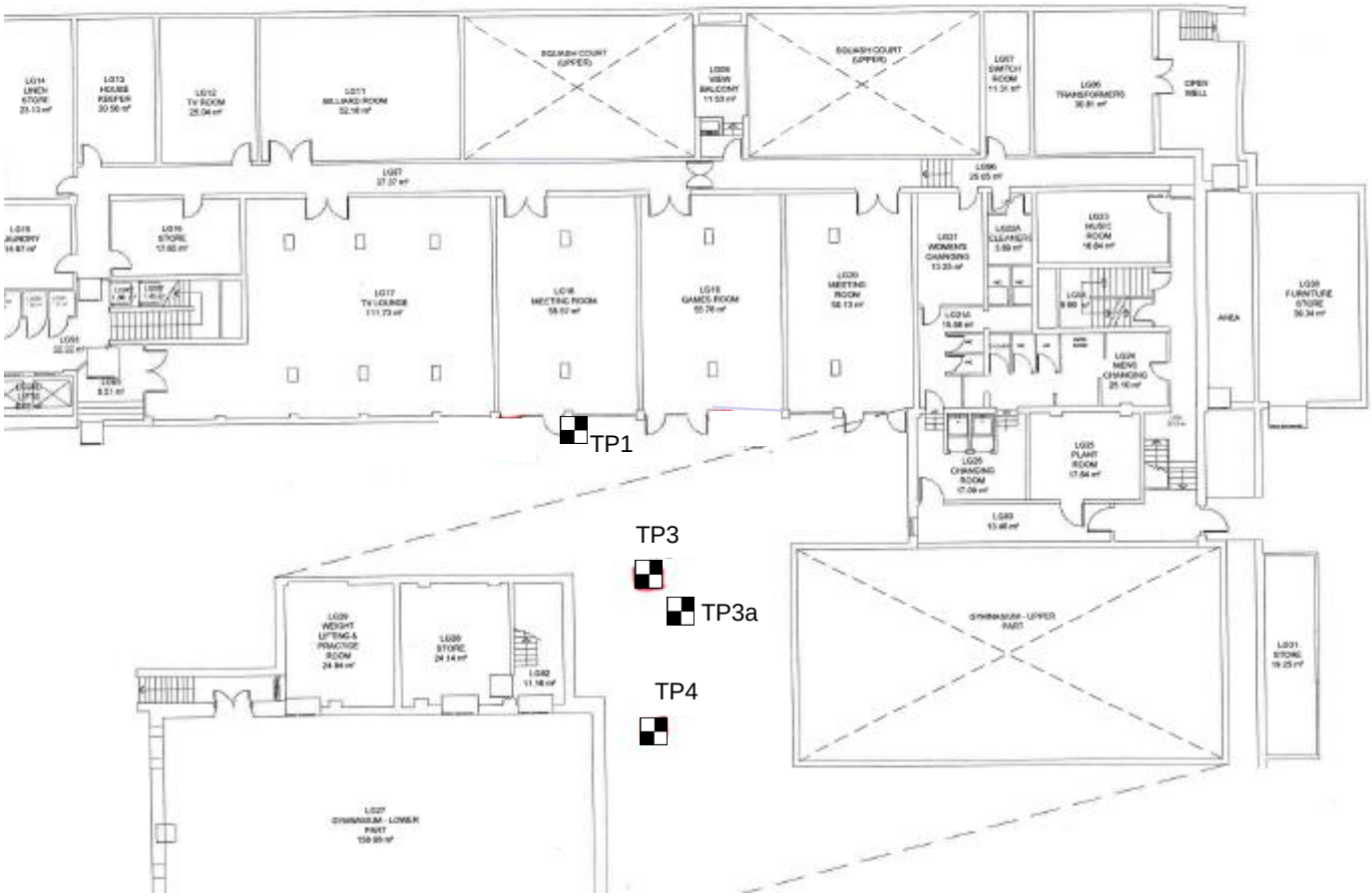
Signed T.J. Smith Dated 03.09.14

Print Name TIM SMITH Position in Company DIRECTOR

On receipt of this form duly completed the required works will be placed into programme

A P P E N D I X 2

Site Plan



Legend:

- Borehole Location
- Trialpit Location
- Site Boundary

Title:	Site Layout Plan
Dwg No:	1
Drawn by:	DMH
Client:	UCL
Site:	ASTOR COLLEGE
Job Ref:	14/10260/1
Scale:	NTS
Revision:	A
Issue Date:	23/9/2014

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A P P E N D I X 3

Boring Records and Trialpit Section

ALBURY S. I. Ltd Petworth Road Witley Surrey GU8 5LH		**Trialpit** 1
Contract	Charlotte Street, London W1	**Report No** 14/10260/CVS
Client	UCL	**Date** 8/9/2014
Site Address	UCL, Charlotte Street, St Pancras,London W1T 4QB	Ground Level mOD

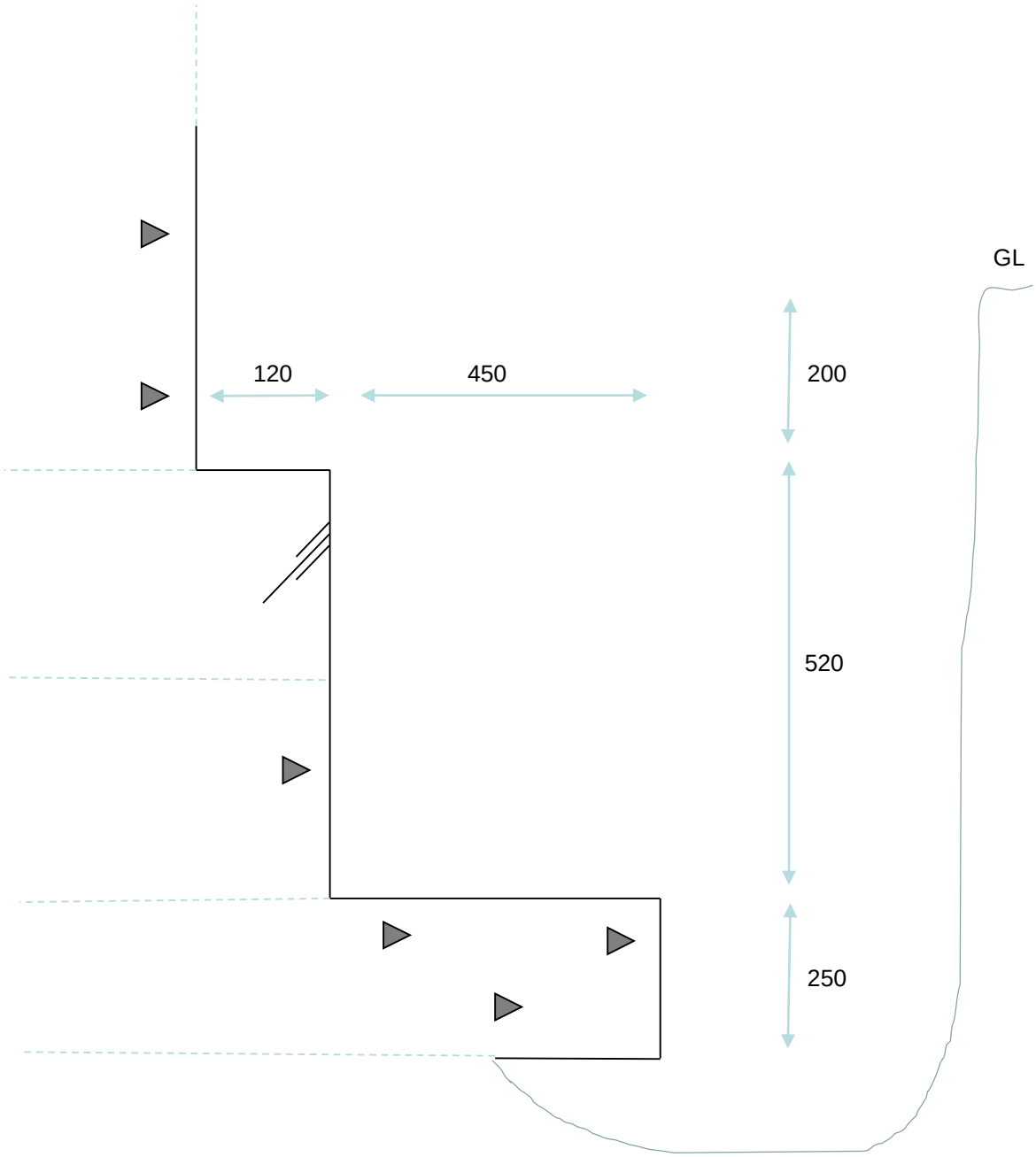
Type of Excavator	Manual/HA	Water level after completion, m	none

Water Strikes, m	Pit Dimensions, m	Ease of Excavation, m	
1 2.70	Length 0.90	Very easy	Difficult 2.60-2.80
2	Breadth 0.40	Moderate GL-2.60	Very hard

Remarks

Sample Type	Depth, m	Shear Strength kPa	Scale 40mm: 1m Depth	Description
			0.20	Made ground (paving slab over concrete)
D	0.25			Made ground (dark brown silty sand with extensive brick and concrete fragments and occasional metal and roots)
D	0.50			
D	1.00		0.95	Made ground (brown silty/clayey sand with gravel and brick fragments)
D	1.50			
D	2.00			
D	2.50			
			2.60	
D	2.70			Brown silty sandy gravel
			2.80	

Sample Code: U – Intact 100 to 50mm Ø B - Large Disturbed D - Small Disturbed W - Water



Site:	ASTOR COLLEGE, LONDON W1T
Drawing No:	14/10260/2
Title:	TP1 sectional drawing
Scale:	NTS
Revision:	A
Issue Date:	1.0 – 23/09/2014

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ALBURY S. I. Ltd Petworth Road Witley Surrey GU8 5LH		**Trialpit** 3
Contract	Charlotte Street, London W1	**Report No** 14/10260/CVS
Client	UCL	**Date** 8/9/2014
Site Address	Charlotte Street, St Pancras, London W1T 4QB	Ground Level mOD

Type of Excavator	Manual	Water level after completion, m	none
Water Strikes, m 1 none 2	Pit Dimensions, m Length 0.40 Breadth 0.40	Ease of Excavation, m Very easy Moderate GL-0.80	Difficult Very hard 0.80+

Remarks

Sample Type	Depth, m	Shear Strength kPa	Scale 40mm: 1m Depth	Legend	Description
					Made ground (paving slab over concrete)
D	0.25		0.25		Made ground (dark brown silty sand with brick and gravel fragments)
D	0.50				Made ground (dark brown peaty silty sand with brick particles)
			0.80		Obstruction

Sample Code: U – Intact 100 to 50mm Ø B - Large Disturbed D - Small Disturbed W - Water

ALBURY S. I. Ltd Petworth Road Witley Surrey GU8 5LH		**Trialpit** 3a
Contract	Charlotte Street, London W1	**Report No** 14/10260/CVS
Client	UCL	**Date** 8/9/2014
Site Address	Charlotte Street, St Pancras, London W1T 4QB	Ground Level mOD

Type of Excavator	Manual	Water level after completion, m	none
Water Strikes, m 1 none 2	Pit Dimensions, m Length 0.40 Breadth 0.40	Ease of Excavation, m Very easy Moderate GL-0.80	Difficult Very hard 0.80+

Remarks

Sample Type	Depth, m	Shear Strength kPa	Scale 40mm: 1m Depth	Legend	Description
					Made ground (paving slab over sand)
D	0.25		0.25		Made ground (dark brown silty sand with brick and gravel fragments and roots)
D	0.50				
			0.80		Obstruction

Sample Code: U – Intact 100 to 50mm Ø B - Large Disturbed D - Small Disturbed W - Water

ALBURY S. I. Ltd Petworth Road Witley Surrey GU8 5LH		**Trialpit** 4
Contract	Charlotte Street, London W1	**Report No** 14/10260/CVS
Client	UCL	**Date** 8/9/2014
Site Address	Charlotte Street, St Pancras, London W1T 4QB	Ground Level mOD

Type of Excavator	Window Sampler	Water level after completion, m	none
Water Strikes, m 1 none 2	Pit Dimensions, m Length 0.40 Breadth 0.40	Ease of Excavation, m Very easy Moderate GL-1.80	Difficult Very hard 1.80+

Remarks

Sample Type	Depth, m	Shear Strength kPa	Scale 40mm: 1m Depth	Legend	Description
					Made ground (paving slab over concrete)
			0.20		
D	0.25				Made ground (dark brown silty sand with brick and gravel fragments)
			0.40		
D	0.50				Made ground (dark brown peaty silty sand with brick particles)
			0.90		
D	1.00				Made ground (brown silty sand with brick and gravel fragments)
			1.40		
D	1.50				Made ground (brown silty sand with occasional brick particles)
			1.80		Obstruction

Sample Code: U – Intact 100 to 50mm Ø B - Large Disturbed D - Small Disturbed W - Water

A P P E N D I X 4

Laboratory Test Results

Scientific Analysis Laboratories is a
limited company registered in England and
Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 421953-1

Date of Report: 24-Sep-2014

Customer: Albury S.I. Ltd
Miltons Yard
Petworth Road
Witley
Godalming
Surrey
GU8 5LH

Customer Contact: Mr Nick McKeon

Customer Job Reference: 14/10260/KJC
Customer Purchase Order: 10827
Customer Site Reference: Charlotte St, W1
Date Job Received at SAL: 12-Sep-2014
Date Analysis Started: 15-Sep-2014
Date Analysis Completed: 24-Sep-2014

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with QP22

1650

Report checked
and authorised by :
Miss Claire Brown
Customer Service Manager

Issued by :
Miss Claire Brown
Customer Service Manager

SAL Reference: 421953
Project Site: Charlotte St, W1
Customer Reference: 14/10260/KJC

Soil Analysed as Soil
Albury SI Suite 1

				SAL Reference	**421953 001**	**421953 002**
				Customer Sample Reference	**BH1 @ 0.5m**	**BH4 @ 0.5m**
				Date Sampled	**11-SEP-2014**	**11-SEP-2014**
				Type	**Fill**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Arsenic	T257	A40	2.0	mg/kg	**14**	**26**
Beryllium	T245	A40	0.5	mg/kg	**0.6**	**1.0**
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**0.2**	**0.3**
Chromium	T257	A40	0.5	mg/kg	**15**	**11**
Copper	T257	A40	2	mg/kg	**110**	**250**
Lead	T257	A40	2	mg/kg	**940**	**2100**
Mercury	T245	A40	1.0	mg/kg	**3.6**	**12**
Nickel	T257	A40	0.5	mg/kg	**17**	**23**
Selenium	T257	A40	3	mg/kg	<3	<3
Vanadium	T257	A40	0.1	mg/kg	**32**	**47**
Zinc	T257	A40	2	mg/kg	**250**	**150**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected
Chromium (trivalent)	T85	A40	2	mg/kg	**15**	**11**
Chromium VI	T82	A40	1	mg/kg	<1	<1
pH	T7	A40			**9.4**	**7.6**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**1.4**	**1.4**
SO4(Total)	T102	A40	0.02	%	**0.82**	**1.4**
Sulphide	T4	A40	10	mg/kg	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.31**	**0.52**
Total Organic Carbon	T21	A40	0.1	%	**3.3**	**8.4**
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1
Phenols(Mono)	T221	AR	0.5	mg/kg	(63) <1.0	(63) <1.0
Moisture @ 105 C	T162	AR	0.1	%	**15**	**23**
Retained on 2mm	T2	AR	0.1	%	(32) <0.1	(32) <0.1

SAL Reference: 421953
Project Site: Charlotte St, W1
Customer Reference: 14/10260/KJC

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

				SAL Reference	**421953 001**	**421953 002**
				Customer Sample Reference	**BH1 @ 0.5m**	**BH4 @ 0.5m**
				Date Sampled	**11-SEP-2014**	**11-SEP-2014**
				Type	**Fill**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Naphthalene	T16	AR	0.1	mg/kg	<0.1	**0.2**
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	**0.3**	**0.6**
Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	**0.7**	<0.1
Pyrene	T16	AR	0.1	mg/kg	**0.7**	**0.1**
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	**0.4**	**0.1**
Chrysene	T16	AR	0.1	mg/kg	**0.5**	**0.2**
Benzo(b/k)Fluoranthene	T16	AR	0.1	mg/kg	**0.8**	**0.2**
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	**0.4**	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	**0.2**	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	**0.2**	<0.1
PAH(total)	T16	AR	0.1	mg/kg	**4.3**	**1.5**

SAL Reference:	421953
Project Site:	Charlotte St, W1
Customer Reference:	14/10260/KJC

Soil Analysed as Soil

Miscellaneous

SAL Reference	**421953 001**	**421953 002**
Customer Sample Reference	**BH1 @ 0.5m**	**BH4 @ 0.5m**
Date Sampled	**11-SEP-2014**	**11-SEP-2014**
Type	**Fill**	**Fill**

Determinand	Method	Test Sample	LOD	Units		
TPH (C10-C12)	T219	AR	2	mg/kg	<2	<2
TPH (C12-C16)	T219	AR	2	mg/kg	<2	<2
TPH (C16-C21)	T219	AR	2	mg/kg	<2	<2
TPH (C21-C35)	T219	AR	2	mg/kg	**85**	**28**
TPH (C35-C40)	T219	AR	2	mg/kg	**150**	**19**
TPH (C10-C40)	T219	AR	10	mg/kg	**240**	**47**

Index to symbols used in 421953-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
32	Whole sample was crushed
63	LOD was raised because an alternative analytical procedure was used
W	Analysis was performed at another SAL laboratory
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Sub contracted analysis performed by SAL Manchester & REC Asbestos Limited
Retained on 2mm is removed before analysis
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except TPH Banded

Method Index

Value	Description
T245	ICP/OES(Aqua Regia Extraction)
T27	PLM
T7	Probe
T4	Colorimetry
T85	Calc
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T16	GC/MS
T162	Grav (1 Dec) (105 C)
T21	OX/IR
T2	Grav
T6	ICP/OES
T82	ICP/OES (Sim)
T102	ICP/OES (HCl extract)
T219	GC/FID (SE)
T221	Colorimetry (CE)
T257	ICP/OES (SIM) (Aqua Regia Extraction)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C10-C12)	T219	AR	2	mg/kg	U	001-002
TPH (C12-C16)	T219	AR	2	mg/kg	U	001-002
TPH (C16-C21)	T219	AR	2	mg/kg	U	001-002
TPH (C21-C35)	T219	AR	2	mg/kg	U	001-002
TPH (C35-C40)	T219	AR	2	mg/kg	N	001-002
TPH (C10-C40)	T219	AR	10	mg/kg	U	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Arsenic	T257	A40	2.0	mg/kg	U	001-002
Beryllium	T245	A40	0.5	mg/kg	U	001-002
Boron (water-soluble)	T82	A40	1	mg/kg	N	001-002
Cadmium	T257	A40	0.1	mg/kg	U	001-002
Chromium	T257	A40	0.5	mg/kg	U	001-002
Copper	T257	A40	2	mg/kg	U	001-002
Lead	T257	A40	2	mg/kg	U	001-002
Mercury	T245	A40	1.0	mg/kg	U	001-002
Nickel	T257	A40	0.5	mg/kg	U	001-002
Selenium	T257	A40	3	mg/kg	U	001-002
Vanadium	T257	A40	0.1	mg/kg	U	001-002
Zinc	T257	A40	2	mg/kg	U	001-002
Asbestos ID	T27	A40			SU	001-002
Chromium (trivalent)	T85	A40	2	mg/kg	N	001-002
Chromium VI	T82	A40	1	mg/kg	N	001-002
pH	T7	A40			U	001-002
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	U	001-002
SO4(Total)	T102	A40	0.02	%	U	001-002
Sulphide	T4	A40	10	mg/kg	N	001-002
Sulphur (total)	T6	A40	0.01	%	U	001-002
Total Organic Carbon	T21	A40	0.1	%	WN	001-002
Cyanide(Total)	T4	AR	1	mg/kg	U	001-002
Phenols(Mono)	T221	AR	0.5	mg/kg	U	001-002
Moisture @ 105 C	T162	AR	0.1	%	N	001-002
Retained on 2mm	T2	AR	0.1	%	N	001-002
Naphthalene	T16	AR	0.1	mg/kg	U	001-002
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-002
Acenaphthene	T16	AR	0.1	mg/kg	U	001-002
Fluorene	T16	AR	0.1	mg/kg	U	001-002
Phenanthrene	T16	AR	0.1	mg/kg	U	001-002
Anthracene	T16	AR	0.1	mg/kg	U	001-002
Fluoranthene	T16	AR	0.1	mg/kg	N	001-002
Pyrene	T16	AR	0.1	mg/kg	N	001-002
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	001-002
Chrysene	T16	AR	0.1	mg/kg	U	001-002
Benzo(b/k)Fluoranthene	T16	AR	0.1	mg/kg	U	001-002
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	001-002
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	001-002
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	001-002
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	001-002
PAH(total)	T16	AR	0.1	mg/kg	U	001-002

A P P E N D I X 5

Contamination Guidelines

Soil Generic Assessment Criteria for Human Health - Inorganics

Determinand	GAC Land-use category (mg/kg^{-1})				GAC Source
	Residential with consumption of home-grown produce	Residential without consumption of home-grown produce	Allotments	Commercial	
Arsenic*	32	ND	43	640	EA SGV, 2009
Antimony	ND	550	ND	7500	EIC/AGS/CL:AIRE, 2010
Barium	ND	1300	ND	22000	EIC/AGS/CL:AIRE, 2010
Beryllium*	51	ND	55	420	LQM/CIEH, 2009
Boron*	291	ND	45	192000	LQM/CIEH, 2009
Cadmium*	10	ND	1.8	230	EA SGV, 2009
Chromium III*	627	ND	15300	8840	LQM/CIEH, 2009/2011
Chromium VI*	4.3	ND	2.1	35	LQM/CIEH, 2009
Copper*	2330	ND	524	71700	LQM/CIEH, 2009
Inorganic Mercury (Hg^{2+})	170	ND	80	3600	EA SGV, 2009
Elemental Mercury (Hg^{4})	1	ND	26	26	EA SGV, 2009
Methyl Mercury (Hg^{+4})*	11	ND	8	410	EA SGV, 2009
Molybdenum	ND	670	ND	17000	EIC/AGS/CL:AIRE, 2010
Nickel*	130	ND	230	1800	EA SGV, 2009
Selenium*	350	ND	120	13000	EA SGV, 2009
Vanadium*	75	ND	18	3160	LQM/CIEH, 2009
Zinc*	3750	ND	618	665000	LQM/CIEH, 2009

*based on a sandy loam with soil organic matter of 6% and pH 7.0 (Environment Agency, 2009)
ND: Not Derived

Soil Generic Assessment Criteria for Human Health - Organics

Determinand	GAC Land-use category (mg/kg^{-1})				GAC Source
	Residential with consumption of home-grown produce	Residential without consumption of home-grown produce	Allotments	Commercial	
Benzene	0.33	ND	0.07	95	EA SGV, 2009
Phenol	420	ND	280	32000	EA SGV, 2009
Ethyl benzene	350	ND	90	2.8×10^3	EA SGV, 2009
Toluene	610	ND	120	4.4×10^3	EA SGV, 2009
o-xylene	250	ND	160	2.6×10^3	EA SGV, 2009
m-xylene	240	ND	180	3.0×10^3	EA SGV, 2009
p-xylene	230	ND	160	3.2×10^3	EA SGV, 2009

based on a sandy loam with soil organic matter of 6% and pH 7.0 (Environment Agency, 2009)
ND: Not Derived

The above GAC are presented above for reference only and should be considered with their respective technical notes.

References:

Environment Agency, 2009. Updated technical background to the CLEA model. Science Report SC050021/SR3
LQM/CIEH, 2009. Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) including 2011 Cr (III) erratum
EIC/AGS/CL:AIRE, 2010. Soil Generic Assessment Criteria for Human Health Risk Assessment.

(Version 7 - Sept 2014)

WASTE TREATMENT

The Landfill (England and Wales) Regulations 2002 require that waste (including inert arisings and contaminated soil) must be treated before it is disposed of at non-hazardous and inert landfills. The proposed treatment option must be compared against a 'three-point test'.

1. It must be a physical, thermal, chemical or biological process including sorting
2. It must change the characteristics of the waste; and
3. It must do so in order to:
   a) reduce its volume; or
   b) reduce its hazardous nature; or
   c) facilitate its handling; or
   d) enhance its recovery.

There are limited exceptions to the above:

- it is inert waste for which treatment is not technically feasible
- it is waste other than inert waste and treatment would not reduce its quantity or the hazards that it poses to human heath or the environment

The waste producer should either

- treat their own waste and provide information about the treatment for subsequent holders, or
- ensure that the waste would be treated by a subsequent holder prior to landfilling

The waste producer or holder should produce a written statement detailing the type of treatment and if relevant the amount of waste sorted out for recovery or alternative treatment.

Based on the foregoing Guidance, it is evident that the current methods of simply removing "contaminated" soil from the site will have to be amended. Preferably as much soil as possible should remain on site, where possible; for example, under areas of hard cover, paths, drives etc. Soils that are to be removed from site must be treated and this may simply be sorting for example the removal of brick and concrete, which can be crushed and used elsewhere. Contaminated soils will require treatment either on site or at a specialist facility prior to disposal. It will be important, therefore, to ensure that the new guidelines are followed during the development of the site. This is likely to have implications on the development in terms of cost and should be carefully considered prior to commencement.