

Site Analytical Services Ltd.



Site Investigations, Analytical & Environmental Chemists, Laboratory Testing Services.

Units 14 + 15, River Road Business Park,
33 River Road, Barking, Essex IG11 0EA

Directors: J. S. Warren, M.R.S.C., P. C. Warren, J. I. Pattinson, BSc (Hons), MSc
Consultants: G. Evans, BSc., M.Sc., PG. Dip., FGS., MEnvSc. A. J. Kingston, BSc C.Eng. MIMM
F. J. Gibbs, F.I.B.M.S. F.I.F.S.T., F.R.S.H. K. J. Blanchette

Tel: 020 8594 8134
Fax: 020 8594 8072
E-Mail: services@siteanalytical.co.uk

Your Ref: **VERBAL INSTRUCTIONS
MR PETER SEALES**

Our Ref: **13/20442
JSW/KLW**

SAMPLE OF TOPSOIL

SUBMITTED BY SEALES ROAD HAULAGE LIMITED

RECEIVED ON 8th MARCH 2013

INTRODUCTION

A sample of topsoil was received into the laboratory for analysis to assess the following characteristics in accordance with B.S. 3882 : 2007.

- a) Nutrient Status, pH Value and Electrical Conductivity
- b) Stone Content and Textural Classification
- c) Visible Contaminants
- d) Chemical analysis for contamination assessment

RESULTS

The results obtained are contained in the Appendix to this report.

COMMENTS

The exceptions to B.S. 3882:2007, Table 1 for Multipurpose topsoil, Low Fertility topsoil, Acidic topsoil and Calcareous topsoil are indicated on the table contained in i2 Analytical Limited Report No. 13-40587, contained in the Appendix to this report.



Reg Office: Units 14 + 15, River Road Business Park,
33 River Road, Barking, Essex IG11 0EA
Business Reg. No. 2255616





COMMENTS

The concentrations of zootoxic heavy metals (Total Arsenic, Total Lead, Total Cadmium, Total Mercury, Total Selenium and Total Nickel) encountered did not exceed the Soil Guideline Values for residential use in the sample analysed.

The concentrations of Trivalent Chromium and Hexavalent Chromium encountered did not exceed CIEH Generic screening values for residential use.

The concentration of Total Cyanide was below the screening value of 20mg/kg and the concentration of Total Phenol was below the Soil Guideline Value for residential use.

An elevated concentration of Benzo(a)pyrene was encountered in the sample at 1.8mg/kg, in excess of the CIEH Generic screening value for residential use of 0.94mg/kg at 2.5% SOM. As such the potential risks to the end-users of the site cannot be discounted at this stage.

The concentration of Petroleum Hydrocarbons encountered did not exceed the screening value of 500mg/kg.

The concentrations of the phytotoxic substances Total Copper, Total Zinc and Boron encountered in the sample were below the CIEH Generic screening values for residential use.

The concentration of Total Sulphide did not exceed 6.2mg/kg in the sample analysed.


The concentration of Total Sulphate encountered did not exceed the BRE guidance level of 2400mg/kg in the sample analysed. However, from the water soluble sulphate concentration BRE Special Digest 1 : 2005, Tables C1 and C2 would classify the sample as Class DS-2.

Loose fibres of Amosite Asbestos were detected in the sample.

The above conclusions have been drawn on the results of the tests carried out on the soil sample submitted and address remediation issues for the protection of the end-user only. The comments made in this report do not address any third party liability.

p.p. SITE ANALYTICAL SERVICES LIMITED

22nd March 2013



J S Warren M.R.S.C
DIRECTOR



Site Analytical Services Ltd.

APPENDIX

Laboratory Test Data



4041



Environmental Science

Aubrey Davidson

Site Analytical Services Ltd
Units 14 -15
River Road Business Park
33 River Road
Barking
Essex
IG11 0EA

t: 0208 5948134
f: 0208 5948072
e: aubreyd@siteanalytical.co.uk

i2 Analytical Ltd.
Building 19,
BRE,
Garston,
Watford,
WD25 9XX

t: 01923 67 00 20
f: 01923 67 00 30
e: reception@i2analytical.com

Analytical Report Number : 13-40586

Project / Site name:	K4	Samples received on:	13/03/2013
Your job number:	13/20442	Samples instructed on:	14/03/2013
Your order number:	11203	Analysis completed by:	21/03/2013
Report Issue Number:	1	Report issued on:	21/03/2013
Samples Analysed:	1 soil sample		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Customer Services Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Samples were received with no indication of date sampled. The recommended holding time prior to analysis may have been exceeded. Results may not be valid should be interpreted with care.

Iss No 20442 - k4 - I2

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Page 1 of 5

Analytical Report Number: 13-40586

Project / Site name: K4

Your Order No: 11203

Lab Sample Number				252083				
Sample Reference				Sample 1				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	11				
Total mass of sample received	kg	0.001	NONE	2.0				
Asbestos Identification Name	Type	N/A	ISO 17025	Amosite - Loose Fibres				
Asbestos in Soil Screen	P/A	N/A	ISO 17025	Present				

General Inorganics

pH	pH Units	N/A	MCERTS	8.0				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	NONE	< 1				
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0				
Total Sulphate as SO ₄	mg/kg	100	ISO 17025	1800				
Water Soluble Sulphate as SO ₄ (2:1)	g/l	0.0025	MCERTS	1.4				
Sulphide	mg/kg	1	MCERTS	6.2				
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.1				

Total Phenols

Total Phenols (monohydric)	mg/kg	2	MCERTS	< 2.0				
----------------------------	-------	---	--------	-------	--	--	--	--

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.2	MCERTS	< 0.20				
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10				
Fluorene	mg/kg	0.2	MCERTS	< 0.20				
Phenanthrene	mg/kg	0.2	MCERTS	0.98				
Anthracene	mg/kg	0.1	MCERTS	0.25				
Fluoranthene	mg/kg	0.2	MCERTS	2.9				
Pyrene	mg/kg	0.2	MCERTS	2.6				
Benzo(a)anthracene	mg/kg	0.2	MCERTS	1.8				
Chrysene	mg/kg	0.05	MCERTS	1.4				
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	2.2				
Benzo(k)fluoranthene	mg/kg	0.2	MCERTS	0.99				
Benzo(a)pyrene	mg/kg	0.1	MCERTS	1.8				
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	MCERTS	1.1				
Dibenz(a,h)anthracene	mg/kg	0.2	MCERTS	0.25				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.3				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	18				
-----------------------------	-------	-----	--------	----	--	--	--	--

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.5				
Boron (total)	mg/kg	1	MCERTS	10				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35				
Lead (aqua regia extractable)	mg/kg	2	MCERTS	87				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	17				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	130				

Petroleum Hydrocarbons

TPH1 (C10 - C40)	mg/kg	10	MCERTS	190				
------------------	-------	----	--------	-----	--	--	--	--



4041



Environmental Science

Analytical Report Number : 13-40586

Project / Site name: K4

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 2 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
252083	Sample 1	None Supplied	None Supplied	Light brown sandy clay with gravel.



4041



Environmental Science

Analytical Report Number : 13-40586

Project / Site name: K4

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-UK	W	ISO 17025
Asbestos Screening in Soil	Screening of samples for Asbestos in Soil. Standard practice is to screen a representative 100 g of the sample provided for the presence/absence of asbestos and identification.	In-house method based on HSG 248. All samples are screened by optical microscopy and identification is carried out using dispersion staining and polarised light	A001-UK	W	ISO 17025
Free cyanide (Low level) in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Stones not passing through a 10 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample results are not corrected for the stone content of the sample.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by extraction with water followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by spectrophotometer.	In-house method	L049-PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	MCERTS



4041



Environmental Science

Analytical Report Number : 13-40586

Project / Site name: K4

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	ISO 17025
TPH1 (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.



4041



Environmental Science

Aubrey Davidson
Site Analytical Services Ltd
Units 14 -15
River Road Business Park
33 River Road
Barking
Essex
IG11 0EA

t: 0208 5948134
f: 0208 5948072
e: aubreyd@siteanalytical.co.uk

i2 Analytical Ltd.
Building 19,
BRE,
Garston,
Watford,
WD25 9XX

t: 01923 67 00 20
f: 01923 67 00 30
e: reception@i2analytical.com

Analytical Report Number : 13-40587

Project / Site name:	K4	Samples received on:	13/03/2013
Your job number:	13/20442	Samples instructed on:	14/03/2013
Your order number:	11203	Analysis completed by:	21/03/2013
Report Issue Number:	1	Report issued on:	21/03/2013
Samples Analysed:	1 soil sample		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Customer Services Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Iss No 13-40587-1

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Page 1 of 5



Environmental Science

i2 Analytical

Building 19
BRE, Bucknalls Lane
Watford, WD25 9XX

Telephone: 01923 670020
Fax: 01923 670030
email: info@i2analytical.com

Certificate of Analysis							
BS 3882:2007 Specification For Topsoil							
Fail BS 3882				client			
Report No:	13-40587			Site Analytical Services Ltd			
Location	K4			Units 14 -15 River Road Business Park 33 River Road Barking Essex IG11 0EA			
Lab Reference (Sample Number)	252084						
Sampling Date							
Sample ID	Sample 1						
Depth (m)				Compliant with range (Y/N)			
		unit	Result	Multi-P	Low-F	Acid	Calc
Texture:	Clay	%w/w	25	Y	Y	Y	Y
	Silt	%w/w	13	Y	Y	Y	Y
	Sand	%w/w	62	Y	Y	Y	Y
	Texture Class		SANDY CLAY LOAM				
Organic Matter:		%w/w	2				
	Clay 5-20%		-	-	-	-	-
	Clay 20-30%		Y	N	Y	N	N
Coarse fragment content:	>2mm	%w/w	42	N	N	N	N
	>20mm	%w/w	14	N	N	N	N
	>50mm	%w/w	0	Y	Y	Y	Y
Soil pH:		pH	7.9	Y	Y	N	Y
Carbonate:		%w/w	7.5	-	-	-	Y
Available plant nutrients	Nitrogen	%w/w	0.123	N	N	N	N
	Extractable Phosphorus	mg/l	42	Y	N	Y	Y
	Extractable Potassium	mg/l	270	Y	N	Y	Y
	Extractable Magnesium	mg/l	160	Y	Y	Y	Y
Carbon: Nitrogen Ratio:		:1	9.5724	Y	Y	Y	Y
Exchangable Sodium Percentage		%	3.7	Y	Y	Y	Y
Phytotoxic contaminants:	Total Zinc	mg/kg	170	Y	Y	Y	Y
	Total Copper	mg/kg	45	Y	Y	Y	Y
	Total Nickel	mg/kg	20	Y	Y	Y	Y
Visible contaminants:	>2mm	%w/w	0	Y	Y	Y	Y
	Plastics	%w/w	0.2	Y	Y	Y	Y
	Sharps	%w/w	0.5	N	N	N	N
Additional analysis:	Available Sodium	mg/l	190				
	Available Calcium	mg/l	3800				
	Conductivity	uS/cm	1200				
Compliancy:				Fail	Fail	Fail	Fail

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Statutory limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation
* = UKAS accredited
** = MCERTS accredited



Analytical Report Number : 13-40587

Project / Site name: K4

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

of a sample is calculated as the % weight of the stones not passing a 2 mm sieve. Results are not corrected for stone content.

Stone content

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
252084	Sample 1	None Supplied	None Supplied	Light brown sandy clay with gravel.



4041



Environmental Science

Analytical Report Number : 13-40587

Project / Site name: K4

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Carbonate In soil	Determination of Carbonate by extraction with 1M HCl followed by titration with 1M NaOH.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L034-PL	D	NONE
Kjeldahl nitrogen in soil	Determination of total nitrogen using the Kjeldahl digestion method and colorimetric determination.	In house method based on BS 7755-3.7:1995 &	L087-PL	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Nitrogen (TKN)	Determination of total nitrogen by Kjeldahl method.	BS3882:2007	L087-PL	D	NONE
Sodium (exchangeable %)	Determination of exchangeable sodium (%) by calculation, in accordance with BS3882:2007 methodology.	BS3882:2007	L087-PL	D	NONE
Stones content of soil	Stones not passing through a 10 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample results are not corrected for the stone content of the sample.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Topsoil Carbon to Nitrogen Ratio	Determination of soil carbon:nitrogen ratio by calculation	BS3882:2007	L01TS	D	NONE
Topsoil Coarse Fragment and Contaminant Analysis		BS3882:2007 & PAS 100:2005	L01TS	D	NONE
Topsoil Conductivity	Determination of the conductivity of soil in accordance with BS 3882:2007 methodology	BS3882:2007	L01TS	D	NONE
Topsoil Extractable/Available Metals	Determination of the extractable metals in soil, in accordance with BS3882:2007 methodology.	BS3882:2007	L01TS	D	NONE
Topsoil Organic Matter	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate. (Walkley Black Method)	In-house method based on BS1377 Part 3, 1990	L023-PL	D	MCERTS
Topsoil pH	Determination of the pH of soil in accordance with BS 3882:2007 methodology	BS3882:2007	L01TS	D	NONE
Topsoil Phosphorus	Determination of the extractable phosphorus in soil, in accordance with BS3882:2007 methodology.	BS3882:2007	L01TS	D	NONE
Topsoil Texture Classification	Determination of the textural classification of soil following BS3882:2007 methodology.	Subcontracted analysis	L01TS	D	NONE

Iss No 13-40587-1

This certificate should not be reproduced, except in full, without the express permission of the laboratory. The results included within the report are representative of the samples submitted for analysis.

Page 4 of 5



Analytical Report Number : 13-40587

Project / Site name: K4

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.