

REF: 1669SP/Pond/mjs

Mike Forgrave
Gower Homes
8 Temple Row
Wrexham LL13 8LY

11th April 2017

Dear Mike,

RE: STANSTY PARK, WREXHAM: BACKFILLED POND

Our investigation details for the backfilled pond are presented below, and should be passed onto the Local Authority to assist in the discharge of the relevant planning condition.

Introduction

GSL geo-environmental report issued in October 2017 identified the possible presence of a pond on site, which may have been backfilled.

Consequently, the Local Authority requested that this feature be investigated. The location of the feature has been plotted from the 1875 historical plan and is presented on the attached sketch.

This sketch shows the location of the pond to be in the back gardens of Plots 50 to 51. The estimated length from the historical plan was in the order of 20m long and 10m wide.

Photographs showing the pond location are presented in Appendix A.

Investigation

A trench was excavated through the backfilled pond on 23rd March 2017. The trench was excavated sufficiently deep enough to prove the depth to the underlying natural ground (Glacial Till) and was extended to the edge of the pond on both sides. This revealed the feature to be around 22m long and was marked as Chainage 0 on the eastern side, extending to Chainage 22 in the west. Photographs of the trench are presented in Appendix A.

At the maximum depth of excavation a typical section was as follows:

0.00 – 0.20	Topsoil
0.20 – 0.60	Made Ground
0.60 – 0.80	Buried Topsoil
0.80 – 0.90	Glacial till

The made ground was mainly dark brown, slightly clayey, sandy silt, and was considered to be derived from a topsoil source. However, it contained between 10 to 20% of demolition debris comprising brick, masonry, tiles, slate fragments and occasional bottles, jars and a trace of polystyrene.

Samples were taken of the made ground at CH 5 and CH 15 with the samples taken off site immediately to the laboratories of ALS in Chester for the same suite of chemical testing as undertaken in the geo-environmental report.

Results of Testing

The results of the soil analyses are presented below, where they compared to the same human health critical values (CVs) used in the geo-environmental report. The results are presented in full in Appendix B.

CLEA SGV Contaminants

Determinant	No of Tests	Range (mg/kg)	CLEA SGV Guidelines A*		% exceeding CLEA SGV
Arsenic	2	6.25 – 14.20	1	32	0
Cadmium	2	0.402-0.993	1	10	0
Lead	2	111 – 486	1	200	0
Mercury	2	<0.14-0.354	1	1	0
Nickel	2	11.9 – 25.4	1	130	0
Selenium	2	<1-1.81	1	350	0
Phenol	2	<0.01*	1	420	0
Cresols	2	<0.01*		NA	
MTBE	2	<0.005*		NA	
Benzene	2	<0.01*	1	0.33	0
Toluene	2	<0.002*	1	610	0
Ethylbenzene	2	<0.003*	1	350	0
M, p-Xylene	2	<0.006*	1	230-240	0
o-xylene	2	<0.003*	1	250	0
Notes					
A* 1 SGV for residential use.					
* - mean value not applicable since all values below laboratory detection levels					

Only one test results exceeded the CLEA SGV values for residential land use with home grown produce. That was for lead from CH 5.

GAC Contaminants

Determinant (GAC Metals)	No of Tests	Range (mg/kg)	GAC Value (mg/kg)	% exceeding GAC
Zinc	2	157 – 454	3750	0
Boron	2	2.99 – 5.73	291	0
Chromium	2	9.93-25.1	NA	
Chromium(Hex)	2	<0.60	4.3	0
Chromium (Triv)	2	9.93 -25.1	3000	0
Copper	2	20.8 – 78.5	2330	0

None of the above values exceed the relevant guidelines.

PAH Speciation

Determinant (GAC Speciated PAH)	No of Tests	Range (mg/kg)	GAC Value (mg/kg)	% exceeding GAC
Anthracene	2	0.053-0.165	4900	0
Acenaphthylene	2	0.025-0.062	400	0
Acenaphthene	2	0.01-0.089	480	0
Benz(a)anthracene	2	0.246-0.983	4.7	0
Benzo(a)pyrene	2	0.291-1.06	5.0 (C4SL)	0
Benzo(b)fluoranthene	2	0.467-1.55	6.5	0
Benzo(ghi)perylene	2	0.277-0.78	46	0
Benzo(k)fluoranthene	2	0.184-0.678	9.6	0
Chrysene	2	0.257-0.819	8.0	0
Dibenzo(ah)anthracene	2	0.0618-0.203	0.86	0
Fluoranthene	2	0.382 – 1.52	460	0
Fluorene	2	<0.01-0.066	380	0
Indeno(123cd)pyrene	2	0.215-0.668	3.9	0
Naphthalene	2	0.0666– 0.0686	3.7	0
Phenanthrene	2	0.15 – 0.466	200	0
Pyrene	2	0.323 – 1.27	1000	0

The above guidance values are based on a SOM of 2.5%, which is the lower bound, as determined by testing. No values exceeded the relevant GAC/C4SL values for residential use.

Other Contaminants

Determinant	No of Tests	Range (mg/kg unless otherwise stated)	Published Guidelines
Sulphide	2	<15	1000 (ICRCL)
Sulphur	2	<10	0.5% (UU)
Sulphate (wat sol)	2	<0.004-0.0457 g/l	N/A
Total Cyanide	2	<1-2.43	NA
pH	2	6.78 – 7.76	<5 (UU)
Soil Organic Matter %	2	3.02 -6.36	6% (EA)
Notes. UU United Utilities EA Environment Agency			

The test results have not revealed any concentrations above the indicated guidance levels for residential land use.

Hydrocarbons

LQM 2.5% Organic Content	No of Tests	Range (mg/kg)	Published Guidelines (mg/kg)
Aliphatic EC 5-6	2	<0.01	55
Aliphatic EC >6-8	2	<0.01	160
Aliphatic EC >8-10	2	<0.01	46
Aliphatic EC >10-12	2	<0.01	230
Aliphatic EC >12-16	2	0.202-0.454	1700
Aliphatic EC >16-35	2	19.78—35.19	64000
Aliphatic EC >35-44	2	2.25-11.90	64000
Aromatic EC 5-7(benzene)	2	<0.01	130
Aromatic EC >7-8(toluene)	2	<0.01	270
Aromatic EC >8-10	2	<0.01	65
Aromatic EC >10-12	2	<0.01	160
Aromatic EC >12-16	2	0.633-0.695	310
Aromatic EC >16-21	2	3.55-5.51	480
Aromatic EC >21-35	2	35.2- 35.7	1100
Aromatic EC >35-44	2	16.90-22.40	1100

None of the above values exceeded the relevant guidance.

The asbestos screening identified traces of Chrysotile asbestos, consequently asbestos identification and quantification was instructed, which recorded an asbestos total of 0.0138%.

Conclusions

The investigation has revealed that the pond was probably a low point in the field where the field and road drainage collected. As such it would have flooded on a regular basis. To return the area to useful land the low point has been backfilled with mainly topsoil, but also some demolition debris.

This has resulted in one lead value exceeding the relevant guidance, along with a trace of asbestos being encountered.

Whilst a pathway to future site users exists from soil ingestion and ingestion of home grown vegetables, the risk is considered to be very low.

However, this area is still in a low point, as shown by the photographs below. It is also at the base of the slope, which rises to the west. Consequently, this area needs to be filled to tie in with the existing ground levels.

It is therefore recommended that as there is a substantial excess of clean topsoil on site, that this area be raised with this material by some 600mm to provide a cover to the backfilled pond and hence reducing the risk further.



In terms of remediation strategy, this is straight forward and it is recommended that the existing topsoil/grass is left in situ. It will then be necessary to excavate hand dug pits through the placed topsoil to prove the required thickness has been placed. Photographs will be taken and provided to

the Local Authority to confirm this work has been undertaken. The grass providing a good marker horizon.

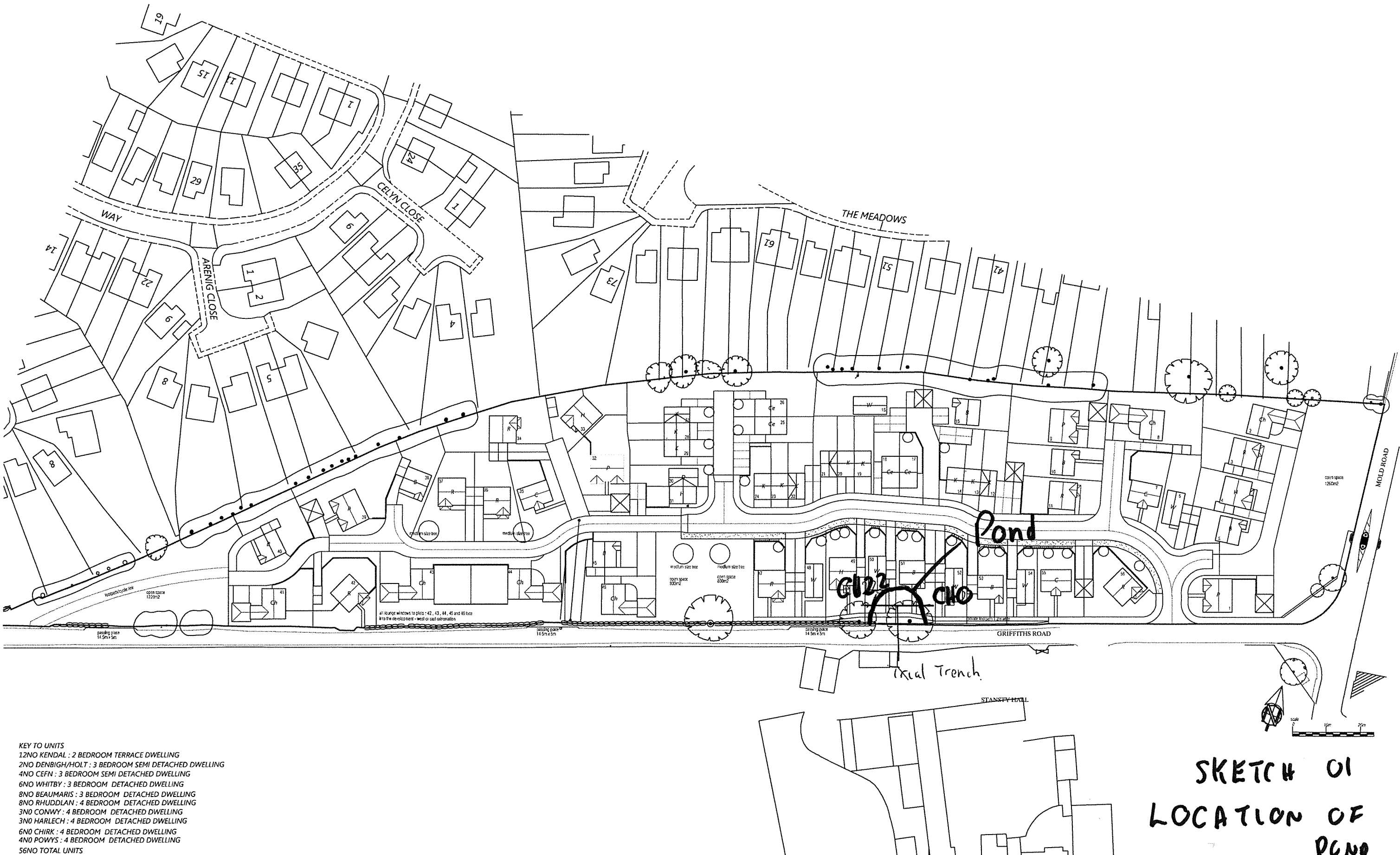
We trust this is satisfactory, should you have any queries please call Mike Scott on 01244 661361.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Mike Scott', with a long, sweeping horizontal stroke extending to the right.

M J Scott

SKETCH



- KEY TO UNITS
12NO KENDAL : 2 BEDROOM TERRACE DWELLING
2NO DENBIGH/HOLT : 3 BEDROOM SEMI DETACHED DWELLING
4NO CEFN : 3 BEDROOM SEMI DETACHED DWELLING
6NO WHITBY : 3 BEDROOM DETACHED DWELLING
8NO BEAUMARIS : 3 BEDROOM DETACHED DWELLING
8NO RUDDLAN : 4 BEDROOM DETACHED DWELLING
3NO CONWY : 4 BEDROOM DETACHED DWELLING
3NO HARLECH : 4 BEDROOM DETACHED DWELLING
6NO CHIRK : 4 BEDROOM DETACHED DWELLING
4NO POWYS : 4 BEDROOM DETACHED DWELLING
56NO TOTAL UNITS

SKETCH OF
LOCATION OF
PCNO



COMPANY TAX NOT A FEE. CHECK COMPANY OR SITE. REPORT ANY ERRORS OR OMISSIONS TO ARCHITECT.

Parry Davies Architects.

Chartered Architects.

PROJECT TITLE

LAND AT BOOZEY FIELD STANSTY WREXHAM

DATE

JULY 2016

DESIGNER

LSOON@A1

REVIEWER

RSG

DATE

12.5539/A1 - 1

DATE

12.5539/A1 - 1

PROJECT TYPE

SITE LAYOUT PLAN

Barclays Buildings, High Street, St Asaph, LL17 0RF

Tel: 01745 565517 Fax: 01745 562162 E-mail: PDPArchitects@aol.com

APPENDIX A

Site Photographs



Photograph 1 Pond Location



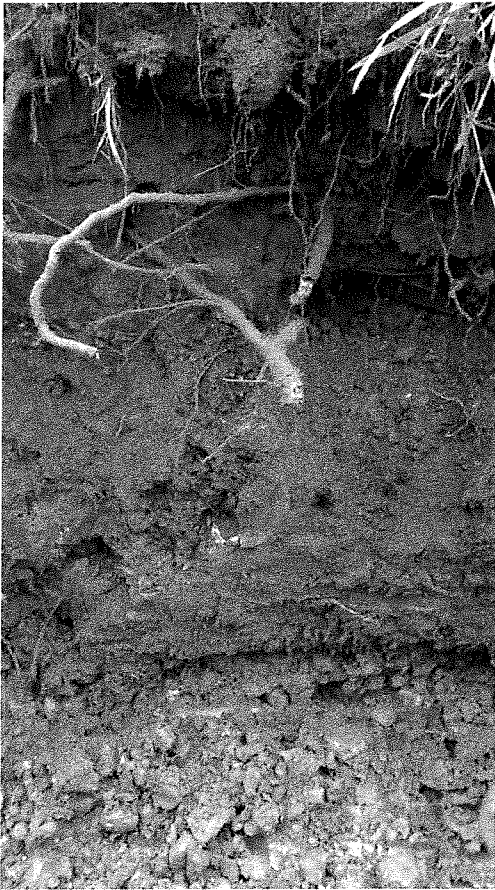
Photographs 2 Pond Location



Photographs 3 CH 0 Edge of Pond



Photographs 4 Trench from CH 0 to CH 22



Photograph 5 Typical Section Glacial till/buried topsoil/ made ground/Topsoil



Photographs 6 showing spoil from excavation



Photographs 7 trench looking towards CH 0



Photographs 8 Trench looking towards CH 22

APPENDIX B

Chemical Test Results



Ground Solve
Unit 1
Well House Barns
Chester Road
Bretton
Cheshire
CH4 0DH

Attention: Mike Scott

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

CERTIFICATE OF ANALYSIS

Date: 10 April 2017
Customer: H_GRSOLVE_BRE
Sample Delivery Group (SDG): 170323-90
Your Reference: 1669/mjs
Location: stansty Park, Wrexham
Report No: 404474

We received 2 samples on Thursday March 23, 2017 and 2 of these samples were scheduled for analysis which was completed on Monday April 10, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan
Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG:	170323-90	Client Reference:	1669/mjs	Report Number:	404474
Location:	stansty Park, Wrexham	Order Number:	1696/01/mjs	Superseded Report:	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15224774	CH5		0.00 - 0.40	23/03/2017
15224775	CH15		0.00 - 0.60	23/03/2017

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90
Location: stansty Park, Wrexham

Client Reference: 1669/mjs
Order Number: 1696/01/mjs

Report Number: 404474
Superseded Report:

Results Legend			Lab Sample No(s)	
☒ Test			1522474	1522475
☐ No Determination Possible			CH5	CH15
Sample Types -			AGS Reference	
S - Soil/Solid			Depth (m)	
UNS - Unspecified Solid			Container	
GW - Ground Water			Sample Type	
SW - Surface Water				
LE - Land Leachate				
PL - Prepared Leachate				
PR - Process Water				
SA - Saline Water				
TE - Trade Effluent				
TS - Treated Sewage				
US - Untreated Sewage				
RE - Recreational Water				
DW - Drinking Water Non-regulatory				
UNL - Unspecified Liquid				
SL - Sludge				
G - Gas				
OTH - Other				
Anions by Kone (soil)	All	NDPs: 0 Tests: 2	X	X
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2	X	X
Asbestos Quantification - Full	All	NDPs: 0 Tests: 1	X	
Chromium III	All	NDPs: 0 Tests: 2	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2	X	X
Easily Liberated Sulphide	All	NDPs: 0 Tests: 2	X	X
Elemental Sulphur	All	NDPs: 0 Tests: 2	X	X
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 2	X	X
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 2	X	X
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2	X	X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2	X	X
Metals in solid samples by OES	All	NDPs: 0 Tests: 2	X	X
PAH by GCMS	All	NDPs: 0 Tests: 2	X	X
pH	All	NDPs: 0 Tests: 2	X	X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2	X	X



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SDG: 170323-90
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Client Reference: 1669/mjs
Order Number: 1696/01/mjs

Report Number: 404474
Superseded Report:

Results Legend

- ☒ Test
☐ No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

15224774

15224775

Customer
Sample Reference

CH5

CH15

AGS Reference

Depth (m)

0.00 - 0.40

0.00 - 0.60

Container

250g Amber Jar
(ALE210)

250g Amber Jar
(ALE210)

Sample Type

S

S

Sample description

All

NDPs: 0
Tests: 2

X

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90
Location: stansty Park, Wrexham

Client Reference: 1669/mjs
Order Number: 1696/01/mjs

Report Number: 404474
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
15224774	CH5	0.00 - 0.40	Dark Brown	Loamy Sand	Stones	Vegetation
15224775	CH15	0.00 - 0.60	Dark Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90 Client Reference: 1669/mjs Report Number: 404474
Location: stansty Park, Wrexham Order Number: 1696/01/mjs Superseded Report:

Results Legend		Customer Sample Ref.	CH5	CH15			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.40	0.00 - 0.60			
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)			
aq	Aqueous / settled sample.		23/03/2017	23/03/2017			
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
-	Subcontracted test.						
--	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		23/03/2017	23/03/2017			
(F)	Trigger breach confirmed		170323-90	170323-90			
1-5&5@	Sample deviation (see appendix)		15224774	15224775			
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	22	18			
Phenol	<0.01 mg/kg	TM062 (S)	<0.01 M	<0.01 M			
Cresols	<0.01 mg/kg	TM062 (S)	<0.01 M	<0.01 M			
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015 M	<0.015 M			
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)	<0.035 M	<0.035 M			
Soil Organic Matter (SOM)	<0.35 %	TM132	6.36 #	3.02 #			
pH	1 pH Units	TM133	7.76 M	6.78 M			
Sulphur, Elemental	<10 mg/kg	TM136	<10 M	<10 M			
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 #	<0.6 #			
Cyanide, Total	<1 mg/kg	TM153	2.43 M	<1 M			
Sulphide, Easily liberated	<15 mg/kg	TM180	<15 M	<15 M			
Chromium, Trivalent	<0.9 mg/kg	TM181	25.1	9.93			
Arsenic	<0.6 mg/kg	TM181	14.2 M	6.25 M			
Boron	<0.7 mg/kg	TM181	5.73 #	2.99 #			
Cadmium	<0.02 mg/kg	TM181	0.993 M	0.402 M			
Chromium	<0.9 mg/kg	TM181	25.1 M	9.93 M			
Copper	<1.4 mg/kg	TM181	78.5 M	20.8 M			
Lead	<0.7 mg/kg	TM181	486 M	111 M			
Mercury	<0.14 mg/kg	TM181	0.354 M	<0.14 M			
Nickel	<0.2 mg/kg	TM181	25.4 M	11.9 M			
Selenium	<1 mg/kg	TM181	1.81 #	<1 #			
Zinc	<1.9 mg/kg	TM181	454 M	157 M			
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0457 M	<0.004 M			
Asbestos Quantification - Gravimetric - %	<0.001 %	TM304	0.0138 #				
Asbestos Quantification - PCOM Evaluation - %	<0.001 %	TM304	<0.001 #				
Additional Asbestos Components (Using TM048)	-	TM304	None #				
Analysts Comments	-	TM304	N/C				
Asbestos Quantification - Total - %	<0.001 %	TM304	0.0138 #				



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90
Location: stansty Park, WrexhamClient Reference: 1669/mjs
Order Number: 1696/01/mjsReport Number: 404474
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	CH5	CH15				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5\	Sample deviation (see appendix)							
		Depth (m)	0.00 - 0.40	0.00 - 0.60				
		Sample Type	Soil/Solid (S)	Soil/Solid (S)				
		Date Sampled	23/03/2017	23/03/2017				
		Sample Time						
		Date Received	23/03/2017	23/03/2017				
		SDG Ref	170323-90	170323-90				
		Lab Sample No.(s)	15224774	15224775				
		AGS Reference						
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	48	51				
			2	2				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	<44	<44				
			2 M	2 M				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5				
			2 #	2 #				
Benzene	<10 µg/kg	TM089	<10	<10				
			2 M	2 M				
Toluene	<2 µg/kg	TM089	<2	<2				
			2 M	2 M				
Ethylbenzene	<3 µg/kg	TM089	<3	<3				
			2 M	2 M				
m,p-Xylene	<6 µg/kg	TM089	<6	<6				
			2 M	2 M				
o-Xylene	<3 µg/kg	TM089	<3	<3				
			2 M	2 M				
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9	<9				
			2	2				
sum of detected BTEX by GC	<24 µg/kg	TM089	<24	<24				
			2	2				
Aliphatics >C5-C6	<10 µg/kg	TM089	<10	<10				
			2	2				
Aliphatics >C6-C8	<10 µg/kg	TM089	<10	<10				
			2	2				
Aliphatics >C8-C10	<10 µg/kg	TM089	<10	<10				
			2	2				
Aliphatics >C10-C12	<10 µg/kg	TM089	<10	<10				
			2	2				
Aliphatics >C12-C16	<100 µg/kg	TM173	454	202				
Aliphatics >C16-C21	<100 µg/kg	TM173	1990	1980				
Aliphatics >C21-C35	<100 µg/kg	TM173	33200	17800				
Aliphatics >C35-C44	<100 µg/kg	TM173	11900	2250				
Total Aliphatics >C12-C44	<100 µg/kg	TM173	47600	22300				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10				
			2	2				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	<10				
			2	2				
Aromatics >EC8-EC10	<10 µg/kg	TM089	<10	<10				
			2	2				
Aromatics >EC10-EC12	<10 µg/kg	TM089	<10	<10				
			2	2				
Aromatics >EC12-EC16	<100 µg/kg	TM173	633	695				
Aromatics >EC16-EC21	<100 µg/kg	TM173	3550	5510				
Aromatics >EC21-EC35	<100 µg/kg	TM173	35200	35700				
Aromatics >EC35-EC44	<100 µg/kg	TM173	22400	16900				
Aromatics >EC40-EC44	<100 µg/kg	TM173	8340	5890				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	61800	58800				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	109000	81100				



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Validated

SDG: 170323-90
Location: stansty Park, Wrexham

Client Reference: 1669/mjs
Order Number: 1696/01/mjs

Report Number: 404474
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	CH5 0.00 - 0.40 SOLID 23/03/2017 00:00:00 24/03/2017 08:31:55 170323-90 15224774 TM048	30/3/17	Chris Swindells	Soil containing loose fibres and ACM debris	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	CH15 0.00 - 0.60 SOLID 23/03/2017 00:00:00 24/03/2017 08:18:25 170323-90 15224775 TM048	30/3/17	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90
Location: stansty Park, Wrexham

Client Reference: 1669/mjs
Order Number: 1696/01/mjs

Report Number: 404474
Superseded Report:

Asbestos Quantification - Full

		Additional Asbestos Components (Using TM048)	Analysts Comments	Asbestos Quantification - Gravimetric - %	Asbestos Quantification - PCOM Evaluation - %	Asbestos Quantification - Total - %
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	CH5 0.00 - 0.40 SOLID 23/03/2017 00:00:00 03/04/2017 07:40:29 170323-90 15224774 TM304	None (#)	N/C	0.0138 (#)	<0.001 (#)	0.0138 (#)



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90
Location: stansty Park, Wrexham

Client Reference: 1669/mjs
Order Number: 1696/01/mjs

Report Number: 404474
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
ASB_PREP				
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM136	Method 17.10, Second Site property, March 2003	Determination of Sulphur by HPLC		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM243		Mixed Anions In Soils By Kone		
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 170323-90 Client Reference: 1669/mjs Report Number: 404474
Location: stansty Park, Wrexham Order Number: 1696/01/mjs Superseded Report:

Test Completion Dates

Lab Sample No(s)	15224774	15224775
Customer Sample Ref.	CH5	CH15
AGS Ref.		
Depth	0.00 - 0.40	0.00 - 0.60
Type	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)	29-Mar-2017	29-Mar-2017
Asbestos ID in Solid Samples	30-Mar-2017	30-Mar-2017
Asbestos Quantification - Full	10-Apr-2017	
Chromium III	29-Mar-2017	29-Mar-2017
Cyanide Comp/Free/Total/Thiocyanate	30-Mar-2017	30-Mar-2017
Easily Liberated Sulphide	27-Mar-2017	28-Mar-2017
Elemental Sulphur	29-Mar-2017	29-Mar-2017
EPH CWG (Aliphatic) GC (S)	27-Mar-2017	27-Mar-2017
EPH CWG (Aromatic) GC (S)	27-Mar-2017	27-Mar-2017
GRO by GC-FID (S)	31-Mar-2017	30-Mar-2017
Hexavalent Chromium (s)	29-Mar-2017	29-Mar-2017
Metals in solid samples by OES	27-Mar-2017	28-Mar-2017
PAH by GC/MS	27-Mar-2017	27-Mar-2017
pH	28-Mar-2017	28-Mar-2017
Phenols by HPLC (S)	27-Mar-2017	27-Mar-2017
Sample description	24-Mar-2017	24-Mar-2017
Total Organic Carbon	30-Mar-2017	30-Mar-2017
TPH CWG GC (S)	31-Mar-2017	30-Mar-2017



CERTIFICATE OF ANALYSIS

SDG: 170323-90
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Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO 17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
\$	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.