

Customer

Customer Services
ALS Life Sciences
Hawarden Business Park
Manor Lane
Hawarden, Deeside
UK
CH5 3US

Certificate Of Analysis

Job Number: 18-47977
Issue Number: 1
Report Date: 11 October 2018

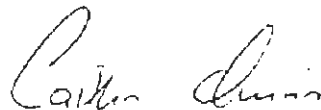
Site: Killycard: 181010-49
PO Number: Not Supplied
Date Samples Received: 10/10/2018

Please find attached the results for the samples received at our laboratory on 10/10/2018.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our website at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

Authorised By:



Caitlin Quinn
Deputy Quality Manager

Authorised Date: 11 October 2018

Notes:

Results relate only to the items tested.
Information on methods of analysis and performance characteristics is available on request.
Any opinions or interpretations indicated are outside the scope of our INAB accreditation.
This test report shall not be reproduced except in full or with written approval of City Analysts Limited.

Certificate Of Analysis

Customer

Customer Services
ALS Life Sciences
Hawarden Business Park
Manor Lane
Hawarden, Deeside
UK
CH5 3US

Report Reference: 18-47977

Report Version: 1

Site: Killycard: 181010-49

Sample Description: GW 01

Date of Sampling: 09/10/2018

Sample Type: Ground

Date Sample Received: 10/10/2018

Lab Reference Number: 414286

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	10/10/2018	Coliforms	1986.3	MPN/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:

PV Value is the parametric value, taken from European Communities. (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count

Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

Certificate Of Analysis

Customer

Customer Services
ALS Life Sciences
Hawarden Business Park
Manor Lane
Hawarden, Deeside
UK
CH5 3US

Report Reference: 18-47977

Report Version: 1

Site: Killycard: 181010-49

Sample Description: GW 03

Date of Sampling: 09/10/2018

Sample Type: Ground

Date Sample Received: 10/10/2018

Lab Reference Number: 414287

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	10/10/2018	Coliforms	1119.9	MPN/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:

PV Value is the parametric value, taken from European Communities. (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count

Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon



CERTIFICATE OF ANALYSIS

SDG:	181010-49	Client Reference:	P1724	Report Number:	477084
Location:	Killycard	Order Number:	Z1260	Superseded Report:	476448

Appendix

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 ISO17025. 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%. 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 leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. 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.

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 (BTEX). 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

If a sample is classed as deviated then the associated results may be compromised.

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.



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

Fehily Timoney
3rd Floor
North Park Offices
North Park Business Park
North Road
Dublin
Dublin 11

Attention: Daniel Hayden

CERTIFICATE OF ANALYSIS

Date: 17 October 2018
Customer: D_FTIM_DUB
Sample Delivery Group (SDG): 181011-82
Your Reference: P1724
Location: Killycard
Report No: 477251

We received 1 sample on Thursday October 11, 2018 and 1 of these samples were scheduled for analysis which was completed on Wednesday October 17, 2018. 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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

Approved By:

Sonia McWhan
Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18505196	GW02		0.00 - 0.00	10/10/2018

Maximum Sample/Coolbox Temperature (°C) :

8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Results Legend

- X Test
- N 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)		18505196
Customer Sample Reference		GWM02
AGS Reference		
Depth (m)		0.00 - 0.00
Container	0.5l glass bottle (ALE227) 250ml BOD (ALE212) H2SO4 (ALE244) HNO3 Filtered (ALE204) NaOH (ALE245) Vial (ALE297)	GW
Sample Type	GW	GW

Parameter	All	NDPs: 0 Tests: 1	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
Alkalinity as CaCO3	All	NDPs: 0 Tests: 1	X					
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1			X			
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X					
BOD True Total	All	NDPs: 0 Tests: 1		X				
COD Unfiltered	All	NDPs: 0 Tests: 1		X				
Coliforms (W)	All	NDPs: 0 Tests: 1		X				
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1	X					
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1					X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1				X		
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 1	X					
Fluoride	All	NDPs: 0 Tests: 1	X					
Mercury Dissolved	All	NDPs: 0 Tests: 1				X		
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 1	X					
Nitrite by Kone (w)	All	NDPs: 0 Tests: 1					X	
Organotins in Aqueous Samples	All	NDPs: 0 Tests: 1	X					



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Results Legend	Lab Sample No(s)							
<p>X Test</p> <p>N No Determination Possible</p> <p>Sample Types -</p> <p>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</p>	18505196							
	Customer Sample Reference	GW02						
	AGS Reference							
	Depth (m)	0.00 - 0.00						
	Container	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	250ml BOD (ALE212)	0.5l glass bottle (ALE227)	
Sample Type	GW	GW	GW	GW	GW	GW		
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 1	X					
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 1	X					
Pesticides (Suite III) by GCMS	All	NDPs: 0 Tests: 1	X					
pH Value	All	NDPs: 0 Tests: 1	X					
Phosphate by Kone (w)	All	NDPs: 0 Tests: 1	X					
Silicon Dissolved by ICP-OES	All	NDPs: 0 Tests: 1			X			
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 1	X					
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 1			X			
VOC MS (W)	All	NDPs: 0 Tests: 1						X



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Results Legend		Customer Sample Ref.	GW02			
#	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)					
Component	LOD/Units	Method	AGS Reference			
Coliforms, Total*	CFU/100ml	SUB	549			
Alkalinity, Total as CaCO3	<2 mg/l	TM043	305	#		
BOD, unfiltered	<1 mg/l	TM045	2.04	#		
Oxygen, dissolved	<0.3 mg/l	TM046	6.01			
Organic Carbon, Total	<3 mg/l	TM090	4.66	#		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	0.414	#		
Fluoride	<0.5 mg/l	TM104	1.04	#		
COD, unfiltered	<7 mg/l	TM107	115	#		
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.472	#		
Antimony (diss.filt)	<1 µg/l	TM152	2.1			
Arsenic (diss.filt)	<0.5 µg/l	TM152	1.48	#		
Barium (diss.filt)	<0.2 µg/l	TM152	76.1	#		
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1	#		
Boron (diss.filt)	<10 µg/l	TM152	28.3	#		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	#		
Chromium (diss.filt)	<1 µg/l	TM152	<1	#		
Cobalt (diss.filt)	<0.5 µg/l	TM152	<0.5	#		
Copper (diss.filt)	<0.3 µg/l	TM152	1.23	#		
Lead (diss.filt)	<0.2 µg/l	TM152	11.5	#		
Manganese (diss.filt)	<3 µg/l	TM152	121	#		
Molybdenum (diss.filt)	<3 µg/l	TM152	12.2	#		
Nickel (diss.filt)	<0.4 µg/l	TM152	2.16	#		
Phosphorus (diss.filt)	<10 µg/l	TM152	23.3	#		
Selenium (diss.filt)	<1 µg/l	TM152	<1	#		
Tellurium (diss.filt)	<2 µg/l	TM152	5.87			
Thallium (diss.filt)	<2 µg/l	TM152	<2	#		
Titanium (diss.filt)	<1 µg/l	TM152	1.54	#		
Vanadium (diss.filt)	<1 µg/l	TM152	<1	#		
Zinc (diss.filt)	<1 µg/l	TM152	68.3	#		
Tin (Diss.Filt)	<1 µg/l	TM152	7.15	#		
Silver (diss.filt)	<0.5 µg/l	TM152	<0.5	#		
Sodium (Dis.Filt)	<0.076 mg/l	TM152	14.5	#		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152	15.1	#		



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Results Legend		Customer Sample Ref.	GW02			
#	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 - 0.00			
		Sample Type	Ground Water (GW)			
		Date Sampled	10/10/2018			
		Sample Time	-			
		Date Received	11/10/2018			
		SDG Ref	181011-82			
		Lab Sample No.(s)	18505196			
		AGS Reference				
Component	LOD/Units	Method				
Potassium (Dis.Filt)	<0.2 mg/l	TM152	3.49	#		
Calcium (Dis.Filt)	<0.2 mg/l	TM152	71.2	#		
Iron (Dis.Filt)	<0.019 mg/l	TM152	0.0546	#		
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	181			
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	#		
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184	<0.05	#		
Chloride	<2 mg/l	TM184	15.2	#		
Nitrite as N	<0.0152 mg/l	TM184	<0.0152	#		
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	0.203	#		
Sulphate (soluble) as S	<1 mg/l	TM184	4.4	#		
Cyanide, Total	<0.05 mg/l	TM227	<0.05	#		
Cyanide, Free	<0.05 mg/l	TM227	<0.05	#		
pH	<1 pH Units	TM256	7.27	#		
Silicon (diss.filt)	<0.05 mg/l	TM284	2.61			
Dibutyl tin	<5 ng/l	TM328	<5			
Tributyl tin	<1 ng/l	TM328	<1			
Tetrabutyl tin	<2 ng/l	TM328	<2			
Triphenyl tin	<1 ng/l	TM328	<1			
Surrogate	%	TM328	51.9			
Trifluralin	<0.01 µg/l	TM343	<0.01			
alpha-HCH	<0.01 µg/l	TM343	<0.01			
gamma-HCH (Lindane)	<0.01 µg/l	TM343	<0.01			
Heptachlor	<0.01 µg/l	TM343	<0.01			
Aldrin	<0.01 µg/l	TM343	<0.01			
beta-HCH	<0.01 µg/l	TM343	<0.01			
Isodrin	<0.01 µg/l	TM343	<0.01			
Heptachlor epoxide	<0.01 µg/l	TM343	<0.01			
o,p'-DDE	<0.01 µg/l	TM343	<0.01			
Endosulphan I	<0.01 µg/l	TM343	<0.01			
trans-Chlordane	<0.01 µg/l	TM343	<0.01			
cis-Chlordane	<0.01 µg/l	TM343	<0.01			
p,p'-DDE	<0.01 µg/l	TM343	<0.01			



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Results Legend # 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)		Customer Sample Ref. Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	GW02				
Component	LOD/Units	Method					
Dieldrin	<0.01 µg/l	TM343	<0.01				
o,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01				
Endrin	<0.01 µg/l	TM343	<0.01				
o,p'-DDT	<0.01 µg/l	TM343	<0.01				
p,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01				
Endosulphan II	<0.02 µg/l	TM343	<0.02				
p,p'-DDT	<0.01 µg/l	TM343	<0.01				
p,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01				
Endosulphan Sulphate	<0.02 µg/l	TM343	<0.02				
Permethrin I	<0.01 µg/l	TM343	<0.01				
Permethrin II	<0.01 µg/l	TM343	<0.01				
Dichlorvos	<0.01 µg/l	TM344	<0.01				
Mevinphos	<0.01 µg/l	TM344	<0.01				
Tecnazene	<0.01 µg/l	TM344	<0.01				
Hexachlorobenzene	<0.01 µg/l	TM344	<0.01				
Diazinon	<0.01 µg/l	TM344	0.419				
Triallate	<0.01 µg/l	TM344	<0.01				
Atrazine	<0.01 µg/l	TM344	<0.01				
Simazine	<0.01 µg/l	TM344	<0.01				
Disulfoton	<0.01 µg/l	TM344	<0.01				
Propetamphos	<0.01 µg/l	TM344	<0.01				
Chlorpyrifos-methyl	<0.01 µg/l	TM344	<0.01				
Dimethoate	<0.01 µg/l	TM344	<0.01				
Pirimiphos-methyl	<0.01 µg/l	TM344	<0.01				
Chlorpyrifos	<0.01 µg/l	TM344	<0.01				
Methyl Parathion	<0.01 µg/l	TM344	<0.01				
Malathion	<0.01 µg/l	TM344	<0.01				
Fenthion	<0.01 µg/l	TM344	<0.01				
Fenitrothion	<0.01 µg/l	TM344	<0.01				
Triadimefon	<0.01 µg/l	TM344	<0.01				
Pendimethalin	<0.01 µg/l	TM344	<0.01				
Parathion	<0.01 µg/l	TM344	<0.01				



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Table with columns: Results Legend, Customer Sample Ref., Depth (m), Sample Type, Date Sampled, Sample Time, Date Received, SDG Ref, Lab Sample No.(s), AGS Reference, Component, LOD/Units, Method. Rows include Chlorfenvinphos, Ethion, Carbophenothion, Triazophos, Phosalone, Azinphos methyl, Azinphos ethyl, Quintozene (PCNB), Telodrin, Chlorothalonil, Etrimphos.



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	GW02				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.00 - 0.00				
diss.filt	Dissolved / filtered sample.	Sample Type	Ground Water (GW)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	10/10/2018				
*	Subcontracted test.	Sample Time					
**	% 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	Date Received	11/10/2018				
(F)	Trigger breach confirmed	SDG Ref	181011-82				
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	18505196				
		AGS Reference					
Component	LOD/Units	Method					
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1	#			
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1	#			
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1	#			
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1	#			
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1	#			
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1	#			
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1	#			
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1	#			
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1	#			
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1	#			
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1	#			
2-Chlorophenol (aq)	<1 µg/l	TM176	<1	#			
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1	#			
2-Methylphenol (aq)	<1 µg/l	TM176	<1	#			
2-Nitroaniline (aq)	<1 µg/l	TM176	<1	#			
2-Nitrophenol (aq)	<1 µg/l	TM176	<1	#			
3-Nitroaniline (aq)	<1 µg/l	TM176	<1	#			
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1	#			
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1	#			
4-Chloroaniline (aq)	<1 µg/l	TM176	<1	#			
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1	#			
4-Methylphenol (aq)	<1 µg/l	TM176	<1	#			
4-Nitroaniline (aq)	<1 µg/l	TM176	<1	#			
4-Nitrophenol (aq)	<1 µg/l	TM176	<1	#			
Azobenzene (aq)	<1 µg/l	TM176	<1	#			
Acenaphthylene (aq)	<1 µg/l	TM176	<1	#			
Acenaphthene (aq)	<1 µg/l	TM176	<1	#			
Anthracene (aq)	<1 µg/l	TM176	<1	#			
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1	#			
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1	#			
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2	#			
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1	#			
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<1	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

SVOC MS (W) - Aqueous

Table with columns: Component, LOD/Units, Method, and results for various SVOCs like Benzo(b)fluoranthene, Benzo(k)fluoranthene, etc. Includes a Results Legend and Customer Sample Ref. details.



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	GW02				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Ground Water (GW) 10/10/2018 . 11/10/2018 181011-82 18505196				
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)						
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM208	113				
Toluene-d8**	%	TM208	101				
4-Bromofluorobenzene**	%	TM208	96.6				
Dichlorodifluoromethane	<1 µg/l	TM208	<1	#			
Chloromethane	<1 µg/l	TM208	<1	#			
Vinyl chloride	<1 µg/l	TM208	<1	#			
Bromomethane	<1 µg/l	TM208	<1	#			
Chloroethane	<1 µg/l	TM208	<1	#			
Trichlorofluoromethane	<1 µg/l	TM208	<1	#			
1,1-Dichloroethene	<1 µg/l	TM208	<1	#			
Carbon disulphide	<1 µg/l	TM208	<1	#			
Dichloromethane	<3 µg/l	TM208	<3	#			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	#			
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	#			
1,1-Dichloroethane	<1 µg/l	TM208	<1	#			
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	#			
2,2-Dichloropropane	<1 µg/l	TM208	<1	#			
Bromochloromethane	<1 µg/l	TM208	<1	#			
Chloroform	<1 µg/l	TM208	<1	#			
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	#			
1,1-Dichloropropene	<1 µg/l	TM208	<1	#			
Carbontetrachloride	<1 µg/l	TM208	<1	#			
1,2-Dichloroethane	<1 µg/l	TM208	<1	#			
Benzene	<1 µg/l	TM208	<1	#			
Trichloroethene	<1 µg/l	TM208	<1	#			
1,2-Dichloropropane	<1 µg/l	TM208	<1	#			
Dibromomethane	<1 µg/l	TM208	<1	#			
Bromodichloromethane	<1 µg/l	TM208	<1	#			
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	#			
Toluene	<1 µg/l	TM208	<1	#			
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	#			
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	#			
1,3-Dichloropropane	<1 µg/l	TM208	<1	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	GW02			
#	ISO17025 accredited.	Depth (m) 0.00 - 0.00 Sample Type Ground Water (GW) Date Sampled 10/10/2018 Sample Time - Date Received 11/10/2018 SDG Ref 181011-82 Lab Sample No.(s) 18505196 AGS Reference				
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)					
Component	LOD/Units		Method			
Tetrachloroethene	<1 µg/l	TM208	<1	#		
Dibromochloromethane	<1 µg/l	TM208	<1	#		
1,2-Dibromoethane	<1 µg/l	TM208	<1	#		
Chlorobenzene	<1 µg/l	TM208	<1	#		
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1	#		
Ethylbenzene	<1 µg/l	TM208	<1	#		
m,p-Xylene	<1 µg/l	TM208	<1	#		
o-Xylene	<1 µg/l	TM208	<1	#		
Styrene	<1 µg/l	TM208	<1	#		
Bromoform	<1 µg/l	TM208	<1	#		
Isopropylbenzene	<1 µg/l	TM208	<1	#		
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	#		
1,2,3-Trichloropropane	<1 µg/l	TM208	<1	#		
Bromobenzene	<1 µg/l	TM208	<1	#		
Propylbenzene	<1 µg/l	TM208	<1	#		
2-Chlorotoluene	<1 µg/l	TM208	<1	#		
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1	#		
4-Chlorotoluene	<1 µg/l	TM208	<1	#		
tert-Butylbenzene	<1 µg/l	TM208	<1	#		
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1	#		
sec-Butylbenzene	<1 µg/l	TM208	<1	#		
4-iso-Propyltoluene	<1 µg/l	TM208	<1	#		
1,3-Dichlorobenzene	<1 µg/l	TM208	<1	#		
1,4-Dichlorobenzene	<1 µg/l	TM208	<1	#		
n-Butylbenzene	<1 µg/l	TM208	<1	#		
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	#		
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	#		
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1	#		
Hexachlorobutadiene	<1 µg/l	TM208	<1	#		
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1	#		
Naphthalene	<1 µg/l	TM208	<1	#		
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1	#		



CERTIFICATE OF ANALYSIS

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	GW02				
#	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)						
Component	LOD/Units	Method					
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1				



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
SUB		Subcontracted Test
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM046	Method 4500G, AWWA/APHA, 20th Ed., 1999	Measurement of Dissolved Oxygen by Oxygen Meter
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM284		
TM328		
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM345	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite III) by GCMS

NA = not applicable.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 181011-82
Location: Killycard

Client Reference: P1724
Order Number: Z1260

Report Number: 477251
Superseded Report:

Test Completion Dates

Lab Sample No(s)	18505196
Customer Sample Ref.	GW02
AGS Ref.	
Depth	0.00 - 0.00
Type	Ground Water

Alkalinity as CaCO3	15-Oct-2018
Ammoniacal Nitrogen	17-Oct-2018
Anions by Kone (w)	16-Oct-2018
BOD True Total	16-Oct-2018
COD Unfiltered	12-Oct-2018
Coliforms (W)	12-Oct-2018
Conductivity (at 20 deg.C)	12-Oct-2018
Cyanide Comp/Free/Total/Thiocyanate	15-Oct-2018
Dissolved Metals by ICP-MS	17-Oct-2018
Dissolved Oxygen by Probe	12-Oct-2018
Fluoride	17-Oct-2018
Mercury Dissolved	17-Oct-2018
Mineral Oil C10-40 Aqueous (W)	17-Oct-2018
Nitrite by Kone (w)	16-Oct-2018
Organotins in Aqueous Samples	16-Oct-2018
Pesticides (Suite I) by GCMS	17-Oct-2018
Pesticides (Suite II) by GCMS	17-Oct-2018
Pesticides (Suite III) by GCMS	17-Oct-2018
pH Value	12-Oct-2018
Phosphate by Kone (w)	15-Oct-2018
Silicon Dissolved by ICP-OES	16-Oct-2018
SVOC MS (W) - Aqueous	15-Oct-2018
Total Organic and Inorganic Carbon	13-Oct-2018
VOC MS (W)	15-Oct-2018

Customer

Customer Services
ALS Life Sciences
Hawarden Business Park
Manor Lane
Hawarden, Deeside
UK
CH5 3US

Certificate Of Analysis

Job Number: 18-48075
Issue Number: 1
Report Date: 12 October 2018

Site: Killycard
PO Number: Not Supplied
Date Samples Received: 11/10/2018

Please find attached the results for the samples received at our laboratory on 11/10/2018.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our website at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

Authorised By:



Shane Reynolds
Laboratory Manager

Authorised Date: 12 October 2018

Notes:

Results relate only to the items tested.
Information on methods of analysis and performance characteristics is available on request.
Any opinions or interpretations indicated are outside the scope of our INAB accreditation.
This test report shall not be reproduced except in full or with written approval of City Analysts Limited.

Certificate Of Analysis

Customer

Customer Services
ALS Life Sciences
Hawarden Business Park
Manor Lane
Hawarden, Deeside
UK
CH5 3US

Report Reference: 18-48075

Report Version: 1

Site: Killycard

Sample Description: GW02

Date of Sampling: 10/10/2018

Sample Type: Ground

Date Sample Received: 11/10/2018

Lab Reference Number: 414589

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	11/10/2018	Coliforms	549.3	MPN/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count

Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon



CERTIFICATE OF ANALYSIS

SDG: 181011-82	Client Reference: P1724	Report Number: 477251
Location: Killycard	Order Number: Z1260	Superseded Report:

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 ISO17025. 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%. 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 leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

21. 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.

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 (BTEX). 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

If a sample is classed as deviated then the associated results may be compromised.

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.

Appendix IV

SITE WALKOVER CHECKLIST AND PHOTOGRAPHIC LOG



Killycard Walkover Survey Checklist – 12th June 2018

Information	Checked	Comment (include distances from site boundary)
1. What is the current land use?		The majority of the site is vegetated and used for agriculture. Derelict mushroom buildings and industrial units are also present to the east of the site.
2. What are the neighbouring land uses?		Primarily agricultural with some residential buildings to the southwest of the site.
3. What is the size of the site?		The site occupies approximately 2 Hectares
4. What is the topography?		The site is relatively flat throughout.
5. Are there potential receptors (if yes, give details)?		Yes, leachate to west of site
Houses		Yes
Surface water features (if yes, distance and direction of flow)		Corrinshigo lake borders the site to the west. Surface water ditches border the site to the southwest and north.
Any wetland or protected areas		No
Public water supplies		No
Private wells		Not evident
Services		Overhead wires along the southeast of the site connecting to industrial units.
Other buildings		Derelict mushroom buildings onsite. Farm buildings to east and south of the site. Residential buildings within 100m to the southwest of the site.
Other		No
6. Are there any potential sources of contamination (if yes, give details)?		Yes – Waste from former landfill
Surface waste (if yes, what type?)		Waste found protruding through soil cover throughout the site. Generally residual inert domestic and C&D waste.
Surface ponding of leachate		No
Leachate seepage		No
Landfill gas odours		No
7. Are there any outfalls to surface water? (If yes, are there discharges and what is the nature of discharge?)		Yes, lake to west of site/ Receptors north and SW of site

Information	Checked	Comment (include distances from site boundary)
8. Are there any signs of impact on the environment? (If yes, take photographic evidence)		Yes, waste depositing into lake
Vegetation die off, bare ground		No
Leachate seepages		No
Odours		No
Litter		Yes, waste found protruding through soil cover throughout the site.
Gas bubbling through water		No
Signs of settlement		No
Subsidence, water logged areas		No
Drainage or hydraulic issues		No
Downstream water quality appears poorer than upstream water quality		No
9. Are there any indications of remedial measures? (Provide details)		No
Capping		No
Landfill gas collection		No
Leachate collection		No
10. Describe fences and security features (if any)		Fencing and walls around buildings, ditches around most of site, wall along the road
Any other relevant information?		

PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.

Date:

1

12/06/18

Description:

Site entrance to
industrial units



Photo No.

Date:

2

12/06/18

Description:

Grassed areas near
industrial units carpark



PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.
3

Date:
12/06/18

Description:

Old gas well near
industrial unit
carpark



Photo No.
4

Date:
12/06/18

Description:

Site entrance to
derelict mushroom
buildings



PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.
5

Date:
12/06/18

Description:

Area in front of
derelict mushroom
buildings



Photo No.
6

Date:
12/06/18

Description:

Site entrance to
vegetated field



PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.
7

Date:
12/06/18

Description:

Southern section of
vegetated field



Photo No.
8

Date:
12/06/18

Description:

Area west of industrial
units, north of derelict
mushroom buildings



PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.
9

Date:
12/06/18

Description:

Northern section of
site, looking
westwards



Photo No.
10

Date:
12/06/18

Description:

Waste material protruding
from northern boundary
adjacent to surface water
ditch



PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.

Date:
12/06/18

11

Description:

Exposed waste material at western boundary of Corrinshigo lake



Photo No.

Date:

12

12/06/18

Description:

Exposed waste material and Japanese Knotweed at western boundary of Corrinshigo lake



PHOTOGRAPHIC LOG

Consultants in Engineering
and Environmental Sciences

www.fehilytimoney.ie



Client Name:
Monaghan Co. Council

Site Location: Killycard

Project Number: P1655

Photo No.

Date:

13

12/06/18

Description:

Waste material
protruding from soil
surface



Photo No.

Date:

14

12/06/18

Description:

Waste material
protruding from soil
surface

