Technical Appendix 9.8: Laboratory Certificates



Minerex Environmental Taney hall Eglinton Terrace Dundrum Dublin Dublin 14

Attention: Sven Klinkenbergh

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 of report Generation: Customer: Sample Delivery Group (SDG): Your Reference: Location: Report No: 20 May 2019 D_MINEREX_DUB 190511-74 3006-028 (COC1) Barnesmore WF RP, Co. Donegal 506327

We received 1 sample on Saturday May 11, 2019 and 1 of these samples were scheduled for analysis which was completed on Monday May 20, 2019. 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).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results. The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

<u>Sonia McWhan</u> Operations Manager



3006-028 (COC1)

506327

Validated

Received Sample Overview

Client Reference:

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
19942644	3006 SW1			09/05/2019
Maximum Sample/Coolbo	x Temperature (°C) :	6.6		

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.

190511-74

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.

Report Number: Superseded Report:

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

Barnesmore WF RP, Co. DorOrder Number:

Validated

SDG: Location:	190511-74 Barnesmore V	WF RP, Co. D	Clie OrOrd	nt Ref er Nur	feren mber	ce: :	3006	3-028 (COC1)	Report Nur Superseded	nber: Report:	506327
Results Legend X Test N Determination	Lab Sample	No(s)					19942644				
Sample Types -	Custom Sample Refe	er erence					3006 SW1				
S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate	AGS Refer	ence									
PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage	Depth (r	n)									
RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Contain	er	0.5I glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)				
	Sample T	уре	SW	SM	WS	SM	WS				
Ammonium Low	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							
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1		×							
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1		^		v					
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1				^					
Kjeldahl Nitrogen on liquids	All	NDPs: 0 Tests: 1	•								
Nitrite by Kone (w)	All	NDPs: 0 Tests: 1		X							
pH Value	All	NDPs: 0 Tests: 1					X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 1		X							
Suspended Solids	All	NDPs: 0 Tests: 1		x							
Total Metals by ICP-MS	All	NDPs: 0	-	X							
Total Nitrogen	All	NDPs: 0		X							
		Tests: 1		x							
IPH by IR Uils and Greases	All	NDPs: 0 Tests: 1	x								
Turbidity in waters	All	NDPs: 0 Tests: 1									



Location:

190511-74

CERTIFICATE OF ANALYSIS

3006-028 (COC1)

Client Reference:

Barnesmore WF RP, Co. DorOrder Number:

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Report Number: Superseded Report:

Control interaction Control interaction South Hand R (S) (South Hand Hand Hand Hand Hand Hand Hand Hand
Longent extension Lob Base Note of the State Note of Lob Note Note Note Note Note Note Note Note
Component Control Contro Control Control <
BOD, unfiltered <1 mgl TM045 <1 Image Image Image Image Carbon, Organic (diss.fift) <3 mgl
Carton, Organic (diss. fill) <i><i><i><i><i><i><i><i><i><i><i><i><i></i></i></i></i></i></i></i></i></i></i></i></i></i>
Ammoniacal Nitogen as N (low < 0.01 mg TM109 0.0443 $< < < < < < < < < < < < < < < < < < < $
Image: second
Copper (lot unfil) $<1 \mu gl$ TM 152 $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $<1 \\ 2$ $ 1 \\ 2$ 1 \\ 2 1 \\ 2
Copper (diss.filt) $-0.3 \mu gl$ TM152 $-20 \mu gl$ TM153 TM154 $-20 \mu gl$ TM154 <
Phosphorus (tot.unfil) $< 20 \ \mu gl$ TM152 $< 20 \ _{2}$ Image: constraint of the second sec
Phosphorus (diss.filt)< 10 µg/lTM152< 10Zinc (tot.unfilt)<5 µg/l
Zinc (tot.unfilt) $<5 \ \mu g/l$ TM 152 $5.68 \ 2$ 2 Image: Constraint of the second seco
Zinc (diss.fill) $< 1 \mu g/l$ TM152 1.74 Image: Constraint of the second seco
Hardness, Total as CaCO3 unfiltered<0.35 mg/lTM1527.69 2 </td
Initiation of the series NO2 <
Phosphate (Ortho as P) <0.02 mg/l TM184 <0.02 Image: Control of the second seco
Nitrate as NO3<0.3 mg/lTM184<0.3Image: second se
Total Oxidised Nitrogen as N<0.1 mg/lTM184<0.1Image: Section of the sectio
Turbidity<0.1 ntuTM1951 1 1Image: Constraint of the second se
Nitrogen, Kjeldahl<1 mg/lTM212<1Image: Constraint of the state of the
Nitrogen, Total <1 mg/l TM212 <1 Image: Constraint of the state of the
TPH / Oil & Greases <1 mg/l TM235 <1 Image: Constraint of the state of
pH <1 pH Units TM256 6.33



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506327

Client Reference: 3006-028 (COC1) Barnesmore WF RP, Co. DoiOrder Number:

Report Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
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
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
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
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM195	Colour and Turbidity of water. Methods for the Examination of Waters and Associated Materials. HMSO, 1981, ISBN 0 11 751955 3.	Determination of Turbidity in Waters & Associated Matrices
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
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

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).

Client Reference: 3006-028 (COC1) Barnesmore WF RP, Co. DoiOrder Number:

Report Number: Superseded Report:

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Lab Sample No(s)	19942644
Customer Sample Ref.	3006 SW1
AGS Ref.	
Depth	
Туре	Surface Water
Ammonium Low	17-May-2019
Anions by Kone (w)	14-May-2019
BOD True Total	17-May-2019
Conductivity (at 20 deg.C)	13-May-2019
Dissolved Metals by ICP-MS	17-May-2019
Dissolved Organic/Inorganic Carbon	14-May-2019
Kjeldahl Nitrogen on liquids	14-May-2019
Nitrite by Kone (w)	13-May-2019
pH Value	16-May-2019
Phosphate by Kone (w)	13-May-2019
Suspended Solids	14-May-2019
Total Metals by ICP-MS	17-May-2019
Total Nitrogen	14-May-2019
TPH by IR Oils and Greases	20-May-2019
Turbidity in waters	13-May-2019

190511-74

Test Completion Dates



190511-74 Client Reference: Barnesmore WF RP. Co. Donega Order Number:

3006-028 (COC1)

Report Number: Superseded Report: 506327

Appendix

General

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, 25 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 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).

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.

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except 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, clav 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
§	Sampled on date not provided
•	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

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).

Asbe stos Type	Common Name			
Chrysofile	WhiteAsbestbs			
Amosite	Brow n Asbestos			
Cro a dolite	Blue Asbe stos			
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.



Minerex Environmental Taney hall Eglinton Terrace Dundrum Dublin Dublin 14

Attention: Sven Klinkenbergh

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 of report Generation: Customer: Sample Delivery Group (SDG): Your Reference: Location: Report No: 15 July 2019 Minerex Environmental 190706-72 3006-28 (COC4) Barnesmore WF RP, Co. Donegal 514293

We received 2 samples on Saturday July 06, 2019 and 2 of these samples were scheduled for analysis which was completed on Monday July 15, 2019. 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).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results. The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

<u>Sonia McWhan</u> Operations Manager



ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291. Version: 2.3 Version Issued: 15/07/2019



3006-28 (COC4)

Report Number: 514293

Superseded Report:

Validated

Received Sample Overview

Client Reference:

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20286456	3006-SW-2-COC4			04/07/2019
20286457	3006-SW-3-COC4			04/07/2019

Maximum Sample/Coolbox Temperature (°C) : ISO5667-3 Water quality - Sampling - Part3 -

11.6

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.

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of $(5\pm3)^\circ$ C.

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

Barnesmore WF RP, Co. DorOrder Number:

190706-72

	SDG:	190706-72 Barnesmore W	ERP Co D		nt Ref	eren	ce:	3006	6-28 (COC4	4)		Re Sui	port Number:	514293	
	Location.		1 H., 00. E			inder							- u			
X Test N No Determination		Lab Sample No(s)			20286457 20286456								20286457			
Sample Types -	3	Custome Sample Refe	er rence					3006-SW-2-COC4					3006-SW-3-COC4			
S - Soil/Solid UNS - Unspecified S GW - Ground Water SW - Surface Water LE - Land Leachate	Solid	AGS Refere	ence													
PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewag US - Untreated Sewag	e age	Depth (n	1)													
RE - Recreational W DW - Drinking Water N UNL - Unspecified Li SL - Sludge G - Gas OTH - Other	/ater lon-regulatory iquid	Containe	er	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)			
		Sample Ty	ре	SW	WS	WS	WS	ws	WS	WS	WS	WS	ws			
Ammonium Low		All	NDPs: 0 Tests: 2			x					x					
Anions by Kone (w)		All	NDPs: 0 Tests: 2		x					x						
BOD True Total		All	NDPs: 0 Tests: 2		x					x						
Conductivity (at 20 deg.C))	All	NDPs: 0 Tests: 2		x					x						
Dissolved Metals by ICP-I	MS	All	NDPs: 0 Tests: 2		x					x						
Dissolved Organic/Inorgan	nic Carbon	All	NDPs: 0 Tests: 2	x					x							
Kjeldahl Nitrogen on liquic	ds	All	NDPs: 0 Tests: 2		x					x						
Nitrite by Kone (w)		All	NDPs: 0 Tests: 2					x					x			
Phosphata by Kana (w)		All	NDPs: 0 Tests: 2		x					x						
Suspended Solids			NDPs: 0 Tests: 2		x					x						
Total Metals by ICP-MS			NDPs: 0 Tests: 2		x					x						
Total Nitrogen			NDPS: 0 Tests: 2				x					x				
TPH by IR Oils and Greas	ses	All	Tests: 2		x					x						
Turbidity in waters		All	Tests: 2	x					x							
			Tests: 2		x					x						



Location:

190706-72

CERTIFICATE OF ANALYSIS

3006-28 (COC4)

Client Reference:

Barnesmore WF RP, Co. DorOrder Number:

Validated

514293

Report Number: Superseded Report:

Results Legend # ISO17025 accredited. M mCERTS accredited.		Customer Sample Ref.	3006-SW-2-COC4	3006-SW-3-COC4				
aq Aqueous / settled sample.		Denth (m)						
tot.unfilt Total / unfiltered sample.		Deptn (m) Sample Tyrco	Surface Water (SM)	Surface Mater (CM)				
* Subcontracted - refer to subcontractor report f	for	Date Sampled	04/07/2019	04/07/2019				
accreditation status.	the	Sample Time	00.00.00	04/01/2013				
efficiency of the method. The results of individ	lual	Date Received	06/07/2019	06/07/2019				
compounds within samples aren't corrected for	or the	SDG Ref	190706-72	190706-72				
(F) Trigger breach confirmed		Lab Sample No.(s)	20286456	20286457				
1-3+§@ Sample deviation (see appendix)		AGS Reference						
Component	LOD/Units	Method						
Suspended solids, Total	<2 ma/l	TM022	<2	<2				
,	5		#		#			
			#		#			
BOD, unfiltered	<1 mg/l	TM045	<1	<1				
			#		#			
Carbon Organic (diss filt)	<3 mg/l	TM000	8 17	8 57				
Carbon, Organic (diss.int)	<5 mg/i	110090	0.17	0.07				
Ammoniacal Nitrogen as N (low	<0.01 mg/l	TM099	0.0293	0.0365				
level)	Ŭ		#		#			
			π		π			
Conductivity @ 20 deg.C	<0.005	TM120	0.0484	0.0506				
	mS/cm		#		#			
Copper (tot unfilt)	<1.ug/l	TM152	<1	<1				
	• ' µg/'	TWITUE	•1	1	ц			
			#		#	L	 	
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3	<0.3				
			2 #		2#			
Dhaanharua (tat unfilt)	<00 ···-*	TM450		-00				
Phosphorus (tot.unfilt)	<20 µg/l	11/152	<20	<20				
			#		#			
Phosphorus (diss filt)	<10 un/l	TM152	<10	<10				
	- 10 µg/l	1111102	-10	-10	<u></u> γμ			
			2#		∠#	L	 	
Zinc (tot.unfilt)	<5 µg/l	TM152	<5	<5				
			#		#			
7 :	44	TN4450	4.05	4.50				
ZINC (diss.filt)	<1 µg/i	TM152	1.65	4.53				
			2 #		2#			
Hardness Total as CaCO3	<0.35 ma/l	TM152	10.6	9 76				
unfiltorod	0.00 mg/		1010	0.10				
unintered							 	
Nitrite as NO2	<0.05 mg/l	TM184	< 0.05	< 0.05				
	, , , , , , , , , , , , , , , , , , ,		#		#			
	.0.00 //	T1404	.0.00	-0.00				
Phosphate (Ortho as P)	<0.02 mg/l	TM184	<0.02	<0.02				
			#		#			
Nitrate as NO3	<0.3 mg/l	TM184	<0.3	<0.3				
	40.0 mg/i	TWITCH	-0.0	40.0				
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1	<0.1				
			#		#			
Truck (alla)	10.4 mbs	TN4405	4.00	0.00				
Turbially	<0.1 mu	11/11/90	1.29	2.00				
			♦ #		♦ #			
Nitrogen Kieldahl	<1 ma/l	TM212	<1	<1				
i ili ogoli, i goldali								
Nitrogen, Total	<1 mg/l	TM212	<1	<1				
			#		#			
TDH / Oil & Grosson	<1 mg/l	TM235	-1	<1	_			
IFIT OIL & Gleases	<r mg="" r<="" td=""><td>11/12.55</td><td>N</td><td></td><td></td><td></td><td></td><td></td></r>	11/12.55	N					
			#		#			
pН	<1 pH Units	s TM256	6.92	7.16				
·			#		#			
		+ +	π		π			
		+ +						
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190706-72

3006-28 (COC4)

514293

Client Reference: Barnesmore WF RP, Co. DoiOrder Number:

Report Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
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
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
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
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM195	Colour and Turbidity of water. Methods for the Examination of Waters and Associated Materials. HMSO, 1981, ISBN 0 11 751955 3.	Determination of Turbidity in Waters & Associated Matrices
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
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

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).



Client Reference: 3006-28 (COC4) Barnesmore WF RP, Co. DoiOrder Number:

Report Number: Superseded Report:

514293

Test Completion Dates

Lab Sample No(s)	20286456	20286457
Customer Sample Ref.	3006-SW-2-COC4	3006-SW-3-COC4
AGS Ref.		
Depth		
Туре	Surface Water	Surface Water
Ammonium Low	15-Jul-2019	15-Jul-2019
Anions by Kone (w)	10-Jul-2019	10-Jul-2019
BOD True Total	11-Jul-2019	11-Jul-2019
Conductivity (at 20 deg.C)	11-Jul-2019	12-Jul-2019
Dissolved Metals by ICP-MS	12-Jul-2019	12-Jul-2019
Dissolved Organic/Inorganic Carbon	08-Jul-2019	08-Jul-2019
Kjeldahl Nitrogen on liquids	11-Jul-2019	10-Jul-2019
Nitrite by Kone (w)	08-Jul-2019	08-Jul-2019
pH Value	10-Jul-2019	10-Jul-2019
Phosphate by Kone (w)	09-Jul-2019	09-Jul-2019
Suspended Solids	10-Jul-2019	10-Jul-2019
Total Metals by ICP-MS	12-Jul-2019	12-Jul-2019
Total Nitrogen	09-Jul-2019	09-Jul-2019
TPH by IR Oils and Greases	10-Jul-2019	10-Jul-2019
Turbidity in waters	08-Jul-2019	08-Jul-2019

190706-72



190706-72 Barnesmore WF RP, Co. Donega Order Number: 3006-28 (COC4)

Report Number: Superseded Report: 514293

Appendix

General

Client Reference:

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. 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.

3. 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.

4. 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

5. 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

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

7. Results relate only to the items tested

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

9. 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 clav 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

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

11. 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.

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

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

14. 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.

15. 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.

16. 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.

17. 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.

18. 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
\$	Sampled on date not provided
•	Sample holding time exceeded in laboratory
9	Sample holding time exceeded due to late arrival of instructions or
@	samples

19 Ashestos

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

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).

Asbe stos Type	Common Name
Chrysolile	White Asbestos
Amosite	Brow n Asbestos
Cro ci dolite	Blue Asbe stos
Fibrous Actinolite	-
Fib to us Anthop hyll ite	-
Fibrous Tremol ite	-

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.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, The Quantification of Asbestos in Soil (2107).

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.



Minerex Environmental Taney hall Eglinton Terrace Dundrum Dublin Dublin 14

Attention: Sven Klinkenbergh

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 of report Generation: Customer: Sample Delivery Group (SDG): Your Reference: Location: Report No: 06 August 2019 Minerex Environmental 190729-40 3006-028-(COC5) Barnesmore WF RP, co. Donegal 516924

This report has been revised and directly supersedes 516923 in its entirety.

We received 1 sample on Saturday July 27, 2019 and 1 of these samples were scheduled for analysis which was completed on Tuesday August 06, 2019. 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).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results. The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

<u>Sonia McWhan</u> Operations Manager



ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291. Version: 2.3 Version Issued: 06/08/2019



3006-028-(COC5)

Validated

516924

516923

Received Sample Overview

Client Reference:

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20420455	3006 SW4			25/07/2019
Maximum Sample/Coolbo	x Tomporature (°C) :	19.6		

Maximum Sample/Coolbox Temperature (°C) : ISO5667-3 Water quality - Sampling - Part3 - **18.6**

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.

Report Number: Superseded Report:

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

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

Barnesmore WF RP, co. DonOrder Number:

190729-40



Validated

SDG: Location:	190729-40 Barnesmore WI	F RP, co. Do	Clie: DrOrde	nt Refe er Num	erenc nber:	:e:	3006-028-(COC5)	Report Number: Superseded Report:	516924 516923
Results Legend									
X Test No Determination Possible	Lab Sample N	No(s)				20420455			
Sample Types -	Custome Sample Refer	r ence				3006 SW4			
UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate	AGS Refere	nce							
PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage	Depth (m)							
RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Containe	r	0.5I glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)			
	Sample Ty	ре	WS	WS	SM	WS			
Ammonium Low	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					
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1		x					
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1		x					
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1	x						
Kjeldahl Nitrogen on liquids	All	NDPs: 0 Tests: 1		x					
Nitrite by Kone (w)		NDPs: 0 Tests: 1				x			
Phosphate by Kone (w)		NDPs: 0 Tests: 1		x					
Sussended Solids		Tests: 1		x					
Total Metals by ICP-MS	All	Tests: 1		x					
Total Nitrogen	All	Tests: 1		x					
TPH by IR Oils and Greases	All	Tests: 1		x					
Turbiditu in watere		Tests: 1	x						
rubuity In Waters	<i>P</i> ui	NDPs: 0 Tests: 1		x					



CERTIFICATE OF ANALYSIS

Location Description Description <thdescription< th=""> <thdescription< th=""> <t< th=""><th>SDG:</th><th>1</th><th>90729-40</th><th>C</th><th>lient Reference:</th><th>3006-028-(COC5)</th><th>Report Numb</th><th>er: 516924</th><th></th></t<></thdescription<></thdescription<>	SDG:	1	90729-40	C	lient Reference:	3006-028-(COC5)	Report Numb	er: 516924	
Automation Content server for any server		n: E	sarnesmore v	VF RP, co. Don u	rder Number:		Superseded Re	port: 516923	
Notestimication Notestimic	Results Legend	C	ustomer Sample Ref.	3006 SW4					
Image: State of the	# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample.		Death (a)	3000 3114					
a series of the series of	diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor	report for	Sample Type	Surface Water (SW)					
Bit was the set of a set	accreditation status. ** % recovery of the surrogate standard t	o check the	Date Sampled Sample Time	25/07/2019					
In Instruction of the second se	compounds within samples aren't correction of the results of recovery	ected for the	Date Received SDG Ref	27/07/2019 190729-40					
Compared Despined solids TotalChooline wethodMethodOrdMethod<	(F) Trigger breach confirmed 1-3+§@ Sample deviation (see appendix)		Lab Sample No.(s) AGS Reference	20420455					
Corport (denomination running)CarlogTrace \mathbf{r}	Component Suspended solids, Total	LOD/Units	Method TM022	<2					
BOD, unfiltered 1 end TM049 2.05 1 1 1 1 1 Carbon, Organe (sis: filt) 3 end TM089 0.0188 1	Suspended solids, rola	≺z mgn	TWOZZ	~2	#				
Carbon Organ (des fit) -4 mail MM00 6.2.5 Interms of the second s	BOD, unfiltered	<1 mg/l	TM045	2.05	♦ #				
Ammonal Nirogen as N(now < 0.0109 10.009 0.0168 $=$	Carbon, Organic (diss.filt)	<3 mg/l	TM090	6.25					
Conductivity @ 20 deg C $\frac{0}{mSCm}$ Th120 0.0409 θ Image: mSCm mSCm mSCm mSCm mSCm mSCm mSCm mSC	Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.0168	#				
Copper (lotuntil) 1 µµ TM 152 < 1 2 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 <td>Conductivity @ 20 deg.C</td> <td><0.005 mS/cm</td> <td>TM120</td> <td>0.0409</td> <td>#</td> <td></td> <td></td> <td></td> <td></td>	Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.0409	#				
Coper (diss.fit) $<0.3 \ \mu g/l$ TM152 $<0.3 \ 2 \ 2 \ 2 \ 2 \ 2 \ 2 \ 2 \ 2 \ 2 \ $	Copper (tot.unfilt)	<1 µg/l	TM152	<1	2#				
Phosphorus (otunfilt) $20 \mu \mu$ TM152 $20 \mu \mu$ TM152 $20 \mu \mu$ TM152 $20 \mu \mu$ TM152 21μ TM152 22μ TM152 21μ TM154 40μ TM154	Copper (diss.filt)	<0.3 µg/l	TM152	<0.3	2#				
Phosphorus (diss fill)<10 µdTM152<10 2 μ <10 2 μ <110 2 μ </td <td>Phosphorus (tot.unfilt)</td> <td><20 µg/l</td> <td>TM152</td> <td><20</td> <td>2 #</td> <td></td> <td></td> <td></td> <td></td>	Phosphorus (tot.unfilt)	<20 µg/l	TM152	<20	2 #				
Zinc (tot.unfil) $< < < < < < < < < < < < < < < < < < < $	Phosphorus (diss.filt)	<10 µg/l	TM152	<10	2#				
Zinc (diss.fill) <1 µg/l TM152 2.41 $2#$ Hardness, Total as CaCO3 <0.35 mg/l	Zinc (tot.unfilt)	<5 µg/l	TM152	6.82	2#				
Indexes unfiltered (-1) (-2)	Zinc (diss.filt)	<1 µg/l	TM152	2.41	2#				
unified Nifite as NO2 $< 0.05 \text{ mgl}$ TM184 $< 0.05 \text{ mgl}$ $< 0.02 \text{ mgl}$ < 0.0	Hardness, Total as CaCO3	<0.35 mg/l	TM152	9.2	2#				
Phosphate (Ortho as P) -0.02 mg/l TM184 -0.02 mg/l TM184 -0.02 mg/l Image: Control of the control of th	Nitrite as NO2	<0.05 mg/l	TM184	<0.05	2				
Nitrate as NO3 $< 0.3 \text{mg/l}$ TM184 $< 0.3 \text{mg/l}$ TM184 $< 0.3 \text{mg/l}$ Image: the second	Phosphate (Ortho as P)	<0.02 mg/l	TM184	<0.02	#				
Total Oxidised Nitrogen as N<0.1 mg/lTM184<0.1 mg/lImage: Constraint of the second	Nitrate as NO3	<0.3 mg/l	TM184	<0.3	#				
Turbidity < 0.1 htuTM195 $1.11_{\bullet #}$ < 0.1 htuTM195 $1.11_{\bullet #}$ < 0.1 htu	Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1	#				
Nirogen, Kjeldahl $<1 mg/l$ TM212 $<1 mg/l$ TM212 $<1 mg/l$ $<1 mg/l$ TM212 $<1 mg/l$	Turbidity	<0.1 ntu	TM195	1.11	# • #				
Nitrogen, Total<1 mg/lTM212<1 mg/l<1 mg/lTM212<1 mg/l<1 mg/l <td>Nitrogen, Kjeldahl</td> <td><1 mg/l</td> <td>TM212</td> <td><1</td> <td>• #</td> <td></td> <td></td> <td></td> <td></td>	Nitrogen, Kjeldahl	<1 mg/l	TM212	<1	• #				
TPH / Oil & Greases<1 mg/lTM235<1 mg/l $(1 mg/l)$ TM235<1 mg/l $(1 mg/l)$ $(1 mg$	Nitrogen, Total	<1 mg/l	TM212	<1	#				
pH <1 pH Units TM256 7.21 # <th< th=""> <th< t<="" td=""><td>TPH / Oil & Greases</td><td><1 mg/l</td><td>TM235</td><td><1</td><td>#</td><td></td><td></td><td></td><td></td></th<></th<>	TPH / Oil & Greases	<1 mg/l	TM235	<1	#				
Image: state	рН	<1 pH Units	TM256	7.21	#				



190729-40

Validated

516924 516923

Report Number: Superseded Report:

Client Reference: Barnesmore WF RP, co. DonOrder Number:

Table of Results - Appendix

3006-028-(COC5)

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
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
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
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
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM195	Colour and Turbidity of water. Methods for the Examination of Waters and Associated Materials. HMSO, 1981, ISBN 0 11 751955 3.	Determination of Turbidity in Waters & Associated Matrices
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
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

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).

Barnesmore WF RP, co. DonOrder Number:

Report Number: Superseded Report: ____

Validated

516924 516923

Lab Sample No(s)	20420455
Customer Sample Ref.	3006 SW4
AGS Ref.	
Depth	
Туре	Surface Water
Ammonium Low	02-Aug-2019
Anions by Kone (w)	03-Aug-2019
3OD True Total	04-Aug-2019
Conductivity (at 20 deg.C)	31-Jul-2019
Dissolved Metals by ICP-MS	05-Aug-2019
Dissolved Organic/Inorganic Carbon	02-Aug-2019
Kjeldahl Nitrogen on liquids	03-Aug-2019
Vitrite by Kone (w)	01-Aug-2019
oH Value	02-Aug-2019
Phosphate by Kone (w)	31-Jul-2019
Suspended Solids	01-Aug-2019
Fotal Metals by ICP-MS	06-Aug-2019
Fotal Nitrogen	01-Aug-2019
FPH by IR Oils and Greases	02-Aug-2019
Furbidity in waters	31-Jul-2019

Test Completion Dates



190729-40 Client Reference: 3arnesmore WF RP. co. Donegal Order Number: 3006-028-(COC5)

Report Number: Superseded Report: 516924 516923

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. 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.

3. 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.

4. 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.

5. 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.

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

7. Results relate only to the items tested.

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

9. 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.

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

11. 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.

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

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

14. 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.

15. 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.

16. 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.

17. 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.

18. 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
§	Sampled on date not provided
•	Sample holding time exceeded in laboratory
9	Sample holding time exceeded due to late arrival of instructions or
@	samples

19. Asbestos

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

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).

Asbe stos Type	Common Name
Chrysolile	White Asbestos
Amosite	Brow n Asbestos
Cro ci dolite	Blue Asbe stos
Fibrous Actinolite	-
Fib to us Anthop hyll ite	-
Fibrous Tremol ite	-

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.

Respirable Fibres

Respirable fibres are defined as fibres of <3 μ m diameter, longer than 5 μ m and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, The Quantification of Asbestos in Soil (2107).

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.